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ABSTRACT

Massively Multiplayer Online Role-Playing Games
As Constructivist Learning Environments in K-12 Education:
A Delphi Study

by

Mark Douglas Wagner

M.A., National University, 2000
B.A., California Polytechnic State University at San Luis Obispo, 1998

Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy
in
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ABSTRACT

Despite a wide variety of research about videogames and learning, few studies have focused on the potential uses of massively multiplayer online role-playing games (MMORPGs) in formal K-12 education. This study investigated the potential benefits and problems of using MMORPGs as constructivist learning environments. Two pillars of study supported this effort: constructivist learning theory and digital game-based learning theory. The study employed a social constructivist paradigm of qualitative research and the Delphi method of inquiry. Three qualitative survey rounds and one quantitative final consensus check were conducted. The Delphi panel consisted of 12 experts, including academic researchers, educators experienced using videogames with students, and professional game developers. A content analysis of the data revealed a high degree of consensus among the panelists around several important potential benefits, including the predictions that MMORPGs may help students develop difficult to teach 21st Century skills and may be used to support student reflection. In addition, the panel predicted many significant challenges related to implementing the games, particularly with respect to infrastructure and logistics. It is recommended that educators begin by repurposing commercial off the shelf MMORPGs, and that developers begin designing explicitly educational MMORPGs. Social change implications of this study may include helping students learn about other cultures, changing students' attitudes, facilitating a greater degree of equity between students, being accessible to students with disabilities and students in remote locations, and supporting constructivist pedagogy in a powerful new medium.

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DEDICATION

This dissertation is dedicated to my wife, Eva, whose support made my research possible,

and to my son, Clark, who was born the day after I finished collecting data.

ACKNOWLEDGMENTS

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CHAPTER 1:

INTRODUCTION TO THE STUDY

Nearly a century ago John Dewey (1915, 1916, 1938) laid out a progressive new

approach to education. He called for schools to break away from the traditional medieval

model of education in which teachers handed down predefined knowledge to relatively

passive students. He believed that experience is the best education and created a system

that would focus instead on learning-by-doing. Today, many young people learn by doing

in a virtual context while using computer-based simulations – or even video games meant

for entertainment purposes.

If Dewey believed that all education is experience, then Lev Vygotsky (1978,

1986, 1997) believed that all experience is social. It follows then that all education is

social. Furthermore, Vygotsky believed that all human development, even human

thought, is social. He introduced the concept of the zone of proximal development (ZPD),

which is now familiar to educators worldwide. This concept suggests that students can

perform more sophisticated tasks with help than they can unassisted. Based on this

paradigm, educators can provide support, or scaffolding, for students to help them

improve their unassisted performance. Ideally, educational tasks will fall within the ZPD

and so provide a challenge without totally frustrating a student. Good video games excel

at challenging players without frustrating them; a video game cannot be successful

without doing this in an individual and differentiated way for each player. What happens

instantaneously in a video game is difficult for teachers to reproduce in a classroom environment, even with considerable preparation, planning, and skill.

Jean Piaget (1929, 1950, 1952) introduced the constructivist concepts of assimilation and accommodation, which describe the way students construct their own meaning as they experience the world. Piaget's student, Papert (1980, 1993, 1996) applied these concepts to his work with children and computers. He believed that if students can use a computer, they should be able to program the computer. The children's programming language "Logo" was the result of his work. Using Logo, students could actually create their own video games; Papert came to believe that if students can play video games, they should be able to program video games.

Jerome Bruner (1966, 1971, 1986, 1990, 1996) built upon the constructivist philosophies of Dewey, Vygotsky, and Piaget as he explored the process and the culture of education. Like Papert, other educational technologists, such as David Jonassen (1992, 1999, 2000, 2003) applied these mature theories of social constructivism to the implementation of educational technologies. Jonassen focused on the use of technology to support intentional rather than incidental learning. While there is now little disagreement that incidental learning takes places in video games (after all, this is what people presume takes place when they fear that video games will make children more violent), it may also be possible to harness the technologies of video games for purposes of intentional learning in formal K-12 educational institutions, just as Jonassen harnessed the incidental learning that happens when browsing the Web for intentional purposes.

This approach may border on being necessary to engage and motivate 21st century students. Prensky (2001b) introduced the metaphor of digital natives and digital immigrants, in which students who have grown up in a time of cell phones, email, instant messaging, ubiquitous Internet access, and –of course – video games are considered digital natives who speak "digital" fluently. People who were born before these technologies were invented (including most educators) are then digital immigrants who must learn to speak "digital" as a second language. Digital natives expect to be engaged and motivated and they expect individualized and differentiated attention. Video games can provide this for them as entertainment, and may be able to provide this for educational purposes as well.

Much has already been written on the use of video games in education. Prensky (2001a, 2006) showed how video games are being used for training purposes in the military and corporate world, and he explained to teachers and parents what students can learn from various genres of video games. Gee (2003, 2004, 2005c), a linguist and cognitive scientist articulated 36 principles of learning that good games embody that many classrooms do not. He also discussed ways in which video games might be better for student's academic performance than traditional teaching methods. Aldrich (2004, 2005) focused on the educational benefits of simulations, and even created a simulation to help players develop a traditionally difficult to teach soft skill, leadership. Shaffer (2006b), like Gee, was interested in using games and simulations to help students develop new identities, particularly professional identities that include innovative ways of thinking. Squire (2003) researched the use of *Civilization III* with high school students,

and Steinkuehler (2004b) uncovered the learning by apprenticeship that happens in massively multiplayer online role-playing games (MMORPGs). Others have written about games that were explicitly created for purposes other than entertainment. For example, Michael and Chen (2006) discussed games meant to educate, train, or inform. Such "serious games" include games for change such as the World Food Program's *Food Force* and Impact Games' *Peacemaker*, which hint the power of video games to not only educate, but to effect positive social change of the sort Dewey and other early constructivists sought. Unfortunately there has been a lack of research into the use of MMORPGs for explicitly educational purposes. This literature, and the gap in the literature with respect to MMORPGs in particular, will be explored in greater detail in Chapter 2.

<div align="center">Problem Statement</div>

Formal K-12 education remains much as it did a century ago, but in the era of the Internet, cell phones, and video games, students have changed. Video games and simulations show potential as engaging and motivating learning environments. MMORPGs in particular have social and cooperative elements that might be valuable for educational purposes. However, despite a wide variety of research about video games and learning in general, few studies have focused on the potential uses of MMORPGs in formal education. With the notable exception of Steinkuehler (2004a, 2004b, 2005a, 2005b), who investigated the informal apprenticeship learning that takes place in MMORPGs, there is a significant gap in the literature regarding learning and MMORPGs. Other video game theorists, including Prensky (2001a, 2006) and Aldrich

(2004, 2005) discuss MMORPGs as a learning platform, but only briefly, and when they do, they disagree about the value of the games for learning. Therefore the aim of this study was to inquire into potential applications for MMORPGs as constructivist learning environments in formal K-12 education, and to explore the potential benefits and drawbacks of such applications.

Nature of the Study

This qualitative study employed a social constructivist research paradigm and the Delphi method of inquiry. A panel of experts was asked to make predictions in response to multiple iterations of a questionnaire. After each iteration, responses were coded and analyzed by the researcher. Subsequent iterations were modified in light of these responses. Summaries of participants' responses were also anonymously shared with the other participants so they had an opportunity to alter their predictions prior to the next iteration. Through this process, the panel moved toward concensus in their predictions. Dissenting opinions and additional comments were given special consideration by the researcher as well.

The expert panel consisted of 12 adult experts drawn from the field of video games and learning; experienced practitioners, academic researchers, and game developers were all represented in the sample. The researcher drew upon this sample by asking them to complete three iterations of a Delphi questionnaire over a period of 8 weeks. Each iteration required 1 hour or less of participants' time.

Research data were collected in the form of participants' written responses to the Delphi study questionnaire. These data were coded and analyzed by the researcher after

each iteration so that summarized results could be presented to the participants and the following iteration of the questionnaire could be composed. A final consensus check survey also asked participants to quantitatively rate their level of consensus with thematic summaries of previous responses. A detailed discussion of the research method appears in chapter 3.

Research Questions

The study was guided by the following two overarching questions:

1. What are the potential benefits of using MMORPGs as constructivist learning environments in formal K-12 education?

2. What are the potential problems related to using MMORPGs as constructivist learning environments in formal K-12 education?

Additionally, based on the literature review and the expert panel's first round responses, the following subquestions were identified and were used to focus the study:

1. Motivation and engagement: How might MMORPGs be used specifically to motivate and engage students, and what problems might be associated with using MMORPGs for this purpose?

2. Context-embedded learning: How might MMORPGs be used specifically to provide a context for student learning, and what problems might be associated with using MMORPGs for this purpose?

3. Social learning: How might MMORPGs be used specifically to support social learning (including facilitated collaboration, cooperation, and competition), and what problems might be associated with using MMORPGs for this purpose?

4. Twenty-first century skills: How might MMORPGs be used specifically to help students develop 21st Century skills, and what problems might be associated with using MMORPGs for this purpose?

Following the expert panel's second round responses, two additional themes of consensus emerged as a focus for the third round and the final consensus check: the importance of providing students with frequent and structured time for reflecting on game play, and the infrastructure and logistical challenges related to implementing MMORPGs in schools.

Purpose of the Study

The goal of this study was to identify potential applications of MMORPGs as constructivist learning environments in the context of formal K-12 education. The purpose was to identify the potential benefits and drawbacks of such applications and to recommend courses of action for future research by academics, future game development by industry professionals, and future instructional decisions made by K-12 educators.

Conceptual Framework

Two pillars of theory supported this study: constructivist learning theory and digital game-based learning theory. The primary underlying theory of learning supporting this study was constructivism, as typified in the works of Dewey, Piaget, Vygotsky, and Bruner. The theories of constructivist educational technologists such as Papert and Jonassen also contributed its foundation. In particular, six elements of a constructivist learning environment were identified: engagement and motivation, context-embedded

learning, inquiry-driven learning, socially negotiated learning, reflection and metacognition, and the importance of effecting positive social change.

Existing digital game-based learning theories were influential in the development of the research questions. Particularly influential works included those of Prenksy, Gee, Aldrich, Schaffer, Squire, Steinkuehler, Beck and Wade, Michael and Chen. Constructivist themes run throughout these books because they suggest that video games can support each of the six elements listed above. Each of these elements is explored in greater detail in Chapter 2.

Operational Definitions

This section includes definitions for some terms that are relatively new to the field of educational technology, terms that are sometimes used ambiguously, and terms that are used in a more (or less) specific way than their general use.

Consensus: The state in which the results of a survey are "at least acceptable to every member [of the expert panel], if not exactly as they would have wished" (Reid, 1988, as cited in Williams & Webb, 1994, p. 182).

Constructivist learning environment: A learning environment in which students are actively engaged and motivated, and in which learning is context-embedded, inquiry-driven, and socially negotiated. Constructivist learning environments also promote reflection and metacognition. For the purposes of this study, an effective constructivist learning environment will also be considered one that can effect positive social change.

Expert: Someone who has demonstrated knowledge, experience, or formal authority in the field being studied (Baker, Lovell, and Harris, 2006).

Games for change: A movement and community of practice dedicated to using computer and video games for social change. An individual video game may also be referred to as a "game for change" if it is produced by this community or shares its ideals (Games for Change, 2006).

Games for health: A community and best practices platform for the numerous games being built for health care applications. This is a subset of the games for change movement (Games for Health, 2006).

Grinding: The practice of repeating tasks in a video game for the primary purpose of accumulating experience points or other rewards within the game.

Ludology (ludologist): The study of video games from a social science or humanities perspective. A ludologist studies ludology.

Massively multiplayer online game (MMO): A type of video game that is played online, allowing large numbers of players to interact with one another. This is a more inclusive term that MMORPG (below), which specifies role-playing games in particular. For brevity's sake MMO is often used in place of MMORPG.

Massively multiplayer online role-playing game (MMORPG): A genre of video games and subset of role-playing games that is played online, allowing large numbers of players to interact with one another in a persistent virtual world.

Metagame: A broad term usually used to define any strategy, action or method used in a game that transcends a prescribed rules set, uses external factors to affect the game, or goes beyond the supposed limits or environment set by the game. Metagame can also be a verb.

Microworld: A virtual world inside which a student can explore alternatives, test hypotheses, and make discoveries.

Mod: As a verb, this term refers to the practice of modifying a video game to create custom items, scenarios, or entire new games. As a noun, it refers to a modified game.

Procedural Rhetoric: "The art of persuasion through rule-based representations and interactions [such as those found in video games and simulations] rather than the spoken word, writing, images, or moving pictures" (Bogost, 2007, p. ix).

Role-playing game (RPG): Two kinds of role-playing games are discussed in this study. The first is a tabletop role-playing game, a type of game (played with paper, pencils, and dice) in which the participants assume the roles of fictional characters and collaboratively create stories. Participants determine the actions of their characters based on their characterization, and the actions succeed or fail according to a formal system of rules and guidelines. Within the rules, players can improvise freely; their choices shape the direction and outcome of the games. A human gamemaster prepares, facilitates, and referees the story in addition to playing all nonplayer characters. The second kind of role-playing game is a video game in which the players assume the role of a fictional character in the game, but in which they have considerably less flexibility to determine their actions due to the limits of computers to improvise and react to human improvisation.

Serious games: A type of game (or simulation) that is meant for a purpose other than education. For instance serious games may be meant to educate, train, or inform, and

may be used in many fields including education, government, health, first response, science, and the military (Serious Games Initiative, 2007).

Twenty-First Century skills: The skills necessary for students to thrive in the 21st century. A variety of skills were identified by North Central Regional Education Laboratory (NCREL) & the Metiri Group (2003) and categorized into four skill clusters, including digital-age literacy, inventive thinking, effective communication, and high productivity.

<div align="center">Assumptions, Limitations, Scope, and Delimitations</div>

The researcher's assumptions, the limitations of the study, the scope of the study, and the researcher's delimitations on the study are discussed in the following sections. These sections address facts assumed to be true, but not actually verified, potential weaknesses of the study, and the bounds of the study.

Assumptions

Fundamental to this inquiry were the twin assumptions that the constructivist pedagogies developed by Dewey, Vygotsky, Piaget, and Bruner are more effective than traditional teaching techniques, and that most existing educational institutions have failed to effectively implement them. Similarly, it was assumed that existing 21st century schools have largely failed to implement educational technology in the revolutionary ways described by Papert and Jonassen, which are also assumed to be more effective than traditional techniques. It was also assumed that very few schools have adopted the use of video games in their curriculum. In addition, the researcher assumed, based on the expert

panelists' previous experience, that the experts were knowledgeable and objective about the topics they were asked.

Limitations

A Delphi study is meant to provide useful predictions about the future. The results of this study are not a description of any existing phenomena, except as a description of consensus in expert opinion that was reached through the process of the Delphi questionnaires. This study makes predictions about the potential benefits of using MMORPGs as constructivist learning environments, and about the potential problems related to such use. Predictions are not guarantees of any particular results. The final result of this study is the articulation of a new theory of the benefits and concerns related to using MMORPGs in education. This theory will require further study to be proven, disproved, or applied.

This study was limited by its generalizability. The expert panel consisted of only 12 people, who were highly educated and technically savvy residents of English-speaking nations. They were well versed in theories of video games and learning, or video game development. As such, they may have been subject to bias based on their experience and education, and their views therefore may not reflect the views of other educators or citizens. This study was focused specifically on the use of MMORPGs in a formal K-12 educational environment. Results will not necessarily be generalizable to other genres of video games or to other learning environments. Similarly, this study explored the use of MMORPGs with respect to constructivist pedagogy and results may not be generalizable to other schools of thought such as traditional or behaviorist pedagogy.

Scope of the Study

The scope of this study was limited by several factors. The researcher implemented only three Delphi rounds; greater detail or greater consensus may have been gained by additional rounds. The number of participants on the expert panel further limited the scope. Only 12 participants completed the study. The particular identities of the experts on the panel and their particular expertise and experiences limited the scope of the study. The scope was limited by the medium of interaction. All questionnaires were distributed and collected via the web. Only participants with the skills, inclination, and access to the technology necessary to complete this process were included. Finally, the study was bound by its duration. Each iteration of the Delphi questionnaire allowed only 1 week for collection of responses and only 1 week for preparation of the next round, for a total of 8 weeks, including the final consensus check. These limitations, particularly the number of participants, are discussed in greater detail in chapter 5.

Delimitations

The researcher imposed certain delimitations on the study. Most importantly, the study focused only on the potential benefits and problems related to the use of MMORPGs as constructivist learning environments. This study did not set out to explore any issues related to the design of such games, including issues related to gender inclusive game design. Similarly, the organizational change necessary to implement such games remained outside the boundaries of the literature review, as did the role of the teacher in supporting such games. Though the expert panel found it important that MMORPGs may help students develop additional 21st Century skills, the preceding

literature review did not address this possibility. Finally, the well-documented educational benefits of face-to-face role-playing were not treated as a part of this study.

These delimitations, along with the limitations and scope discussed above, represent potential weaknesses of the study.

Significance of the Study

The goal of this dissertation was to identify potential applications of MMORPGs as constructivist learning environments in the context of formal K-12 education. The purpose was to identify the potential benefits and drawbacks of such applications and to make recommendations for future research by academics, future game development by industry professionals, and future instructional decisions by public educators. In this way, the study contributes to reducing the knowledge gap identified in chapter 2. Currently, there is very little written about the use of MMORPGs for learning, particularly in formal educational environments. This study is also significant because it explored a technology that may have the potential to improve (and perhaps revolutionize) education for 21st century students and educators. An MMORPG might help students develop difficult-to-teach 21st Century skills, particularly if frequent and structured reflection time is provided for students. MMORPGs may be motivating and engaging for students while providing a context for learning and a framework for social learning. Such games can also be made available to students around the world, regardless of geographical, socioeconomic, and cultural boundaries, as long as students are able to connect to the Internet with sufficient hardware. Finally, as the serious games movement has

demonstrated, these games might have the ability to inspire players to effect positive social change.

Summary

This chapter provided an introduction to the study, including background information. Sections describing the problem statement, the nature of the study, and the purpose of the study were also included, as were details related to the conceptual framework, operational definitions, and bounds of the study. Finally, the significance of the study was articulated.

Chapter 2 includes a detailed review of literature on the use of video games as, or in, constructivist learning environments. An overview of constructivist theory begins the section, followed by a detailed discussion focused on elements of constructivist learning environments. This discussion is organized around themes identified in the literature, including engagement and motivation, context-embedded learning, inquiry-driven learning, socially negotiated learning, reflection and metacognition, and effecting positive social change. Chapter 2 also includes a review of literature related to the Delphi method and other potential methodologies considered for this study.

Chapter 3 then presents a detailed discussion of the research method. The chapter begins with an overview of the research design, including the qualitative research paradigm and the role of the researcher. The research context is described and justified, and details related to participant selection are shared, including measures to be taken for the ethical protection of the participants and the criteria for selecting participants. The data collection and data analysis procedures and software are then explained. This is

followed by a discussion of efforts taken to improve the credibility, transferability, dependability, and confirmability of the study. The results of a previous quantitative exploratory study are also summarized.

Chapter 4 reports the results of the present study. First, the data collection process is explained as are the researcher's systems for keeping track of data and emerging understandings. The findings are then reported in six thematic summaries of participant responses; this is the heart of the chapter and includes the elements of consensus reached by the expert panel. Next, dissenting opinions and additional comments are also reported in detail. Finally, chapter 4 concludes by presenting evidence of the study's quality, including confirmability measures such as the researcher's log, peer debriefing, and an external auditor.

This final chapter begins by reviewing the problem statement and methods of this study. The results of the study are summarized as well. Next, an interpretation of the findings is presented, followed by an explanation of dissenting opinions and participants' additional comments. The relationship of this study to previous research is also covered. Finally, the implications of the study are discussed and followed by recommendations for educators, game designers, and academics – including recommendations for further research. The chapter concludes with a reflection on the researcher's experience and a concluding statement.

CHAPTER 2:

LITERATURE REVIEW

The goal of this study is to investigate the potential benefits and drawbacks of

using MMORPGs as constructivist learning environments in formal K-12 education.

Therefore, this literature review begins with an overview of constructivist learning theory

and the elements of a constructivist learning-environment. The following sections are

then focused on individual elements, including: engagement and motivation; context-

embedded learning, inquiry-driven learning, socially negotiated learning, reflection and

metacognition, and effecting positive social change. In each of these sections, the

literature review has revealed much that has been written with respect to video games and

learning, but very little literature directly related to the use of MMORPGs in formal

education. Each section of the review demonstrates a gap in the literature that this study

will address through the research questions listed in chapter 1. This chapter concludes

with a review of literature related to the Delphi method and other potential methods

considered for this study.

The literature review began with a search of the Walden University library

databases, the University of California Irvine library, and the online library at

Questia.com. The review also included searching the public World Wide Web, primarily

via Google Web Search and Google Scholar, though several other services were used to

create RSS-based search feeds. Primary search terms included "video game," "computer

game," "digital game," "electronic game," "simulation," and "MMORPG." These were

often combined with terms such as "education" or "learning" and with specific terms

related to constructivist learning environments such as "context," "inquiry,"

"collaboration," or "reflection." Because this topic of inquiry is relatively new and in

constant flux, many sources were included in this review that relied on probe and break

research or on anecdotal evidence. Nevertheless, these sources were chosen because they

represent expert opinion within the field.

<p style="text-align:center">The Core Constructivist Belief</p>

Literature extolling the educational virtues of video games often relies on a

foundation of explicitly constructivist beliefs about the nature of knowledge and the

process of learning. In contrast to the empirical behaviorist view that knowledge about an

objective reality can be simply and reliably passed on from teacher to student, the kernel

of constructivist philosophy is the belief that all knowledge must be actively and

subjectively constructed in the mind of each individual.

Dewey (1916) articulated this belief when he described a new form of education

that was an active and constructive process rather than a passive process of learning by

absorption (p. 38). Piaget (1952) formalized this thinking with his theories of

assimilation, which accounted for both the act of incorporating new data into existing

mental structures (or schema) and also the construction of entirely new schema into

which data could then be incorporated (p. 6, 410, 416), and *accommodation*, which

referred to the ways in which existing schema are modified to account for new input (p.

7). Even Vygotsky (1986), who stressed the importance of social relationships in

learning, believed that "direct teaching of concepts is impossible and fruitless" (p. 150).

Later, Bruner (1986), who was explicitly constructivist, believed that each individual's perception of reality is a symbolic construct of his or her own mind (p. 95).

This core belief of constructivists such as Dewey, Piaget, Vygotsky, and Bruner continues to inform the work of 21st century researchers, including those exploring the educational potential of video games. For example, Shaffer (2006b) cites Dewey, Vygotsky, and Bruner extensively in *How Video games Help Children Learn*, and the foundation of Schafer's theories is Piaget's schema view of learning (p. 149). Even game designers Salen and Zimmerman (2004), who are not writing with an educational end in mind, base their theories on the importance of the schemas (p. 103) and cognitive frames players develop to "interpret actions and events" (p. 374). Steinkuehler (2006b) has studied similar forms of meaning-making within the cultural context of existing MMORPGs created for commercial and entertainment purposes. MMORPGs created for educational purposes might be able to harness and support these core processes, but this remains to be studied.

<center>Corollary Constructivist Beliefs</center>

The most important corollary of this core constructivist belief is the adage of learning by doing. Dewey (1938) called for "education of, by, and for, experience" (p. 29), a sentiment that echoed in the work of video game scholars such as Jenkins, Klopfer, Squire, & Tan (2003), who explain that "knowledge developed through game play… is valuable information when confronting new challenges and solving problems" (p. 6). Slator et al. (2006) also finds value in "virtual role based worlds for education… constructed purposefully for student immersion" (p. 11). As role-playing games,

MMORPGs might offer students virtual worlds where they can learn by doing in ways that are impractical or impossible in a classroom, however this has yet to be investigated.

Learning is also considered by many constructivists to be a social phenomenon. Dewey (1915) discussed the notion that cognitive development is a social process (p. 99), and later Vygotsky's (1978) ZPD was based on the observation that students can accomplish more with the help of others than they can independently. Based on these earlier theories, Shaffer (2006b) discussed the use of computer games as scaffolding to help students move toward mastery of skills in their zone of proximal development (p. 152). MMORPGs may also provide a social network to student learning, but this has not been formally investigated.

It is also accepted by many constructivists that individual learners will have different interests as well as different strengths and weakness. Gardner (1999), for instance, identified ten independent capacities for aptitude in individuals. In addition to being able to engage students through multiple modalities and to allow students to exercise more of Gardner's intelligences than a traditional classroom might, video games can also work to help players develop their weaker intelligences (Prensky, 2006, p. 95). It may be that MMORPGs can fulfill this role as well, but there is as yet no specific evidence to support this view.

Engagement and Motivation

One of the fundamental properties of an effective constructivist learning environment is that it engages and motivates students. For more than a century, traditional classroom lessons – including lectures, reading, and written assignments –

have often failed to effectively or reliably engage and motivate students (Dewey, 1938; Slator et al., 2006). In recent decades, video games (and other interactive media) may have exacerbated this problem because students now come to school with higher expectations of engagement (Carstens and Beck, 2005; Papert, 1993; Prensky, 2001a, 2001b, 2006). However, these same technologies, including video games, can also offer a solution to the problem by being used to engage and motivate students for academic purposes (Gee, 2003, 2005c; Jonassen, Howland, Moore, & Marra, 2003; Papert, 1993, Prensky, 2001a, 2006; Shaffer, 2005; Shaffer & Gee, 2005).

The Value of Play

Constructivists have long considered play a valuable learning process (Bruner, 1966; Dewey, 1926; Dixon-Krauss, 1996; Piaget, 1950; Vygotsky, 1978). Today, Modern game scholars share these perspectives. For example, Salen and Zimmerman (2004) consider play valuable for developing meaning (p. 33-34), social relations (p. 462), and identity (p. 519), among other things. For Salen and Zimmerman, as for Prensky (2005b, 2006), the complexity of the game is an important factor in whether or not the play is meaningful (Salen and Zimmerman, 2004, p. 170). Koster (2005) expressed the value of complex social play succinctly: "from playing cops and robbers to playing house, play is about learning life skills" (p. 61). Slator et al. (2006) concluded that "the value of play in learning can hardly be overemphasized" (p. vii). Others, such as Prensky (2001, 2006), Gee, (2003, 2004, 2005c), Aldrich (2004, 2005), and Shaffer (2006b) have made the value of play a cornerstone of their theories. Though much of what they have written would likely apply to MMORPGs, they rarely address MMORPGs specifically.

Hard Fun

There seems to be little doubt that modern video games are deeply motivating and engaging to many of the same students who struggle to pay attention in school – despite the fact that games continuously and consistently challenge students, often to the brink of frustration (Johnson, 2005; Papert 1993; Shaffer, 2006b). This is the foundation of Papert's (n.d.) concept of *hard fun* – that games are fun because they are hard, not in spite of being hard. As Jenkins (2005) shared, the worst thing students can say about homework is that it's too hard, while the worst thing they can say about a video game is that it's too easy. To be fun (and thus commercially successful), a video game has to remain squarely in Vygotsky's (1978) zone of proximal development, challenging but not frustrating players – even players of significantly varied skill levels. Constructivists have long considered play a valuable learning process (Bruner, 1966; Dewey, 1926; Dixon-Krauss, 1996; Piaget, 1950; Vygotsky, 1978), and today this property of video games to deliver hard fun can be an educational asset (Caperton, 2005; Jenkins and Wright, 2005; Shaffer, 2006b).

MMORPGs in particular often require players to perform repetitive tasks that seem suspiciously like work, and yet these games are among the most compellingly immersive experiences available. Shaffer (2006b) noted that many things that players do in an MMORPG "don't, on their own, seem like fun" (p. 22). He quoted one player as saying, "I'm just running some boring errands in the game" (p. 22). However, there are at least four types of players with different motivations and reasons for playing an MMORPG: those who enjoy "achievement within the game context," those who enjoy

"exploration of the game," those who enjoy "socializing with others," and those who enjoy "imposition upon others" (Bartle, 1996). According to Steinkuehler (2006a), MMORPGs have a "capacity for sustained engagement" (p. 7) and are becoming "a compelling means of enculturation into the globally networked community" (p. 7). However, despite this apparent potential, there has yet to be any formal research dedicated to understanding the effectiveness of MMORPGs to engage and motivate students in an academic context.

Intentional Learning

Despite advocating for the value of fun and play in education, the constructivist perspective does not recommend an environment free of structure. In contrast, the hope is to harness the strategies of engagement and motivation responsible for the incidental learning that takes place in many good games and put these strategies to use for the purposes of intentional learning in formal educational environments. According to Dewey (1926, p. 196), "it is not enough just to introduce play and games… everything depends upon the way in which they are employed" (p. 196). In his wake, social constructivists such as Bruner (1971) and Mooney (2000), educational technologists such as Papert (1993) and Jonassen, Peck, and Wilson (1999) also focused on the importance of intentionality and goals in educational play, as did video game scholars such as Squire (2005) and Shaffer (2006b). Aldrich (2005) also warns against what he calls *motivatism*, a philosophy of learning "that suggests if a learner is sufficiently motivated, he or she will pick up everything needed on his or her own" (p. 82). It remains to be seen if

MMORPGs will have value for intentional learning beyond the initial elements of engagement and motivation.

Games Are No Panacea

Video game scholars caution, too, that not all games will appeal to all students, even those that consider themselves gamers. Squire (2005), for instance, found that 25% of students who played *Civilization III* in school "complained that the game was too hard, complicated, and uninteresting, and they elected to withdraw from the gaming unit and participate in reading groups instead" (p. 2). He also found that "some students (including gamers) rejected the game experience in school… because playing Civilization III in a school context was *compulsory*" (p. 4). In addition, video games are not an effective instructional medium for students that consider themselves non-gamers; Littleton (2005) found that students who do not play video games for entertainment were less likely to be motivated by (or to learn from) video games in the classroom. Of course, even among students who consider themselves gamers, some will have strong preferences for or against particular video game genres. Unfortunately, there have been no such studies focused specifically on MMORPGs and student motivation.

Context-Embedded Learning

Perhaps the most fundamental property of a constructivist learning environment is that it offers a context for student learning. Context-embedded learning has been a cornerstone of the constructivist movement since at least the early 1900's. Now, nearly a

century later, video games and simulations can offer new contexts for student learning that would not have been available to students in the past. Video games are able to provide students with a context that allows them to learn by doing, remain in a state of flow, explore microworlds that allow easy transfer of learning, develop situated and distributed understanding, exercise new identities, and benefit from role-playing.

Learning by Doing

While traditional teaching and learning tends to be a passive experience for the student who receives knowledge from the teacher, constructivist pedagogy emphasizes learning by doing, learning from experience, and problem solving in context. In order to learn by doing, a student must not simply read from a textbook or listen to a lecture. Rather, the student must engage authentic (or real-world) problems in their authentic context. Dewey (1915, 1938) considered schoolwork to be remote and isolated in comparison to real-world activities, and he called for students to be given responsibility for their own problem solving. Bruner (1966) also considered traditional schooling to be removed from meaningful life in society, and urged educators to consider learning in a situated cultural context. He was more interested in history as a discipline and a culture than as a curriculum, and he was ultimately interested in knowing as doing (Bruner, 1996).

Modern video game scholars have argued that video and computer games can help provide such a context for learning. Prensky (2001a, 2005a, 2006) highlighted the importance of game contexts (including characters), suggested that game goals must be worthwhile to students, wrote about five levels of learning by doing in games, and

predicted that future educational games will be more realistic, experiential, and immersive while including better storytelling and characters. Like Prensky, Gee (2003, 2004) discussed ways in which video games can provide a context for learning by encouraging active and critical thinking while players engage with a domain of learning as a complex system rather than as isolated facts. Gee (2005a, 2005b) also expected good games to help learners build accurate simulations in their own minds and to learn new skills by providing an amplification of meaningful input to the learner and an opportunity for a greater amount of practice time on-task. Aldrich (2004) pointed out that this is most effectively achieved if the simulations in the game accurately represent the activity being learned, particularly if they are high fidelity when necessary to impact learning yet simple and streamlined when additional detail would be unhelpful (p. 173-175); he also opposed simulations that present the world as it should be rather than as it is, even if this is done in the name of political correctness. Shaffer (2004), too, noted that "new technologies make it easier for students to learn about the world by participating in meaningful activity" (p. 1403). His epistemic games "are about having students do things that matter in the world by immersing them in rigorous professional practices of innovation" (Shaffer & Gee, 2005, p. 12). McMahan (2003) also discussed the value of the *presence* and *immersion* offered by video games (p. 68-77). It seems that even commercial off the shelf games provide some of these benefits to players; Beck and Wade (2004) have noted that the gamer generation is excelling in, and even reshaping, the business world.

Though Prensky (2001a, 2006) and Gee (2003, 2004, 2005) pointed out many existing video games that effectively provide a context for learning in the ways they

discussed, few of their examples included any MMORPGs. And although Aldrich (2004) and Shaffer (2006b) created the educational simulations as proofs of concept illustrating their theories, they both opted not to create an MMORPG, on account of the additional logistical challenges inherent in the genre. So although it may seem that MMORPGs might be able to provide many of the elements discussed above, the potential value of MMORPGs to provide a context for learning by doing thus remains unproven.

The Flow State

When students are in an environment where they can learn by doing, ideally they will be challenged without being frustrated, and thus remain in a state of flow, an ideal state of learning (or performance). Csikszentmihalyi (1997) described flow experiences as "exceptional moments" (p. 29) that tend to occur "when a person's skills are fully involved in overcoming a challenge that is just about manageable… a fine balance between one's ability to act, and the available opportunities for action" (p. 30). This bears resemblance to Vygotsky's (1978) Zone of Proximal Development, which also describes the way in which students learn when challenged just beyond the horizon of their mastery, but not so far beyond that they become frustrated. Early in his description of the optimal experiences that generate flow states, Csikszentmihalyi (1997) noted that "it is easy to enter flow in games" (p. 29), at least in part because games, like other flow activities, "provide immediate feedback" (p. 30).

Video games, in particular, are designed to provide individualized levels of challenge and feedback for players. Shaffer (2006b) made the connection between video games and Csikszentmihalyi's work, pointing out that "we learn best when working on

things that are neither too easy nor too hard" (p. 125). Shaffer went on to point out that, as Dewey suggested "the obstacles have to be relevant to the thing you are trying to do: They have to push back on issues that are related to the task at hand, rather than being something irrelevant or extraneous that you have to overcome in order to keep working" (p. 125). Relevance is key to the use of flow experiences for learning – and needs to be present in educational games. MMORPGs are a medium in which such relevance might be easily incorporated; as Steinkuehler (2004b) points out, in an MMORPG "information is given 'just in time,' always in the context of the goal-driven activity that it's actually useful for – and made meaningful by – and always at a time when it can be immediately put to use" (p. 7), thus facilitating playing and learning in a state of flow. However, more research into this phenomenon is necessary if MMORPGs are to be used in an educational context.

Microworlds

In order to support student's early efforts, the learning context can be a microworld, or simplified version, of the real-world context in which similar skills might be used – and to which students' new skills will eventually be expected to transfer. Microworlds model only the elements of the experience that are important to a student's developmental level, while limiting other distractions. Papert (1980) originated the concept of microworlds as incubators for knowledge (p. 120). Jonassen (2000) later observed that many video games are in fact well-designed microworlds that require players to master each environment before moving onto the next one.

What Prenksy (2006) called a complex game might be considered a microworld; he differentiates between trivial games or minigames (such as most board games or most fighting-based video games) and modern complex games (such as computer-based role playing games) that can take up to 100 hours to master as players learn a wide variety of new skills and strategies often requiring outside research and collaboration – and often requiring the assumption of alternate identities within the context of the game. Gee (2003) also noted that games can provide an authentic context for student tasks because learning in a game takes place "in a (simplified) subset of the real domain" (p. 137). Gee (2005a) called such a game a "sandbox" (p. 27), a term that might also be considered roughly synonymous with microworld.

In the tradition of Papert's microworlds, Aldrich (2004), too, was interested in the way "simulations describe small worlds" (p. 152) as a context for learning. The simulation he designed, *Virtual Leader*, provides a microworld in which players learn about leadership, a skill that is typically difficult-to-teach (and assess) in a traditional classroom environment. Shaffer (2006b) also developed several educational video games that provide a microworld in which students can learn and pursue meaningful goals in subjects as diverse as geometry, biology, journalism, debate, and architectural design. Like Prensky, Shaffer believed that the "video games… of children's culture today demand strategic thinking, technical language, and sophisticated problem-solving skills" (p. 6). And, in the tradition of Dewey, he believed that video games can provide a "*simulated* 'world of hard conditions'" (p. 127, italics in original). Holland, Jenkins, and Squire (2003) also discussed an example of an explicitly educational video game that

provided a microworld in which students could learn curricular material, in this case

physics. In addition to these explicitly educational games, there are many ways in which

even commercial off the shelf video games can serve as valuable microworlds for

learning (Jenkins et al., 2003; Shaffer, Squire, Halverson, & Gee, 2005; Squire, 2003;

Squire & Jenkins, 2003).

Though MMORPGs may be some of the best commercial examples of

microworlds, these studies do not explicitly concern MMORPGs and it is thus debatable

whether or not the are an appropriate medium for education. However, they show a great

deal of promise. As Steinkuehler (2005b) pointed out, "MMOGaming is participation in a

multimodal, and digital textual *place*" (p. 98, italics in original). She also explained that

"within video games… the reader becomes or inhabits a symbol, enabling him or her to

interact with signs as *if* they are the very things they represent" (p. 99, italics in original),

a property of video games that supports learners in transferring new skills to other

environments. Even so, more research into this area is required.

Transfer

The transfer of skills from a learning situation (such as a microworld) to a real-

world scenario is one of the goals of any educational system. Slator et al. (2006)

expressed this goal by writing that "students who learn through simulations should

acquire content-related concepts and skills as a consequence of playing the game, and this

learning should transfer to knowledge contexts outside the game" (p. 4). Several video

games designed for educational purposes have been successful in achieving this goal,

including *Biohazard* (Holland et al., 2003), and *Escher's World* (Shaffer, 2006b). Pillay

(2005) also established that skills acquired in a computer game do transfer to other similar activities, though the games and activities he studied were comparatively unsophisticated. While this sort of transfer may be the goal of any educational game, it is important to note that a game alone is unlikely to reliably produce this effect; rather, a traditional interaction with teachers, students, and academic texts might be required for students to be fully prepared for the game and to fully benefit from the game experience (Squire, 2002). This suggests that playing MMORPGs alone would not be sufficient for students to transfer their knowledge from the game to real-world applications, but research is required to explore this suggestion.

Situated and Distributed Understanding

Learning that happens within a microworld (or other authentic context) is what constructivists consider situated learning, which allows students to develop a situated understanding of the skills they are developing and problems they are solving. Constructivists such as Bruner (1996) and Duffy and Jonassen (1992) believed that knowledge is always situated in authentic activities – which need not be the actual real-world context as long as students are engaging in similar activities and using similar tools. In the constructivist tradition, Gee (2003) argued that learning involves situating (or building) meanings in context, and that "video games are particularly good places where people can learn to situate meanings through embodied experiences" (p. 26). Many other scholars also believed that video games and simulations can provide environments in which such situated learning can occur (Dede, 2005; Shaffer, 2006b; Shaffer et al.,

2005). Steinkuehler (2008), who studied MMORPGs specifically, was also interested in "the situated meanings individuals construct" (p. 17).

Many microworlds (and other authentic contexts) also offer opportunities for students to develop a distributed understanding of skills and problems. Unlike in traditional testing situations, students do not need to memorize all of the answers to their problems and information required in the learning context. They can call upon tools and other individuals within the context to aid them in their efforts. As Bruner (1996) expressed it, intelligence is "not simply 'in the head' but [is] 'distributed' in the person's world" (p. 132). Gee (2003) believed that in good games "thinking, problem solving, and knowledge are 'stored' in material objects and the environment" (p. 111).

Though it may seem likely that MMORPGs would support the development of both situated and distributed understanding among students, this position is not supported in any existing literature. Additional research is required.

Identity

As students develop situated and distributed understanding within a learning context, they are essentially exploring an identity within that context – a way of acting and thinking that is specific to the context and problems at hand. Shaffer et al. (2005) believed that "the virtual worlds of games are rich contexts for learning because they make it possible for players to experiment with new and *powerful identities*" (p. 106, italics in original). Gee (2003) in particular was most interested in the way that good games can facilitate learning by requiring players to take on a new identity and form "bridges from [their] old identities to the new one" (p. 51). Citing Gee, Shaffer (2006a)

aimed to "give adolescents new possible selves that are based on authentic experiences with innovative thinking that matter in the world" (p. 158). This experience can also extend to selves that are impossible in the real world, including an identity of a different race or sex (Lahti, 2003; Yee, 2006). Steinkuehler (2006a) studied the nuanced development of such new identities in MMORPGs in particular (both in and out of game identities), suggesting that MMORPGs too might be a medium in which students might develop meaningful new identities. However, this has yet to be established in an educational context.

<div align="center">Inquiry-Driven Learning</div>

Another fundamental property of constructivist learning environments is that they facilitate inquiry-driven learning. Like Dewey (1916) and Bruner (1996), many constructivists believe that direct instruction is impossible and that educators should instead tap into students' interest in asking questions and discovering things about the world. Though constructivists have long maintained that their pedagogies can help, computers and video games can now be used to expand the opportunities students have to exercise their powers of inquiry (Shaffer, 2006b).

Active Learning

Active engagement of the student is a critical part of inquiry-driven learning. Dewey (1915, 1916) was interested in actively enlisting students' own dispositions and developing in them their own intrinsic direction. Later, Papert (1993) introduced children to computers in part because he was convinced that students' best learning takes place when they are in charge of the experience. The potential for games to offer opportunities

for active learning appeared in Prensky's (2001a) work when he suggested that students feel constrained when required to follow a single path or thought instead of being allowed to make their own connections (p. 54-55). Gee (2003) also illuminated the potential of video games to provide learners with opportunities for active learning – through his active critical learning principle (p. 39), the probing principle (p. 107), and the multiple routes principle (p. 108). Gee (2005b) encouraged educators and game designers to empower learners; he asserts that "good learning requires that learners feel like active agents (producers) not just passive recipients (consumers)" (p. 25). In this respect he felt that "the best commercial video games are already state of the art learning games" (Gee, 2005b, p. 1). This may be true of commercial MMORPGs as well, but this is not addressed directly in the literature.

Asking Questions

The heart of inquiry-driven learning is the opportunity for students to ask questions and seek answers (in an authentic or real-world context). In Dewey's (1938) ideal of progressive education, each student has a question of his own and is actively engaged in answering it – with structured support from the teacher. Bruner (1986), too, hoped to see a focus on supporting the process of inquiry. Today, some video games can provide both the opportunity for educational inquiry and the structure to support it (Jenkins et al., 2003; Klopfer and Yoon, 2005; Squire, 2003; Squire & Jenkins, 2004). However, it remains to be seen if this is true for MMORPGs.

Discovery Learning

An integral element of inquiry-driven learning, perhaps even the goal of inquiry-driven learning, is the possibility of student discovery. Dewey (1915) supported discovery learning in schools, but again cautioned a structured approach. Bruner (1966, 1971, 1996) also recognized discovery as an intrinsic motivator and crucial element of learning. In modern video games students can choose their own path through a structured environment via a process of exploration and discovery, which can be both meaningful and motivating for the student (Gee, 2003; Prensky, 2001a; Shaffer, 2005; Slator et al., 2006). Presumably, the same sort of experience is possible in the large scale virtual worlds of current MMORPGs, but this is not discussed in detail in the existing literature.

Problem Solving

This process of posing questions and discovering answers naturally encourages students to make new connections in their minds, the essence of building schema in the constructivist philosophy. Dewey (1916) sought this sort of problem solving in his method of education. Jonassen Howland, Moore, & Marra (2003) believed that "solving problems can… be the most meaningful kind of learning activity" (p. 20), especially during intentional learning, and he illustrated examples in WebQuests, web publishing, and virtual travel. Open-ended video games are another natural choice of technology to provide students with opportunities for problem solving that grows from their own goals and interests and has a potentially infinite number of resolutions (Shaffer, 2006b; Squire & Jenkins, 2004). The open-ended nature of MMORPGs suggests that they, too, might be able to perform this function, but again this is missing from the literature reviewed.

Self-Regulation

While educators can encourage inquiry and support student discovery, constructivists hope that students come to learn the importance of self-regulation (or discipline and diligence) in pursuit of their goals. Dewey (1915, 1916, 1938) felt so strongly about this that he considered it development of self-regulation in students to be the goal of his progressive method of education. Today, many students are interested in video games, but in order to master them, they must develop discipline (Gee, 2005b; Shaffer, 2006b; Squire & Jenkins, 2003). Players must be dedicated and disciplined to succeed in commercial MMORPGs and though it has yet to be illustrated in an educational context, this might be a useful attribute of the genre.

Individualized Learning

Because different individual students will ask unique questions and bring unique experiences to the learning environment, inquiry-driven learning is necessarily individualized. Dewey (1915, 1938) believed that if educators do not tap into students' personal experiences and interests, then students will approach their learning without hunger – and without vigorous inquiry. Bruner (1966), too, advocated for the personalization of learning by creating educational environments that allow students to be engaged in different ways and to progress through the curriculum in different ways. Prensky (2001) suggested that well-designed video games can provide an interactive environment which allows students to learn in this way, and which adapts to their needs. Many of Gee's (2003) 36 learning principles (that good games embody and many classrooms do not) addressed or necessitated an individualized learning experience.

Shaffer (2006b) was also interested in using video games to provide both multiple

pathways to learning and multiple ends for learning, depending on each student's

aptitudes and interests. Of course, the nature of students' individuality guarantees that no

educational game will appeal to all students. Koster (2005), a game designer, notes that

"since different brains have different strengths and weaknesses, different people will have

different ideal games" (p. 105). This truth of commercial game design has proven true in

classroom situations as well (Littleton, 2005; Squire, 2005). If MMORPGs are also an

appropriate format for such individualized instruction, which has not been addressed in

the literature, then they too may experience this limitation, but this remains to be seen.

Gateway Learning

One key to individualized learning, and to inquiry-driven learning in general, is to

discover something each student is interested in or passionate about – something that can

be used as a gateway to other learning. Dewey (1915) discussed the use of sewing, which

was then a vocational curriculum, as a point of departure for learning a variety of

subjects. Papert (1980, 1993), whose childhood love of gears lead to his love of

mathematics and computers, brought a similar philosophy to the use of educational

technologies; he felt that if students are to play video games, they should also program

video games. In this way a student's interest in video games themselves can provide a

gateway to other learning. This transfer of interest isn't limited to technical skills, though,

as an interest in video games can often engender interest in other knowledge, skills, and

media (McDivitt, 2005; Shaffer, 2006b; Squire, 2005). Though the literature does not

explicitly include an exploration of MMORPGs in this respect, they to may serve as a gateway to further student learning and are thus worthy of investigation.

Islands of Expertise

While student interests serve as gateways to new learning, students will develop islands of expertise that may be unique. Though many constructivists advocate helping students develop certain commonly important concepts, they tend to resist hegemony of the curriculum. Bruner (1966) noted that "we get interested in what we get good at" (p. 118), a phenomenon that creates a sort of positive feedback loop in which each student to develop islands of expertise in the areas that they are already interested in and good at. An island of expertise is "any topic in which children happen to become interested and in which they develop relatively deep and rich knowledge" (Crowley & Jacobs, 2002, p. 333, as cited in Shaffer, 2006a, p. 5). This expertise develops "as the culmination of a long series of collaborative interactions that are opportunistic and relatively unremarkable when viewed individually, but which collectively create a powerful linkage between understanding and interest. Shaffer's effort to use video games to help student develop epistemic frames, which "have a basis in content knowledge, interest, identity, and associated practices" (Shaffer, 2006a, p. 10), is very much an effort to help students develop new (and valuable) islands of expertise.

Relevance

Ultimately, by fostering inquiry-driven instruction, constructivists create a learning experience that is relevant to students because it taps into their interests, desires, and cares. Dewey (1915) believed that the best learning took place when it was relevant

to students and he aimed for progressive education to reflect students' desires. This principle is also at work behind the hope that video games can help students learn valuable skills. If important information is embedded into the game environment such that it is available on-demand and just-in-time to support student inquiry, then this information too will have greater relevance to the students (Gee, 2003). Relevance is also a key ingredient in Shaffer's (2006) explicitly educational epistemic games. It might be possible to build this sort of relevance into an educational MMORPG, but this has not been attempted or investigated.

Creativity

Ideally, students will learn to be innovative and creative as they ask their own questions and solve their own problems. Papert (1980) believed that creativity was an important part of the learning process, and Jonassen et al. (2003) suggested that video games, especially those that allow user creation with the game environment, can take advantage of this. Gee (2005b) also suggested that video games can provide learners with the tools necessary to manipulate elements within the learning context in order to help students feel empowered to be creative, and Aldrich (2005) acknowledged that players enjoy a simulation more if there are multiple paths to success and they are able to be creative with their solutions. In fact, many educational technologists and video game scholars have suggested that students should be creating their own video games (Aldrich, 2005b; Papert, 1993; Prensky, 2001a), or at least elements within a game (Shaffer, 2006b; Squire & Jenkins, 2004). As Steinkuehler (2005b) shared, MMORPGs too can inspire player creativity, however this has not been examined in an educational context.

Socially Negotiated Learning

A constructivist learning environment does not leave a student in isolation, but rather facilitates socially negotiated learning. Early constructivists believed not only that all learning is experience, but also that all experience is social - and that thus all learning is social. In fact, some social constructivists maintain that meaning is not so much made within an individual mind, but socially negotiated and shared between individuals. Now, modern video game scholars believe that video games and simulations, particularly multiplayer games, might be able to support such socially negotiated learning.

Experience is Social

Dewey (1916, 1938) believed that all human experience is social and that all social life is educational, but he felt that traditional schools often isolate students from educational social situations. Piaget (1950) also assigned a great deal of significance to "social factors in intellectual development" (pp. 171-182). Vygotsky (1997) thought that even individual cognitive development was a social process, and Bruner (1966) also considered thought an internal version of social dialog. Like these constructivist theorists, video game scholars such as William and Facer (2004) are similarly interested in the way computer games are situated within social contexts, the social environments created in or around games, and the "the potential applications of games practices to the formal educational setting" (p. 264). Others also discussed ways in which multi-player video games might provide a context for learning and a framework for collaboration (Gee, 2003, 2004, 2005c; Prensky, 2001, 2006; Steinkuehler, 2004b; Winograd, 2005). Though multi-player games appear in the literature, most are not massively multiplayer, and much

remains to be investigated regarding ways that MMORPGs might support a social learning experience.

Social Negotiation of Meaning

Early constructivists came to believe that meaning is not so much made within an individual mind, but socially negotiated and shared between individuals. Dewey (1916), for instance, believed that "meaning depends upon connection with a shared experience" (p. 15), and that "persons modify *one another's dispositions*" (p. 31, italics in original). Bruner (1986), who was even more concerned with the influence of culture on cognitive development wrote that "most of our approaches to the world are mediated through negotiation with others" (p. 68), and he went on to say that "it is this truth that gives such extraordinary force to Vygotsky's theory of the zone of proximal development (p. 68). Bruner (1996) was concerned with "the making and negotiating of meanings... the cultural 'situatedness' of all mental activity" (p. x), and shared negotiable ways of thinking. According to Bruner, "learning is an interactive process in which people learn from each other, and not just by showing and telling" (p. 22). He explained that intelligence is located not in a single head and "not only in your particular environment of books, dictionaries, and notes, but also in the heads and habits of friends with whom you interact, even in what socially you have come to take as given" (p. 154). Bruner was also careful to point out that "making sense jointly need not be *hegemony*... nor unanimity, but more consciousness. And more consciousness always implies more diversity" (p. 96-97, italics in original).

Today many social constructivists maintain that "access to knowledge, including literacy, is socially constructed" (Cutts-Dougherty, 1991, as cited in Dixon-Krauss, 1996, p. 176). Game scholars Squire and Jenkins (2004) note that even in effective military simulations, "learning is guided by more experienced members of the military community, and the meaning of these activities is negotiated through social interactions" (p. 9) These philosophies are now evident in many modern volumes on video games and learning, most notably including Gee's (2003) and Shaffer's (2006) work, but these do not focus on MMORPGs in any detail.

Scaffolding

The concept of the ZPD has given rise to the concept of scaffolding, which suggests that teachers can provide structure and support for students as they build their own understanding. Not only can teachers provide this structure, but also so can peers, especially those with greater expertise (Bruner, 1996). Video games and simulations can be used to offer students scaffolding - opportunities for error correction, the expansion of their horizons, and the development of new patterns of investigation (Jenkins et al., 2003; Shaffer, 2004; Squire & Jenkins, 2004).

MMORPGs in particular inherently provide a measure of social scaffolding. Steinkuehler (2004b) notes that MMORPGs "are not mastered by overt instruction but rather through apprenticeship" (p. 5). As Steinkuehler (2004b) pointed out, "newcomers [in an MMORPG] learn the game through full participation in genuine game play with more knowledgeable/skilled others… [they] have to play with others if [they] ever hope to develop genuine expertise" (p. 7). Steinkuehler (2006b) also observed that "gamers

who have already mastered the social and material practices requisite to game play

enculturate, through scaffolded and supported interactions, newer gamers who lack such

knowledge and skill" (p. 3). She explained the way a more experienced MMORPG

player:

> scaffolds her students by modeling successful performance, focusing her attention
> on key material, social, and contextual aspects that are crucial to its success...
> entrusting more and more control over the ongoing actions to the apprenticeship,
> and allowing numerous opportunity for practice and situated feedback.
> (Steinkuehler, 2004b, p. 7)

These attributes of MMORPGs have been studied in commercial games, but not

in an explicitly educational game. More research is required to identify the value of

MMORPGs in providing scaffolding to students for intentional academic purposes.

Culture Impacts Development

The culture (or cultures) within which learning takes place can affect student

development, making the culture of the learning environment another important aspect

for educators to consider. Dewey (1915) saw the school as a community with its own

culture and was particularly interested in its relationship to other forms of social life.

Culture was also important in Vygotsky's (1978) work, as he focused on the

sociohistorical elements of development rather than the biological. Bruner (1996), too,

believed that culture played a larger role in individual learning and development than

biological factors, and he eventually came to consider himself not a constructivist, but a

culturalist.

Bruner (1990) also discussed the importance of narrative, including fictional and

empirical narratives, in creating and passing on knowledge. Naturally, video games,

particularly role-playing games, can provide a narrative structure for meaning-making and the social negotiation of meaning, and this property of role-playing games might be harnessed for intentional educational purposes. Bruner (1996) believed that "education must be conceived as aiding young humans in learning to use the tools of meaning-making and reality construction" (p. 20), so it follows that any such games would need to contribute to this purpose. Video games have the potential to be something "a culture does to assist the development of the powers of mind of its members is, in effect, to provide amplification systems to which human beings, equipped with appropriate skills, can link themselves" (Bruner, 1971, p. 53). Though Gee (2003) and others touch on the social elements of video games, the element of culture is relatively absent from the literature, even with respect to role-playing games, including MMORPGs.

Cooperation and Collaboration

In order to support social negotiation of meaning, one aim of a constructivist learning environment is to promote cooperation and collaboration between students, as opposed to isolating students and placing barriers between them. According to Dixon-Krauss (1996), cooperation and collaboration make up the backbone of Vygotsky's theory of social teaching and learning. In the wake of such constructivists, Prensky (2001, 2004a, 2004b) saw the potential of video and computer games to provide support for cooperation and collaboration, and he considered interaction between players more important than their interaction with the computer running the game (or with nonplayer characters in a game). Like Prensky, Gee (2003) also found value in games as a framework for cooperative and collaborative learning among what he called affinity

groups, and Shaffer (2004) found that collaborative learning in games can be competitive as well as cooperative. Explicitly educational games can provide opportunities for both cooperative and competitive student collaboration (DeKanter, 2005).

When Gee (2003) addressed multiplayer games, including MMORPGs such as *Everquest*, he wrote explicitly about learning as a social process that happens in the game (p. 169). However Aldrich (2004, 2005) dismissed MMORPGs as an ineffective format because of the logistical issues related to getting students in the same virtual place at the same time, the games' unreliability in creating genuine role-playing, and the general lack of replayability. Given this disagreement in the literature regarding the value of MMORPGs for encouraging cooperation and collaboration among students, additional research is justified.

Transfer

Constructivists maintain that the skills that students develop when collaborating in a learning community will transfer to real-world contexts more successfully than those skills developed in isolation using traditional teaching techniques. Shaffer's (2004) research showed that skills acquired in simulated negotiation not only helped players of an epistemic game acquire real-world negotiation skills, but also helped students understand the issues involved from multiple perspectives. Ultimately, Shaffer (2006a) argued that games based on socially valued practices "have the potential to help students develop ways of thinking that persist beyond the game environment… [and to thus] provide an alternative model for organizing our educational system" (p. 19). Though others have noted that the skills learned by guild leaders in MMORPGs transfer well to

the business world (Carstens & Beck, 2005), it has not been shown that MMORPGs

could be used to develop knowledge that would transfer into other academic contexts.

Social Relevance

Ideally, constructivists hope not only for a transfer of skills, but also that the

learning occurring in schools will itself have relevance to the student and to the greater

society as well. Dewey (1926), in particular, was concerned with education's social ends

and wanted to see an education system that was both relevant to society and actively

promoting positive social change. Modern video game scholars also subscribe to this

need for social relevance. Shaffer (2004), for instance, looks to epistemic games as a way

to teach ethics; in one case study, "enacting professional learning practices helped…

students think about ethical dilemmas" (p. 1414). Existing MMORPGs fall primarily into

the genres of science fiction and fantasy. Their relevance to contemporary society may be

said to be low, and they are certainly not explicitly focused on social change. It remains

to be seen if they can be made to be more socially relevant.

Video Games Are Social

Many video game scholars maintain that video game playing is often a deeply

social experience and that well designed games can provide a learning environment that

facilitates socially negotiated learning. Squire (2003) asserted that gaming is a

fundamentally social phenomenon and that video games generate rich social interactions.

Later, Shaffer et al. (2005) noted that video games create new social and cultural worlds

that help players to learn. Shaffer (2005) explained that video games can offer virtual

worlds in which students can interact, and he believed that video games could help bring together communities of practice.

MMORPGs Are Social

MMORPGs are inherently social, requiring dialog, cooperation, and collaboration between players. Learning communities and communities of practice are commonplace in MMORPGs and though it may not be common among casual players, the games are designed to promote role-playing within the environment.

Jonassen et al's (2003) discussion of building technology-supported learning communities on the Internet is significant for its approach to MUDs, MOOs, and role-playing games. In contrast to the usual classroom dynamic where students are "disconnected or competing with each other" (p. 72), Jonassen was interested in fostering learning communities where students "share common learning goals or interests" (p. 72), and where emphasis is "placed on the social and cognitive contributions of a group of learners to each other, with students collaborating and supporting each other" (p. 73). MUDs and MOOs can support such learning communities by "engaging learners in high-level conversations that support personal reflection" (p. 101). MUDs and MOOs were originally text based, but modern MMORPGs now offer similar experiences in 3D graphical virtual environments. In the text based games, "visitors not only interact, but, depending on their level of experience, can participate in the design and construction of the environment itself" (p. 101) and this is beginning to be true of graphical games as well; most allow players to craft items, and some, such as Linden Lab's *Second Life* rely on user creation of almost all elements of the online environment.

Such an environment might be ideal for sort of mentoring that Jonassen et al. (2003) advocates (pp. 108-109), and could also be an environment in which a teacher could foster community, provided the infrastructure would allow for communication – especially feedback (p. 111), attention to student differences (p. 111), shared culture (pp. 111-112), adaptation to the needs of student groups (p. 112), dialogue (pp. 112-113), access to information (p. 113), membership (pp. 113-114), and motivation (p. 114). Jonassen et al. offered the advice to teachers that "the concept of learning communities is [only] an ideal" (p. 114), that "technology, resources, and models can help" (p. 115), that "it's not all or nothing" (p. 115), and to "respect [their] own knowledge and situation" (p. 115).

Steinkuehler (2006a) shared a view of "*cognition as (inter)action in the social and material world*" (p. 3, italics in original), and she considered MMORPGs to be "social simulations" (2006b, p. 4). She explained that MMORPGs are "learning environments, albeit naturally occurring, self-sustaining, indigenous ones dedicated to play rather than work or school" (p. 3). Her ethnographic work lead her to characterize MMORPGs as "rich settings for reciprocal forms of teaching and apprenticeship, [because] successful in-game problem solving often requires access to the collective intelligence… of the communities attending them" (p. 3). She considered such games to be "rich spaces for social interaction and enculturation, requiring complex cognitive/cultural knowledge and skills" (2006a, p. 25) and she believed they operated as "sites for socialization, enculturation, and learning" (2005, p. 30).

Squire and Steinkuehler (2006) stated that "understanding [MMORPGs] as cultures and not just environments is crucial… [because] these communities are defined by and through their cultural practices – the shared customs, procedures, rituals, and beliefs" (p. 3). They also maintained that "despite frequent public dismissals and indictments, [MMORPGs] do constitute complex and nuanced sets of multi-modal social and communicative practices" (p. 4). After all, as Steinkuehler and Williams (2006) pointed out, "the basic medium of multiplayer games is communication" (p. 11). MMORPGs allow "*socially [and] materially distributed cognition* [to] aid [players] in unpacking the situated interactions of individuals with their environment, tools, artifacts, representations, and other actors" (Steinkuehler, 2005b, p. 96, italics in original).

According to Steinkuehler (2008), MMORPGs are sites for socially distributed cognition, collaboration, and meaning-making. She noted that in MMORPGs, players can take on not only new identities, but also new social roles. Ultimately, MMORPGs are "complex social spaces of affiliations and disaffiliations, constructed largely out of shared (or disparate) social and material practices" (p. 24). Steinkuehler's work also highlighted several shared elements in MMORPGs, including interests, goals, activities, discursive resources, textual practices, social interaction, ways to coordinate, folk theories, systems of value, and epistemologies (p. 18-19).

In addition, Jenkins, Klopfer, Squire, and Tan (2003) found that multiplayer games, including MMORPGs, are living communities in which each player has different experiences, and in which players become a social community full of differing opinions and competing interests. Squire and Steinkuehler (2006) also noted that MMORPG

communities evolve based on a combination of both the designers' and the players' intentions. Like other video games, MMORPGs can also generate rich social interactions outside of the games themselves, and gamers use the game to create their own cultural artifacts and social interactions (Steinkuehler, 2008). It is this highly social nature of MMORPGs that suggests they might be an effective medium for the social negotiation of meaning in a formal K-12 educational context, but this has not been the subject of any formal research.

<div align="center">Reflection and Metacognition</div>

A fifth fundamental property of constructivist learning environments is that they support reflection and metacognition. Reflection can be a powerful mechanism for meaning-making, particularly as students sort out relationships between the actions they take, the consequences of their actions, and other variables affecting their experiences. Metacognition, the practice of thinking about one's own thinking (including decision making and strategies), is also a powerful tool for students to promote their own cognitive development.

Supporting Reflection

Dewey (1916, 1938) and Bruner (1986, 1996) both highlighted the importance of reflection in education – and in life. Jonassen (2003), who followed in the constructivist tradition of Dewey and Bruner, called for educational technologies to be used to support reflective education rather than what he called prescriptive education (p. 15). Video games may be a natural technology for encouraging such reflective education. Players already reflect on the games they play (Gee, in press, as cited by Squire and Steinkuehler,

2006, p. 16; Prensky, 1996), but meaningful reflection is more likely to occur if time is

set aside after gameplay for the explicit purpose of debriefing and reflecting on the action

(Aldrich, 2004; Prensky, 2006; Shaffer, 2006b). Even a commercial off the shelf game

such as *SimCity* or *Civilization III* could be used to support student reflection in this way

(Shaffer, 2006b; Squire, 2003). The strategic nature of MMORPGs may inherently

require more reflection of players even without additional debriefing, but with teacher

support more might also be possible. However, neither supposition has been formally

explored in detail.

Supporting Metacognition

Constructivists such as Bruner (1996) have been interested in the role of

metacognition in learning for years. Papert (1993) suggested that educators encourage

"learning about learning" (p. 49-50) by "engaging children about strategies for learning"

(p. 50) when they are playing video games. In the same tradition, Gee (2003) saw the

importance of being able to think about new learning in video games "at a 'meta' level as

a complex system of interrelated parts" (p. 23). Designers of video games and elearning

games also consider metacognition an important part of the game, especially when

learning is the goal (Iverson, 2005; Quinn, 2005; Salen & Zimmerman, 2004). Some

game scholars focus on the metagame, the conversation and other interactions that take

place outside the formal boundaries of a game (Salen & Zimmerman, 2004; Squire &

Jenkins, 2004). Others focus on meta-rules, or rules that state "how rules can be changed"

(Frasca, 2003, p. 232), and games' meta-narratives, or "all the divergent options and

trajectories within the game world" (Grodal, 2003, p. 153). Steinkuehler (2006b) was

specifically interested in the metastrategies developed by MMORPG players, and the way they debrief and theorize about games (p. 3). These practices of MMORPG players commonly lead them to become part of a social meta-group, or a group outside of the game that revolves around the game (Freeman, 2004, p. 2411-2412). It remains to be seen how such strategies or meta-groups might impact formal learning.

Reflection and MMORPGs

MMORPGs may offer opportunities for groups of students to reflect on the consequences of their in-game actions – perhaps using formal processes such as after action reviews. Jonassen (2003) noted that "internet-based multiuser environments [such as MUDs, MOOs, and MMORPGs]… are engaging learners in high level conversations that support personal reflection" (p. 101). Prensky (2001), too, noted that RPGs and MMORPGs can include elements of reflection (p. 167), the inclusion of which Prensky (2001b) considers "one of the most interesting challenges and opportunities" of teaching digital natives (p. 5). As Jenkins et al. (2003) pointed out, "the power of a multiplayer game is that it is a living community… students [can] pull back from the immediate play experience and reflect on the choices they have made" (p. 9). Steinkuehler (2006b) suggested that MMORPG game play "includes all the traditional characteristics of problem solving… [including] debriefings [and] theorizing about the problem space" (p. 3). These practices of MMORPG players commonly lead them to become part of a social meta-group, or a group outside of the game that revolves around the game (Freeman, 2004, p. 2411-2412).

Social Change

A constructivist learning environment is not complete without explicit social

goals. Societal development is as much a part of the constructivist philosophy as

individual development. Constructivist thinkers have long focused on the cultural

importance and implications of educators' work. Modern educational technologists and

video game scholars, too, are concerned with how educational technologies, including

video games and simulations, can effect positive social change.

Constructivists and Social Change

Largely due to the influence of his wife, Dewey was interested in the study of

education as a force for social change (Mooney, 2000, p. 1). Dewey (1915) considered

school the key to a harmonious society and expected schools to broaden students'

horizons and prepare them for a life of service to society. For Dewey (1926), a part of

this preparation of students for social service was an effort to develop their moral

character. Equity and diversity were also important to Dewey (1926). He was concerned

with providing such a moral education not only to upper class students, but also to all

members of the democracy (p. 290). Ultimately, Dewey wanted students to have the

"desire and ability to share in social control, the ability to become masters of their [own]

fate" (p. 320).

Rieber and Robinson (2004) characterized Vygotsky's learning theory as "a

theory of cultural transmission" (p. 172). In short, Vygotsky (1997) saw education as a

means to a social end and as a powerful tool for social change. Echoing Dewey and

Vygotsky, Bruner (1966, 1986) also suggested that in the modern world, society needs an

education system designed to effect social change. This rested on his belief that "at the heart of any social change one often finds fundamental changes in regard to our conceptions of knowledge and thought and learning" (Bruner, 1986, p. 121). He also wanted each individual student to develop a sense of self that allows him to become " a member of the culture-creating community" (p. 132). He saw successful schools as countercultures (Bruner, 1996, p. 82) and challenged educators to "move beyond regulations, [and to] focus on renewal" (p. 85).

Video Games and Social Change

Shaffer was interested in just this sort of renewal. His work was not so much about "how computer and video games can help kids do better in school… [but rather] about how computer and video games can help adults rebuild education for the postindustrial, high-tech world by thinking about learning in a new way" (Shaffer, 2006b, p. 5) Among other things, his epistemic games aimed to help students understand how their actions impact society (p. 135). Like Bruner, Shaffer was explicitly interested in educational equity across demographics and saw video games as a way that all children could have access to powerful learning experiences (p. 8). However, he acknowledged the conflict between the culture of games and the culture of school, and the difficulty teachers have finding the time and support to pursue the innovative use of video games and simulations in the current educational culture, particularly in the United States (p. 183). These issues will need to be explored further if video games, including MMORPGs, are to be used in formal K-12 education.

Shaffer et al. (2003) wrote that "video games have the potential to change the landscape of education as we know it" (p. 111). They urged that games be designed with "sound theories of learning and socially conscious educational practices" (p. 111). However, they also noted that the theories of learning embedded in video games as a medium run counter to the presiding theories of learning in schools. Elsewhere, Squire and Jenkins (2004) explained that games may be viewed as suspect in an era when the value of instruction is measured by standardized tests (p. 30).

Even so, other recent literature explores ways in which video games can be explicitly used for purposes other than entertainment. Michael and Chen (2006) discussed games meant to educate, train, or inform. These serious games include games for change such as *Food Force*, *Peacemakers*, and *A Force More Powerful*, which hint the power of video games to not only educate, but to effect positive social change of the sort Dewey and other early constructivists sought. Bogost (2007) explained that "video games are an expressive medium" (p. vii) and suggested that "video games open a new domain for persuasion, thanks to their core presentational mode, procedurality" (p. ix). He concluded that "video games can... disrupt and change fundamental attitudes and beliefs about the world, leading to potentially significant long-term social change." In his work, he highlighted "three domains in which video game persuasion has already taken form and still has great promise: politics, advertising, and learning" (p. ix). More research is required to explore how MMORPGs might best be used as procedural rhetoric in these domains.

In the wake of constructivists such as Bruner, even game designers Salen and Zimmerman (2004) believed that games are one way in which society passes on its values and that some games can actually transform the culture around them. They discussed the use of games (and game design) as cultural resistance focusing on culturally transformative play (p. 569). This is the aim of many serious games, which are meant to use players' leisure time to broaden their horizons and motivate them to service in ways that might have excited Dewey.

Unlike narratives such as a history text, a game or simulation is built on the basic assumption that change is possible (Frasca, 2003). However, the game designer(s) agenda can "slip into the game's inner laws" (p. 233). This ability to model reality for students can be put to good use by game designers and educators to effect positive social change, but it can of course also be abused. An important part of game literacy or simulation literacy is understanding that the underlying rules of a game, including a serious game, may not necessarily model reality accurately. The player must consume this new media at least as critically as a reader would consume the printed word. Issues such as this need to be much better understood and explored if games, including MMORPGs, are to be used in formal education.

MMORPGs and Social Change

MMORPGs may be a particularly powerful genre of game for effecting positive social change. Steinkuehler and Williams (2006) found that MMORPGs "function as one novel form of a new 'third place' for informal sociability" (p. 2). These games are low profile, playful, accessible, and accommodating neutral grounds (and social levelers)

where conversation is the main activity and where regulars can find a home away from home (p. 8-17). Steinkuehler and Williams noted that participation in MMORPGs "affects participants' social capital in terms of both broad but week social networks… and deep but narrow social networks" (p. 3). They found that MMORPGs can also serve as "a window into new worlds of people and ideas" (p. 22) and that players have the ability to "explore, construct, and resist" dominant culture (p. 13). In terms of formal K-12 education it may be even more important that in MMORPGs it is common for teenagers to mentor "adults twice their age and education in how to lead" (p. 20) and that "large percentages of MMOGamers play online with 'real life' romantic partners, family members, co-works, and friends" (p. 15). Though the genre is largely untapped for education purposes, these properties suggest that MMORPGs may be an ideal format for a serious game, though no such game has been developed. Of course, this potential will require further study.

<div align="center">The Delphi Method</div>

The Delphi method is used to help a group of purposefully selected experts come to a consensus regarding the answer to a question, particularly if the answer involves a phenomenon about which little is known or requires making predictions about the future (Skulmoski, Hartman, & Krahn, 2007). The Delphi method is a flexible technique with many permutations (Linstone and Turoff, 1975, p. 3). Rowe and Wright (1999) noted that Delphi is often used in the field of education in particular. Hartman (1981) concluded "the Delphi technique is a forecasting tool with proven benefits for long-range educational planning" (p. 495).

The Delphi method is thus an appropriate choice for this present study. The field of video games and learning is only in its infancy; it is not well defined, well understood, or well quantified. In the case of this present study, the questionnaires will focus on forecasting the potential benefits and drawbacks of using MMORPGs in formal K-12 education.

History of the Delphi Method

The Delphi method is named for the Greek Oracle of Delphi where it was said that the god Apollo could predict the future by speaking through a number of priests who functioned as informants - and as multiple data sources (Bowles, 199; Kennedy, 2004, as cited in Baker et al., 2006, p. 60; Williams & Webb, 1994). Though "the first Delphi-type study sought to forecast the outcome of horse races" (Bowles, 1999, p. 32), formal use of the Delphi technique began with defense research conducted by the RAND Corporation for the United States government in the 1950's (Helmer & Rescher, 1959, cited in Williams & Webb 1994, p. 181). Dalkey and Helmer, who worked for the RAND Corporation, then published a study in 1963 and are often credited as the developers of the formal Delphi method (Baker et al., 2006, p. 60). Following their work, the Delphi method became more widely used (Bowles, 1999, p. 32). Today the Delphi is a well-established mainstream research method used by a wide variety of organizations in a wide variety of fields (Baker et al., 2006; Bowels, 1999; Ludwig, 1997; Rowe and Wright, 1999; Williams & Webb, 1994). Even so, the Delphi is considered "an under-used methodology" (Ludwig, 1997, p. 1). In recent years, the Delphi, which was traditionally administered by mail, has often been administered by email (the e-Delphi) or

via the Web (the Web Delphi) (Wong, 2003, p. 18), making it an even more attractive choice for 21st century researchers, particularly when the experts involved can be expected to have the necessary technical savvy.

Key Features

The classical Delphi has four key features. These are anonymity of the participants (from each other), various iterations of the survey instrument (or instruments), controlled feedback, and statistical aggregation of group response (Rowe & Write, 1999; Skulmoski et al., 2007, p. 3). As Rowe & Wright (1999) explain, "anonymity is achieved through the use of questionnaires" (p. 354). There are many versions of the Delphi method, but in all "anonymity of respondents during the process is an important aspect" (Ludwig, 1997, p. 1) This allows iterations to be productive, because "with the iteration of the questionnaire over a number of rounds, the individuals are given the opportunity to change their opinions and judgments without fear of losing face in the eyes of the (anonymous) others in the group" (p. 354). The mechanism for this is the controlled feedback provided by the researcher between rounds so that the participants "are informed of the opinions of their anonymous colleagues" (p. 354). Though many classic Delphi studies include statistical aggregation of group responses in a quantitative form, some studies have also been conducted in a purely qualitative fashion (MG Taylor Corporation , 1983; Skulmoski et al., 2007).

Overview of the Process

According to Skulmoski et al. (2007), "the Delphi method is an iterative process to collect and distill the anonymous judgments of experts using a series of data collection

and analysis techniques interspersed with feedback" (p. 1). In Figure 1, Joppe (n.d.)

provides a simple illustration of the Delphi process.

Flowchart for the Delphi Method

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                    ┌─────────┐
                    │  Start  │
                    └────┬────┘
                         ▽
              ┌────────────────────┐
              │ Problem definition │
              └─────────┬──────────┘
                        ▽
          ┌───────────────────────────┐
          │ Select panel members based│
          │  on the expertise required│
          └─────────────┬─────────────┘
                        ▽
      ┌─────────────────────────────────┐◁─────────┐
      │ Prepare and distribute questionnaire│      │
      └─────────────────┬───────────────┘          │
                        ▽                           │
      ┌─────────────────────────────────┐          │
      │ Analyze questionnaire responses │          │
      └─────────────────┬───────────────┘          │
                        ▽                           │
                   ╱─────────╲                      │
         ┌─────╲ ╱   Has a    ╲                     │
         │ Yes  ╳   consensus  │                    │
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                   ╲─────────╱                      │
                        │                           │
                      (No)                          │
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      ┌─────────────────────────────────┐          │
      │ Provide requested information   ├──────────┘
      │    and tabulated responses      │
      └─────────────────────────────────┘

      ┌─────────────────────┐
    ▷ │ Develop final report│
      └─────────────────────┘
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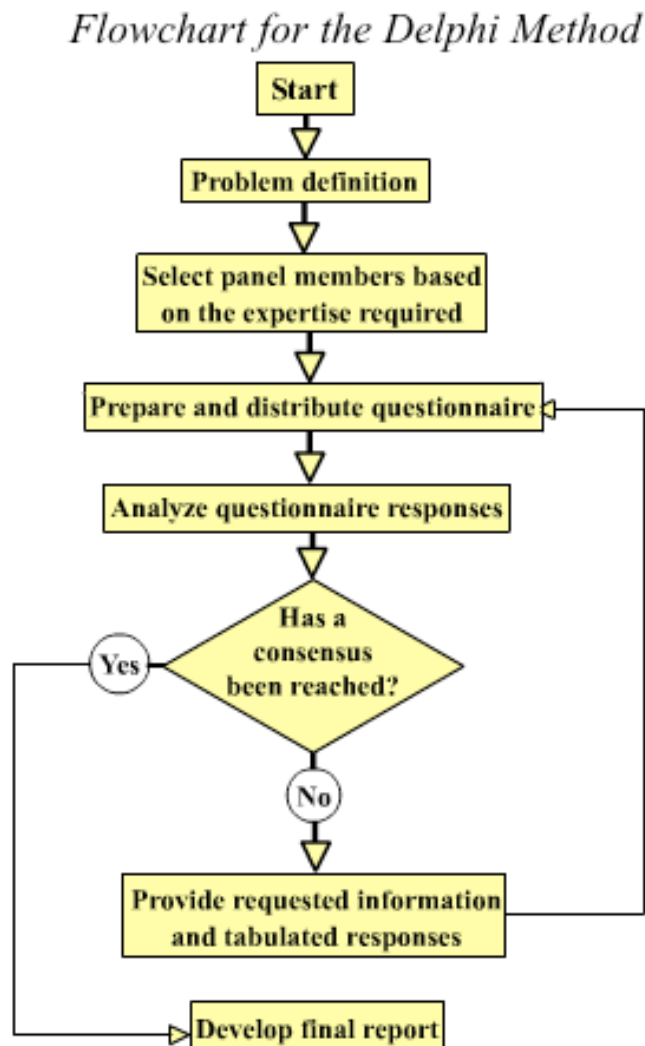
Figure 1: Flowchart for the Delphi Method (Joppe, n.d.)

Though it can take several forms, the first round questionnaire usually consists of

one or two broad open-ended questions meant to gather a wide range of responses from

the expert panel (Ludwig, 1997; Skulmoski et al., 2007). The second round questionnaire then includes two major parts: a review of the first round responses, and an additional round of more structured questions written in light of the first round responses (Ludwig, 1997; Okoli & Pawlowski, 2004; Skulmoski et al., 2007). This process usually continues for at least one more round, or until consensus is reached by the expert panel (Ludwig, 1997; Okoli & Pawlowski, 2004; Skulmoski et al., 2007).

Experts and Consensus

The selection of experts to participate in a Delphi panel is critical to the success of a Delphi study. The quality of the results depends directly on the expertise of the participants (Rowe & Wright, 1999). Unfortunately, this is "the most important yet most neglected aspect of the Delphi method – choosing appropriate experts" (Okoli & Pawlowski, 2004, p. 16). Though there is no widely accepted definition of expert used in all Delphi studies, Baker et al. (2006) have identified three key elements of expertise: demonstration of knowledge through publishing books or peer-reviewed articles, demonstration of experience through professional qualifications and accomplishments, and demonstration of formal authority though ability to influence policy. Skulmoski et al. (2007) also suggest that Delphi participants should meet four requirements to be considered experts fit for the study; they must not only demonstrate knowledge or experience, but must also have the capacity, time, and communication skills necessary to participate.

The conclusion of a Delphi study occurs once the participating experts reach a consensus. However, establishing how to determine consensus is also sometimes

overlooked by researchers. One definition of consensus that has been used is that the results are "at least acceptable to every member, if not exactly as they would have wished" (Reid, 1988, as cited in Williams & Webb, 1994, p. 182). Williams and Webb (1994) also recommend specifying a range of consensus levels at the outset of a Delphi project in order to be able to identify a high level of consensus or a low level of consensus in the final findings.

Strengths and Criticisms

The Delphi method has a variety of strengths. Chief among them is its flexibility and usefulness in a wide range of situations (Okoli & Pawlowski, 2004; Skulmoski et al., 2007; Williams & Webb, 1994). The Delphi method also allows for the development of consensus among experts while reducing the effects of ego, defensiveness, and a tendency to bandwagon present in face-to-face meetings (Williams & Webb, 1994). Other benefits include the use of an expert panel, controlled anonymous feedback (with less pressure on panel members to conform than in a committee), systematic refinement, development of consensus, and easy, inexpensive access to a large number of experts who may be geographically distant (Bowles, 1999, p. 32). Those who read and evaluate the study will appreciate that "the uniqueness of Delphi lies in its reliability, given the variableness of human opinion" (Bourgeois, Pugmire, Stevenson, Swanson, and Swanson, n.d., p. 1).

Despite its evident strengths, there are significant concerns and criticisms related to the Delphi method. The flip side of the Delphi method's flexibility is the lack of specific guidelines for implementing an effective Delphi study (Williams & Webb,

1994), the lack of a widely accepted definition for consensus or expert (Williams &

Webb, 1994; Bowles, 1999; Baker et al., 2006), and the lack of an accepted ideal panel

size (Bowles, 1999). In addition, participants with extreme views are less likely to

complete a Delphi process and this attrition might effect response bias (Bowles, 1999;

Rowe & Wright, 1999; Williams & Webb, 1994). Another concern related to participants

is a challenge to the value of anonymity when valuable data may be lost because panelists

cannot interact directly (Bowles, 1999). There is even concern over the Delphi's

reliability, especially given the potential for researcher bias throughout the process

(Bowles, 1999; Ludwig, 1997; Williams and Webb, 1994). In addition, "all the

questionnaire design issues of a survey also apply to a Delphi study" (Okoli &

Pawlowski, 2004, p. 19). Finally, Bowles (1999) raises a concern over the cost of the

Delphi due to the multiple iterations.

<div align="center">Other Potential Methodologies</div>

Rowe and Wright (1999) compared the Delphi method to other comparable

methods by examining which predictions were more accurate. Delphi was more accurate

than "staticized group" by 12 cases to 2 (p. 364), and more accurate than "interactive

groups" by 5 cases to 2, with 2 "ties" (p. 365). Several other methods were also found to

be less accurate than the Delphi (p. 366).

Okoli and Pawlowski (2004) "judged the Delphi method to be a stronger

methodology (than traditional surveys) for a rigorous query of experts and stakeholders"

(p. 18). Furthermore, the Delphi has many of the same advantages of traditional surveys.

For instance, "Delphi is desirable in that it does not require the experts to meet

physically, which could be impractical for international experts" (p. 18). Also, "the questionnaire can include questions that solicit quantitative or qualitative data, or both" (p. 19). More importantly, "non-response is typically very low in Delphi surveys since most researchers have personally obtained assurances of participation" (p. 19).

Okoli and Pawlowski (2004) also suggested that the Delphi method "permits the collection of richer data leading to a deeper understanding of the fundamental research questions"(p. 18) than is possible with other comparable methods. Janio (2007) pointed out that the Delphi method has several advantages over traditional methods of phenomenology, grounded theory, ethnography, and case studies (p. 89). Unlike in a phenomenological study in which the researcher must "consciously suspend any previously held views and expectations… the Delphi method focuses on actively seeking professionals who are already familiar with the phenomena studied" (p. 90). Similarly, the panel of experts is missing from a traditional grounded theory study (p. 91). A Delphi study also allows the researcher to draw on the expertise of geographically distant experts, which would be impossible in an ethnographic study requiring immersion into a local culture (p. 92). A simple case study is similarly limited to a specific time and place (p. 93). Most importantly, all of the methods mentioned above fail to address the need to make useful predictions about the future.

Conclusion

This chapter included a detailed review of literature related to the use of video games as (or in) constructivist learning environments. This began with an overview of constructivist theory, followed by detailed discussion focused on elements of

constructivist learning environments: engagement and motivation, context-embedded learning, inquiry-driven learning, socially negotiated learning, reflection and metacognition, and effecting positive social change. This chapter also included a review of literature related to the Delphi method and other potential methodologies considered for this study. The following chapter presents a detailed discussion of the research method.

CHAPTER 3:

RESEARCH METHOD

This chapter provides a detailed discussion of the research method. It begins with an overview of the research design, including the qualitative research paradigm and the role of the researcher. The research context is described and justified, and details related to participant selection are shared, including measures taken for the ethical protection of the participants and the criteria for selecting participants. The data collection and data analysis procedures, including software to be used, are then explained. This is followed by a discussion of efforts taken to improve the credibility, transferability, dependability, and confirmability of the study. Finally, the results of a previous quantitative exploratory study are summarized.

Research Design

This study employed a qualitative Delphi method due to the relatively new and emergent nature of the field being studied. Because MMORPGs in particular are not actually currently being used for explicitly educational purposes (with the notable exception of *Second Life*, which, while massively multiplayer, is not technically a game in and of itself), there are no current or emergent phenomena to study. Therefore, the Delphi method was chosen in order to make predictions about the potential benefits and drawbacks of using MMORPGs in formal K-12 education.

Due to the lack of existing implementations of MMORPGs in education there is very little known about the potential benefits and drawbacks of such an implementation.

Statistical or model-based procedures are inappropriate in this context, and development

of an MMORPG for use with test subjects (and not with a control group) would require

time and resources far beyond what is available to the researcher. The researcher was

thus investigating something that does not exist yet. Because this topic of inquiry was not

yet well defined or quantified, a qualitative approach to the Delphi process was chosen.

Qualitative Research Paradigm

The foundation of this study was a social constructivist paradigm. Contemporary

constructivism rests on the belief that the human mind is constantly engaged in

developing subjective meanings from the environment in which it lives (Creswell, 2003,

p. 8; Jonassen et al., 2003, p. 3). Social constructivism in particular is built upon the

belief that this meaning-making is a process of social negotiation via dialogues or

conversations between individuals (Creswell, 2003, p. 8; Jonassen et al., 2003, p. 3).

Ontologically, social constructivists thus postulate "a world in which reality is socially

constructed, complex, and ever changing... [and in which] social realities are constructed

by the participants in... social settings" (Glesne, 1999, p. 5). Social constructivist

epistemology therefore requires that "researchers interact and talk with participants about

their perceptions... [and] seek out a variety of perspectives" (p. 5).

The most appropriate methods of inquiry for this paradigm are qualitative

measures, which Trochim (2001) defined as "any measures where the data is not recorded

in numerical form, [including] short written responses on surveys; interviews;

anthropological field research; video and audio data recording; and many other

approaches" (p. 152). These measures are especially appropriate in a social constructivist

context because "qualitative researchers are interested in understanding the meaning people have constructed, that is, how they make sense of the world and the experiences they have in the world" (Merriam, 1998, p. 6).

The research approach of social constructivists often generates hypotheses or new theory (Creswell, 2003, p. 6; Glesne, 1999, p. 6). Trochim (2001) also suggested that qualitative research can play an important role in developing new theory – and can help the researcher achieve a deep understanding of the related issues (p. 152). Because the development of new theory to guide educators and serious game designers is a goal of the researcher, and because the researcher hopes to gain a deep understanding of the related issues as a foundation for further exploration, a social constructivist approach to qualitative research is an appropriate foundation for this study.

Specifically, a Delphi inquiry is an appropriate method for use within this paradigm. As Okoli and Pawlowski (2004) pointed out, "researchers can use the Delphi method in a number of ways related directly to theory building" (p. 19). In this respect, the Delphi method is similar to the grounded theory method, in which "the researcher attempts to derive a general, abstract theory of a process, action, or interaction grounded in the views of participants in a study" (Creswell, 2003, p. 14). Like a grounded theory study, a Delphi study is also a "complex iterative process" (Trochim, 2001, p. 160) involving "multiple stages of data collection and the refinement and interrelationship of categories of information" (Strauss & Corbin, 1990, 1998, as cited in Creswell, 2003, p. 14). According to Leedy and Ormrod (2005), "the major purpose of a grounded theory approach is to begin with the data and use them to develop a theory" (p. 140). This

Delphi study also involved the practices of identifying core concepts, linking the participants' responses, coding responses, and aiming for conceptual density in the findings, as a grounded theory study might (Trochim, 2001, p. 160-161).

Role of the Researcher

As Creswell (2003) wrote, "qualitative research is interpretive research, with the inquirer typically involved in a sustained and intensive experience with participants" (p. 184). Furthermore, as Merriam (1998) pointed out, "in a qualitative study the investigator is the primary instrument for gathering and analyzing data" (p. 20). Defining the role of the researcher was therefore critical to the success of this qualitative study.

Merriam (1998) recommends that a qualitative researcher must have "an enormous tolerance for ambiguity" (p. 20), must be sensitive or "highly intuitive" (p. 21), and must be a good communicator who "empathizes with respondents, establishes rapport, asks good questions, and listens intently" (p. 23). Merriam also stressed the importance of being a careful observer when conducing qualitative research (p. 94). Though this study was not conducted face-to-face, these qualities were no less important to the researcher's success. The researcher was personally responsible for all aspects of implementing the Delphi process. He recruited all participants, composed all questionnaires (including summaries of previous responses), analyzed all data, and interpreted all findings. His careful observations of participant responses were critical to the success of this study.

Research Questions

As previously described in chapter 1, the purpose of this qualitative Delphi study was to understand the potential benefits and drawbacks of using MMORPGs as constructivist learning environments in a formal K-12 educational context. The study was guided by the following two overarching questions:

1. What are the potential benefits of using MMORPGs as constructivist learning environments in formal K-12 education?

2. What are the potential problems related to using MMORPGs as constructivist learning environments in formal K-12 education?

Additionally, based on the literature review and the expert panel's first round responses, the following questions were identified and were used to focus the study:

1. Motivation and engagement: How might MMORPGs be used specifically to motivate and engage students, and what problems might be associated with using MMORPGs for this purpose?

2. Context-embedded learning: How might MMORPGs be used specifically to provide a context for student learning, and what problems might be associated with using MMORPGs for this purpose?

3. Social learning: How might MMORPGs be used specifically to support social learning (including facilitated collaboration, cooperation, and competition), and what problems might be associated with using MMORPGs for this purpose?

4. Twenty-first century skills: How might MMORPGs be used specifically to help students develop 21st Century skills, and what problems might be associated with using MMORPGs for this purpose?

Following the expert panel's second round responses, two additional themes of consensus emerged as a focus for the third round and the final consensus check: the importance of providing students with frequent and structured time for reflecting on game play, and the infrastructure and logistical challenges related to implementing MMORPGs in schools.

Research Context

Unlike many studies, this Delphi study did not take place in a specific physical location. Instead, the entire study was conducted online. Communication with the participants was conducted via email, and all iterations of the Delphi questionnaire were collected via the web using SurveyMonkey.com. The online nature of the study allowed the researcher access to a geographically dispersed panel of experts. It also allowed the experts to participate in a way that is convenient and flexible enough to accommodate their individual schedules.

Access to Participants

Because the study did not take place at a particular site, physical access to the participants was not a concern. However, the researcher needed to contact each participant via email. In most cases, this was not a challenge; many of the video game scholars included in the literature review freely disseminate their email addresses along with their work. Academics were also accessible via the email addresses listed on their

institutions' websites. Naturally, game developers were also easy to contact via the email

addresses listed on their organizations' websites. The researcher also had met and

corresponded with many of the authors reviewed in chapter 2 and with many practitioners

in the field during the course of over 3 years researching the topic. Contacting them with

an invitation to participate in the study following IRB approval was a trivial task.

Researcher-Participant Working Relationship

The working relationship between the researcher and the participants was

established in the initial email invitation to participate. Following IRB approval of the

study, 71 potential participants received an email from the researcher that included the

approved Consent/Assent form describing the study, the participant's role in the study,

and the researcher's role in the study. The participant's role was to offer thoughtful and

complete responses to each iteration of the Delphi questionnaire, and to respond to the

researcher's email and other communications when necessary. As discussed above, the

researcher's role was to recruit all participants, compose all questionnaires (including

summaries of previous responses), analyze all data, and interpret all findings. The

researcher was the participants' sole point of contact regarding this study. Most

communication between the researcher and the participants was conducted

asynchronously via email, though instant messaging and the social microblogging service

at Twitter.com were used occasionally as well.

Measures for Ethical Protection of the Participants

Fortunately, the potential ethical issues related to this study were minimal. No

protected classes were involved and no participants were at risk of any harm as a result of

their participation (nor did any issues of a person's right to service come into play, as there was no service being rendered and no control group in the research design). Because the research was conducted via the web, there were no issues related to gatekeepers and access to research sites. Participation in this study was voluntary; that is, people were not coerced into participating in the research (Trochim, 2001, p. 24). To this end, the "research participants [were] told the nature of the study to be conducted and given the choice of either participating or not participating" (Leedy and Ormrod, 2005, p. 101). The researcher provided participants with "sufficient information to make informed decisions about participating in [this] study" (Glesne, 1999, p. 114) and received informed consent from each participant; each was "be fully informed [in writing] about the procedures and risks involved in [the] research" (Trochim, 2001, p. 24). The researcher also submitted the necessary documentation to the Walden University Institutional Review Board and received approval from the board before recruiting participants or beginning the study (IRB Approval # 12-03-07-0266040).

<div align="center">Criteria For Selecting Participants</div>

The expert panel consisted of 12 adult experts drawn from the field of video games and learning; experienced practitioners, academic researchers, and game developers were all represented in this population. Each participant selected was an expert who has demonstrated knowledge, experience, or formal authority in the field of video games and learning (Baker et al., 2006). Participants were also selected based on the degree to which they had the capacity, time, and communication skills necessary to

participate (Skulmoski et al., 2007). No consideration was given to other demographic factors.

Sampling

Because the study used the Delphi methodology, all of the participants selected were experts in the field being studied. For this reason, in a Delphi study, "randomly selecting participants is NOT acceptable" (Ludwig, 1997, p. 2). As the researcher actively recruited experts for this study, he was explicitly not using typical case sampling, network sampling, or convenience sampling, as defined by Glesne (1999). Instead, this study used a form of purposeful sampling, which "is based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (Merriam, 1998, p. 61).

The number of participants recruited for the Delphi panel varies widely, with metastudies revealing panel sizes usually ranging between 3 and 98 experts (Rowe and Wright, 1999) and some panels with over a hundred – or even several hundred – participants (Skulmoski et al., 2007). However, panel sizes of between 10 and 20 experts are generally recommended (Bourgeois et al., n.d.; Ludwig, 1997; Skulmoski et al., 2007)

There is a trade-off between quality of the Delphi results and the manageability of the study. As Skulmoski et al. (2007) explain, "there is a reduction in group error (or an increase in decision quality) as sample size increases. However, above a certain threshold, managing the Delphi process and analyzing the data becomes cumbersome in return for marginal benefits" (p. 10). Naturally, it is recommended that researchers use

"the minimally sufficient number of respondents" (Debecq, Van de Ven, & Gustafson 1975, as cited in Ludwig, 1997, p. 2).

In Delphi studies it is recommended that the researcher recruit at least two respondents for every question being investigated (Alder & Ziglio, 1996, as cited in Janio, 2007, p. 6). Based on the six subquestions articulated in the initial proposal, the researcher aimed to recruit at least 12 participants for this Delphi study. This number of participants also allowed the researcher to recruit approximately several participants in each of the primary subcategories of expert: practitioners, academics, and game designers. Additional participants were initially recruited in order to protect against attrition. However, in order to maintain a manageable panel size, the researcher at no time included more than double this number of experts (24) to participate.

Of the 24 participants who initially consented to participate in the study, 15 completed round one, 13 completed round two, and 12 completed both round three and the final consensus check. Of these final 12 participants, one authored a book on the subject, three were practicing K-12 educators who have implemented games with their students, four were university faculty who have either published research in the field or implemented video games in teacher education, and four were video game developers.

Data Collection

The data collected during this study were primarily qualitative written responses provided by purposefully selected experts in the field of video games and learning. The Delphi method requires collection of data via anonymous surveys. In recent years, the Delphi, which was traditionally administered by mail, has often been administered by

email or via the Web (Wong, 2003, p. 18). This study implemented the Delphi method via the web. The online survey service SurveyMonkey.com was used to conduct each iteration of the Delphi. Initial contact with the participants, as well as instructions for each round of the Delphi, were communicated via email.

Specifically, the researcher used the service at SurveyMonkey.com to distribute surveys and collect responses. This service allowed the researcher to compose a survey using simple online forms (or to cut and paste existing questions into these forms). The researcher then had a variety of options for disseminating the survey, including placing a link on an existing webpage or emailing a link to each participant. In this case, the researcher chose the later. Each email was sent separately so that participant identities were not revealed in the "To" or "CC" field of the message. Participants clicked on the link sent via email; this opened a web page, which presented the survey questions and prompted participants to enter their answers. Once participants had entered their complete responses they clicked a button to submit their answers. The researcher was then able to access and download participants' answers via the admin interface at SurveyMonkey.com.

The round one survey included only two broad and open-ended questions. These were identical to the research questions driving this study (See Appendix B: Round one Questionnaire). Written responses were collected from the expert panel via the online survey. Data were collected for round one over a period of four weeks; the winter holiday season necessitated extended deadlines and recruitment of additional participants in order to ensure ample participation.

In the second round of the Delphi, the questions were based on thematic summaries of participants' first round responses. The research subquestions were expected to be emergent in this way during the course of the Delphi study. Some of the second round questions focused on themes identified in the literature review because these were also dominant themes in the participants' responses. In addition, the researcher's analysis of the expert responses in the first round resulted in emergent themes, and thus generated new questions for round 2 (See Appendix C: Round 2 Questionnaire). The first four questions of in round 2 focused on four specific themes: motivation and engagement, context-embedded learning, social learning, and 21st Century skills. The fifth and final question in round 2 asked participants to choose among seven additional less prominent themes to identify the most important benefit or concern among them. Written responses for round 2 were collected from the expert panel via online survey over a period of nine days.

In light of the round 2 data, the round 3 questionnaire focused entirely on six thematic summaries of previous responses. These themes now included the four themes focused on in round 2, plus two new themes: the importance of reflection, and the infrastructure and logistical challenges likely to be encountered (See Appendix D: Round 3 Questionnaire). Participants were asked what they disagreed with most strongly in each summary and why. Again, written responses were collected from the expert panel via an online survey. Data collection for round 3 occurred over a period of 1 week.

Based on this round 3 data, a final set of six thematic summaries was composed and included in the final consensus check. Participants were asked to rate their level of

consensus with each summary on a well-defined quantitative scale from one to five (See Appendix E: Final Consensus Check Questionnaire). Participants were also invited to leave additional written comments related to the topic of each summary, particularly if there was anything in the summary with which they disagreed.

<div align="center">Data Analysis</div>

Following the collection of responses for each round of the Delphi survey, the researcher reviewed and analyzed the data. The first step in this process was to "organize and prepare the data for analysis" (Creswell, 2003, p. 191). Next, the researcher "read through all the data" (p. 191). This was important for the researcher to "obtain a *general sense* of the information and to reflect on its overall meaning" (p. 191, italics in original).

At this point, the researcher began a content analysis by conducting a "detailed analysis with a coding process" (p. 192). According to Creswell, "*coding* is the process of organizing material into 'chunks' before bringing meaning to those 'chunks'… It involves… segmenting sentences (or paragraphs)… into categories, and labeling those categories with a term" (p. 192, italics in original). Merriam (1998) defined coding as "nothing more than assigning some sort of shorthand designation to various aspects of your data so that you can easily retrieve specific pieces of the data" (p. 164), and Trochim (2001) defined it as "a process for categorizing qualitative data and describing the implications and details of these categories" (p. 160). These categories, according to Merriam (1998), should reflect the purpose of the research and be exhaustive, mutually exclusive, and all of the same level of abstraction (p. 184). Glesne (1999) explained coding as "a progressive process of sorting and defining and defining and sorting those

scraps of collected data… that are applicable to your research purpose" (p. 135). To facilitate this coding process the researcher used TAMS Analyzer for Mac OS X, an open source qualitative analysis tool that supports complex hierarchical codes. The coding process was especially appropriate for a Delphi study because it can help the researcher "develop a more specific focus or more relevant questions" (p. 133).

The results of the coding process were then used to "generate… themes for analysis" (Creswell, 2003, p. 193). Following the first and second iterations of the survey, these themes informed the composition of the next iteration of the survey. Following the third iteration of the survey and the final consensus check, these themes then served as the basis for the findings. In this final report, "a narrative passage [is used] to convey the findings of the analysis" (p. 194). Finally, in chapter 5 below the researcher made an interpretation as to the meaning of the findings (p. 194-195). At this point, the researcher was theorizing, or "thinking about data… [and taking] a step toward developing a theory that explains some aspect of educational practice and allows a researcher to draw inferences about future activity" (p. 188), which is the goal of a Delphi study. In this respect the researcher's role in the study was to build "from the data to broad themes to a generalized model or theory" (p. 132).

Because of the iterative nature of the Delphi study, the researcher's analysis of round 1 responses amounted to a form of early data analysis, in which "data analysis done simultaneously with data collection [enabled the researcher] to focus and shape the study as it proceed[ed]" (Glesne, 1999, p. 130). The researcher also kept a research log in order to practice memo writing (or memoing) "by getting [his] thoughts down as they

occur[ed], now matter how preliminary or in what form" (p. 131). As Merriam (1998)

pointed out, "data collection and analysis is a *simultaneous* activity in qualitative

research" (p. 151, italics in original), and "data that have been analyzed while being

collected are… illuminating" (p. 162).

The nature of the Delphi study also meant that the participants played a role in the

analysis of data as well. In addition to generating the responses to be analyzed, after each

iteration of the survey they received feedback from the researcher allowing the previous

responses (from other participants) to influence their responses on successive iterations of

the survey.

Discrepant Cases

Discrepant cases, or dissenting opinions, are particularly important to a Delphi

study. As an attempt was made to identify consensus among the participants, it was

critical not to minimize or marginalize dissenting opinions. As Glesne (1999) articulated,

"because real life is composed of different perspectives that do not always coalesce,

discussing contrary information adds to the credibility of [a study]" (p. 196). At each

stage of the Delphi process, when controlled feedback was offered to the participants,

dissenting opinions were highlighted as well, so that each participant could then make

their next responses in light of all opinions, not just that of the majority. Dissenting

opinions were reported in the findings presented in chapter 4. Possible reasons behind

these discrepant cases are discussed in the final chapter of this dissertation. Ultimately,

readers are able to make their own judgments about the credibility of any consensus that

may arise from the study based on exposure to the dissenting opinions as well as the summaries of general consensus.

Coding Procedure and Software

A coding procedure was used to make sense of the qualitative data following the collection of responses for each round of the Delphi survey. The researcher assigned shorthand designations to various sections of data in order to easily retrieve, categorize, and synthesize the data (Merriam, 1998, p 164). To support this process, the researcher used software that has been specifically developed for use with qualitative data. Participant responses were loaded into the Mac OS X version of the Text Analysis Markup System (TAMS) Analyzer. The researcher read several responses and made a list of all important topics represented in the responses; these topics were abbreviated as codes (Creswell, 2003, p. 192). The codes were then be applied to portions of text in all of the responses using the TAMS Analyzer software. This will be a cyclical and "progressive process of sorting and defining and defining and sorting… scraps of collected data" (Glesne, 1999, p. 135). Once themes, elements of consensus, and discrepant cases were identified for each round, these were included in the text of the controlled feedback (or thematic summaries) offered to participants as part of next round of the Delphi survey – and as part of the final consensus check.

Credibility, Transferability, Dependability, & Confirmability

In a qualitative study the terms validity and reliability are not applicable as they are in traditional quantitative research, but there are still clear steps the researcher can take to improve the quality of the study. Trochim (2001) shared "four criteria for judging

the soundness of qualitative research" (p. 162): credibility, transferability, dependability, and confirmability.

"The credibility criteria involves establishing that the results of the qualitative research are credible or believable form the perspective of the participant in the research" (Trochim, 2001, p. 162). This form of credibility is to some degree integrated into the Delphi process. After each iteration of the Delphi questionnaire, feedback was provided to the participants, who were then able to react to the researcher's interpretations of their responses and to affect the direction of the study through their responses to the next round questionnaire. In addition, the final consensus check was an opportunity for the participants to indicate their level of agreement with the consensus identified by the researcher. This is not unlike what Okoli and Pawlowski (2004) suggested when they wrote that "the Delphi method can employ further construct validation by asking experts to validate the researcher's interpretation and categorization of the variables" (p. 19). Perhaps more importantly, the weight of this credibility will depend a great deal on the credibility of the participants, in a colloquial sense; if the participants are highly credible (i.e. published and recognized experts), then the study will be more credible. Therefore, the researcher recruited those experts with the knowledge and experience in the field, as discussed above. As Baker et al. (2006) pointed out, "within consensus methods of research, especially Delphi panel techniques, the use of 'experts' is fundamental to reliability" (p. 59).

"Transferability refers to the degree to which the results of qualitative research can be generalized or transferred to other contexts or settings" (Trochim, 2001, p. 162).

This was primarily the responsibility of the researcher, who in this case made every effort to "enhance transferability by doing a thorough job of describing the research context and the assumptions that were central to the research" (p. 162). The thick rich narrative offered in the final report of the findings (based on the researcher's notes throughout the data collection process detailed above) helps ensure the transferability of the results.

According to Trochim (2001), "reliability is the consistency or repeatability of your measures" (p. 88), and "the traditional view of reliability is based o the assumption of replicability or repeatability" (p. 162). In much qualitative research, though, neither is anything being measured nor can the study be performed in exactly the same way twice. So, the concept of quantitative reliability may be replaced with the concept of qualitative dependability, which "emphasizes the need for the researcher to account for the ever changing context within which research occurs" (p. 163). Again, in this study, the researcher has taken responsibility for describing the changes that occurred [throughout the study] and how these changes affected the way the researcher approached the study" (p. 163).

Confirmability, then, "refers to the degree to which the results could be confirmed or corroborated by others" (Trochim, 2001, p. 163). In order to enhance the confirmability of this study, the researcher documented the data analysis procedures throughout the study, identified a colleague to serve as a devil's advocate to the results (and document the result), and actively searched for and document any dissenting opinions among the panel of experts (p. 163). Creswell (2003) also recommended several strategies for validating the accuracy of findings in a qualitative research study (p. 195-

197). The researcher employed these following eight strategies to varying degrees: triangulation, member-checking, rich thick description, bias clarification, negative or discrepant information, prolonged time in the field, peer debriefing, and an external auditor (p. 196).

Exploratory Study

The researcher conducted a related exploratory study in the fall of 2004. The study was conducted as part of a research methods course that included instruction in statistical analysis. As such, the study was a quantitative exploration of teacher perceptions of MMORPGs as constructivist learning environments.

This study aimed to investigate Teachers' Perceptions of MMORPGs as Constructivist Learning Environments. The study postulated that MMORPGs have the potential to serve as constructivist learning environments for students. However, in order to help teachers to accept and embrace this technology, their perceptions of these games must be understood. Marc Prensky (2001) suggested that the "games generation" of those born after 1960 having a markedly different perspective on video games and on learning. It remains to be seen if this is true regarding teachers' perceptions of MMORPGs as constructivist learning environments. This study investigated whether teachers born in 1960 or before have a significantly different perception of MMORPGs as constructivist learning environments in comparison to teachers born after 1960. A survey of 20 closed-ended questions and an interview protocol of similar but open-ended questions were used for data collection.

Statistical analysis of the quantitative survey data were used to determine that the sample did not provide enough evidence to support the claim that teacher perceptions of the potential of MMORPGs to serve as constructivist learning environments differed based on their age, but it did reveal that younger teachers are more comfortable playing MMORPGs in their personal life than teachers born in 1960 or before. Analysis of the qualitative data did not shed additional light on the answer to the research question, but did provide greater insight into the younger teachers' perceptions and additional inspiration for future research.

In addition to the quantitative data collected, participants were given the opportunity to offer qualitative comments to explain their answers. The qualitative data collected for this study suggested a variety of additional studies to explore the following concerns:

1. High quality game design that encourages learning

2. An educational "engine" to encourage and capture student learning and understanding

3. Integrated assessment tools

4. The balance between open endedness and structure for learning

5. Modern and motivating graphics that are not overly violent or sexual

6. Privacy issues

7. Protected environment issues

8. Inclusion of a wide-range of students and interests

9. Engaging and accurate story lines

The present study was in part inspired by the results of this exploratory study.

Conclusion

This third chapter has provided a detailed discussion of the research design. It began with an overview of the research design, including the qualitative research paradigm and the role of the researcher. The research context was described and justified, and details related to participant selection were shared, including measures to be taken for the ethical protection of the participants and the criteria for selecting participants. The data collection and data analysis procedures and software were then explained. This was followed by a discussion of efforts taken to improve the credibility, transferability, dependability, and confirmability of the study. Finally, the results of a previous quantitative exploratory study were summarized.

CHAPTER 4:

RESULTS

The study was guided by the following two overarching questions:

1. What are the potential benefits of using MMORPGs as constructivist learning environments in formal K-12 education?

2. What are the potential problems related to using MMORPGs as constructivist learning environments in formal K-12 education?

This chapter reports the results of this inquiry. First, the data collection process is explained as are the researcher's systems for keeping track of data and emerging understandings. The findings are then reported in six thematic summaries of participant responses; this is the heart of the chapter and includes the elements of consensus reached by the expert panel. Next, dissenting opinions and additional comments are reported. Finally, this chapter concludes by presenting evidence of the study's quality, including confirmability measures such as the researcher's log, peer debriefing, and an external auditor.

Data Collection Process

Using the Delphi method, data for this study were collected over four rounds. The first three rounds generated qualitative data by asking a series of open-ended questions to which the participants on the expert panel responded with written answers. The fourth round was a final consensus check that generated quantitative data by asking participants to rate their level of consensus with six thematic summaries of the previous qualitative

responses. Data for all four rounds were collected electronically via the World Wide Web using the service at SurveyMonkey.com.

Round 1

The round 1 survey included instructions for the 23 participants and consisted of only two broad open-ended questions, which were identical to the research questions driving this study:

1. What are the potential benefits of using MMORPGs as constructivist learning environments in formal K-12 education?

2. What are the potential problems related to using MMORPGs as constructivist learning environments in formal K-12 education?

Participants provided written responses to these two questions (See Appendix F: Sample Participant Responses). The average response to each question was 158 words long, with responses varying in length from 19 to 482 words. Twenty-four experts initially agreed to participate in the study and were mailed a link to the Round 1 survey by the researcher. Of these, sixteen participants completed Round 1.

The data for this round were collected completely anonymously; participants were anonymous to each other and to the researcher as well. Though the researcher knew the identity of all participants because they had signed a consent form in keeping with IRB policy, the Round 1 questionnaire did not include a place for participants to indicate their name. The researcher initially believed this would help him remain as unbiased as possible while reviewing participant responses, but it quickly became clear that this increased the difficulty of managing the logistics of data collection because the researcher

could not know who had already responded and who had not. Those who responded after the researcher discovered this were asked to indicate their names on the questionnaire. In future rounds, all participants were asked to indicate their name on the questionnaire. However, the researcher was able to continuing reviewing responses to individual questions independently from participants' names.

Round 2

The Round 2 survey included instructions for the 16 remaining participants and a brief overview of their first round answers. The survey then offered a series of four thematic summaries generated by the researcher based on the participants' first round responses. These summaries included both potential benefits and related potential drawbacks. Each of these summaries was followed by a focused but open-ended question:

1. Motivation and engagement: How might MMORPGs be used specifically to motivate and engage students, and what problems might be associated with using MMORPGs for this purpose?

2. Context-embedded learning: How might MMORPGs be used specifically to provide a context for student learning, and what problems might be associated with using MMORPGs for this purpose?

3. Social learning: How might MMORPGs be used specifically to support social learning (including facilitated collaboration, cooperation, and competition), and what problems might be associated with using MMORPGs for this purpose?

4. Twenty-first century skills: How might MMORPGs be used specifically to help students develop 21st Century skills, and what problems might be associated with using MMORPGs for this purpose?

A fifth summary provided brief articulations of other topics identified in participants' first round answers which did not fit neatly into the four categories above. These topics included reflection, social change, infrastructure and logistics, resistance, cost, time, and others. A fifth and final question was then posed to participants:

5. Additional themes and other responses: Which of the items summarized above is most important, either as a potential benefit or a potential concern, and why?

Participants provided written responses to these five questions (See Appendix F: Sample Participant Responses). The average response to each question was 130 words long, with responses varying in length from three words ("nothing to add") to 578 words. Of the sixteen participants who completed Round 1, thirteen completed Round 2. Participants remained anonymous to each other in the second round, but for logistical purposes, the researcher began asking participants to include their name with their responses. The researcher was able to continuing reviewing responses to individual questions independently from participants' names.

Round 3

The Round 3 survey included instructions for the 13 remaining participants and then offered a series of six thematic summaries generated by the researcher based on the participants' first and second round responses. These themes now included: motivation and engagement, context-embedded learning, social learning, 21st Century skills,

reflection, and infrastructure and logistics. These summaries included both potential benefits and related potential drawbacks. Each of these summaries was followed by the same question: What claim in the above summary do you disagree with most strongly and why?

Participants provided written responses to these six questions (See Appendix F: Sample Participant Responses). The average response to each question was 101 words long, with responses varying in length from one word ("none") to 222 words. Of the 13 participants who completed Round 2, 12 completed Round 3. Participants remained anonymous to each other in the third round, but for logistical purposes, the researcher collected participant names with their responses.

Final Consensus Check

The final consensus check survey included instructions for the 12 final participants and then offered a series of six thematic summaries generated by the researcher based on the participants' first, second, and third round responses. These themes were identical to the third round themes and the summaries were slightly modified versions of the third round summaries. Again, these summaries included both potential benefits and related potential drawbacks (See the findings section below for the content of these final thematic summaries).

For the purposes of this study, consensus was defined for the participants as the state in which the results are "at least acceptable to every member [of the expert panel], if not exactly as they would have wished." (Reid, 1988, as cited in Williams & Webb, 1994,

p. 182). Then, participants were asked to rate their level of consensus with each thematic

summary using the following scale:

> 5. Complete Consensus – I am in agreement with everything stated in this
> summary. The results are acceptable to me, if not exactly as I would have
> wished.

> 4. High Level of Consensus – I agree with most of what is stated in this
> summary, and I disagree in only minor or insignificant ways. The results
> are acceptable to me.

> 3. Moderate Level of Consensus – I agree with much of what is stated in
> this summary, but I also disagree in some ways. The results are acceptable
> to me.

> 2. Low Level of Consensus – I agree with some of what is stated in this
> summary, but I also disagree in some major or significant ways. However,
> the results are still acceptable to me.

> 1. No consensus – I disagree with most or all of what is stated in this
> summary. The results are not acceptable to me.

By thus rating their own level of consensus with each summary participants

provided some quantitative data in the final consensus check. Additional qualitative data

were also collected. Participants were told to "feel free to leave any additional comments

related to the topic of this summary, particularly if there is anything in the summary with

which you disagree." Of 13 participants, only 3 to 5 left additional comments on any one

summary (See Appendix F: Sample Participant Responses). The average comment was

115 words long, with responses varying in length from eleven words to 410 words. Each

of these final comments is represented in the findings section below.

Of the 12 participants who completed Round 3, all 12 completed the final consensus check. Participants remained anonymous to each other in this final round, but for logistical purposes, the researcher collected participant names with their responses.

Systems for Keeping Track of Data and Emerging Understanding

The data collected in rounds 1 through 3 and in the final consensus check were analyzed throughout the study using various tools and systems for keeping track of data and emerging understanding. The online questionnaires themselves were the first tools used to keep track of collected data. Qualitative research software (specifically TAMS Analyzer for Mac OS X, version 2.5) was then used to analyze the data and keep track of emerging understanding through a system of coding the qualitative data. The codes assembled in TAMS were then entered into outliner software (specifically Omni Outliner Pro, version 3.6.4) for further analysis and organization by the researcher, with the goal of authoring a summary of participant responses after each round. These summaries were then shared with participants in the subsequent round; the Delphi process itself is an iterative process designed to support analysis of emerging understanding. In the final round of data collection, participants were also asked to rate and comment on their level of consensus with the final summaries, thus providing additional feedback to the researcher. Finally, the researcher's own log played a role in tracking data and emerging understanding throughout the course of the study.

Online Questionnaire Archives

The online questionnaires themselves were the first tools used to keep track of collected data. The service at SurveyMonkey.com not only allowed the researcher to

collect data from participants via the web, but it stored the data in online archives and presented data for review in a web-based format. Qualitative data could be read online in two ways; the researcher had the choice to read all answers to a particular question, or to read all responses from a particular participant. Quantitative data (for the final consensus check) were represented in easy to read horizontal bar charts highlighting the most common response. Data were also provided regarding how many participants completed each survey, and how many answered or skipped each question.

The service also allowed the researcher to download data collected for each round of the Delphi process in a spreadsheet format. This was most useful in the case of the Final Consensus Check because the quantitative data could then be used for statistical analysis. The researcher simply cut and pasted the qualitative data from the online presentation of responses to each question into a text file for use with the TAMS analyzer qualitative research software.

Qualitative Research Software

TAMS Analyzer for Mac OS X (version 2.5) was used to analyze all qualitative data during each round of the Delphi process. Data from the online questionnaire were cut and pasted into text files, each file containing all of the responses to a single question. The researcher than began the coding process using TAMS Analyzer. A separate analysis file was created for each round of the Delphi. Then, individual text files of participant responses were associated with each analysis file. Then the researcher was able to open the text files within TAMS Analyzer, which allowed the researcher to highlight a portion of an individual response and assign a code to it. TAMS Analyzer added tags

corresponding to each code to the text file, with an opening tag indicating the beginning of a coded excerpt and a closing tag marking the end of the excerpt. Later, the researcher was then able to search any text file (or multiple files) by tag and return a result of all excerpts that had been assigned the same code. This process made it easy to access relevant data when composing the thematic summaries of participant responses.

The Coding Process

The coding process followed a different pattern for each round of the Delphi study. For the first round of data, the researcher began preliminary coding as soon as the first three participants had responded. Quickly, the categories of codes (and thus potential second round questions) grew beyond the six themes identified in the literature review, a trend that continued throughout the first round data collection process. In this respect the process of beginning with broad open-ended questions was fruitful. It was also clear that the coded results would need to be synthesized and condensed to allow for a manageable and productive second round.

For the second round of data, the coding scheme was improved and formalized to some degree. The first letter of each code denoted the question topic (such as "m" for motivation) and the second letter denoted the response (such as "b" for benefit). Additional responses types included the following:

b – benefit

c – concern

n – need

i – idea

For question five in Round 2, which asked participants to choose from among several themes and write about the one they thought was most important, a slightly different coding scheme was used. This scheme was simpler and included the following letters as the second character in the code:

a – agree

d – disagree

i – idea

During Round 2 it also became clear that some consensus was developing. Some participants responded by writing things such as "all the responses above are very valid," "nothing to add," and "there is absolutely no question."

Due to the growing consensus, following data collection for Round 3, it was clear that a formal coding scheme was not necessary for the initial analysis of the data. Round 3 presented summaries (by theme) and asked participants to respond to the statement in the summary that they disagreed with most strongly. In some cases participants replied that they did not disagree with anything on the page. In other cases they indicated that they did not disagree "strongly" and then provided a response to some elements that they had minor concerns about, or else they merely elaborated on a point. So, the researcher simply dealt with each response one at a time in one of the following three ways:

1. The researcher altered the summary to reflect the concern addressed in the response.

2. The researcher cataloged the response as a dissenting opinion, to be reported in this chapter.

3. The researchers cataloged the response as repetitive, off-topic, or an insignificant contribution.

Initially, TAMS Analyzer was used to tag responses for these three purposes: {alter}, {dissenting}, and {discard}. However, later it became clear that another set of codes was necessary to group responses that addressed the same issues. These included codes such as 21stcenturyskills, anonymity, and ingamereflection for example. In this way it remained easy to search by code and update the existing thematic summaries.

Outliner Software

Outliner software was used to organize the codes generated by each round of data analysis and for outlining the resulting thematic summaries. Specifically, Omni Outliner Pro version 3.6.4 was used for these purposes. Following each round of analysis with TAMS Analyzer, the researcher entered each tag into the outliner. Similar tags were grouped into themes and organized in a meaningful way. This process made clear which themes would be included and summarized in subsequent rounds. The same outline was then used to prepare and compose the thematic summaries. As the researcher wrote the summary, he would consult the outline, identify the next tag to be included, search for that tag in TAMS Analyzer, and then summarize the relevant excerpts from participant responses.

Summaries

The thematic summaries were one of the primary means for tracking data and emerging understanding. Following each round of data collection, summaries of participant responses were reported back to participants as part of the subsequent round

of data collection. Summaries were organized by theme to reduce redundancy in the original responses, to focus the study on elements of consensus, and to eliminate irrelevant responses. Each summary included both potential benefits related to the use of MMORPGs in education, and related concerns, in an effort to meaningfully integrate the two into a consistent perspective, with which participants could either indicate consensus or disagreement.

Each summary was composed from an outline in Omni Outliner Pro made up of tags that were used to search TAMS Analyzer for original participant responses. The resulting summaries were composed in a text file and then uploaded into the next round questionnaire on SurveyMonkey.com. This process of organization and composition was the most subjective part of this Delphi process. However, participants were able to offer feedback on the researcher's summaries in each subsequent questionnaire. The researcher also logged his efforts and concerns in his research log.

Levels of Consensus

The primary purpose of the final consensus check was to gather feedback from the participants regarding their level of consensus with the summaries provided of participant responses in previous rounds. In this case, feedback was gathered quantitatively in order to allow some statistical analysis and comparison of the summaries. The researcher's initial analysis was completed using the graphs provided by SurveyMonkey.com, which clearly showed which of the summaries resulted in the highest ratings from the participants. Then, results were downloaded in a spreadsheet format (.xls specifically) and a rudimentary statistical analysis was completed using the

spreadsheet application Numbers '08 version 1.0.2. The mean, median, mode, range, and standard deviation were found for the responses to each of the six thematic summaries (See Table 1 in the Findings section below). Based on the mean response, each summary was assigned a level of consensus: very high (4.51-5.00), high (3.51-4.5), moderate (2.51-3.5), low (1.51-2.5), or none (0.00-1.50).

In order to determine which findings readers might have the greatest level of confidence in, the six summaries were then ranked in three ways. First, they were ranked according to their mean response; this indicated which summaries represented the highest levels of consensus among the participants (See Table 2 in the Findings section below). Next, the summaries were ranked according to the standard deviation of the responses, thus indicating the level of consistency among the participant responses (See Table 3 in the Findings section below). Finally, their rankings in these two previous charts was combined to produce a third composite ranking meant to indicate which summaries received both a high level of consensus and a high level of consistency, thus suggesting that readers might have a higher level of confidence in those findings (See Table 4 in the Findings section below). This was the summative assessment of the data analysis and understandings that emerged throughout the study.

The Delphi Process

The nature of the Delphi process lends itself to keeping track of emerging understandings. A Delphi study is an iterative process, so that even in a qualitative study the researcher is receiving feedback from participants following his interpretation of each rounds' responses. The researcher's interpretations are thus either validated or

challenged. In this way emergent understanding can be pursued in greater depth and supported by additional data during each iteration of the Delphi survey, including the final consensus check.

Summary of Findings

This section presents a summary of the expert opinion generated through this Delphi study. Based on patterns and relationships present in the collected data, the findings have been organized by theme. This organization occurred following the first round of the Delphi process and was refined following the second and third rounds. The themes are presented here in an order based on the final consensus check; those summaries which had the highest mean levels of consensus and the highest levels of consistency (the lowest standard deviation in levels of consensus) appear first, followed by those summaries with lower levels of consensus and consistency. In this way, the findings presented here are organized beginning with those in which the reader might have the highest level of confidence and progressing to those in which a lower level of confidence might be justified. Though there is some overlap between the primary themes derived from the literature review in chapter 2, several additional themes were generated by the Delphi process. Based on the final consensus check survey, the themes are presented here in a different order from chapter 2.

Each theme presented here is broken down into two subsections based on the two research questions driving the study. Potential benefits are presented first, followed by potential problems. Potential solutions or mitigating strategies are also included along with the potential problems.

Following the presentation of the six primary themes, the levels of consensus reported via the final consensus check are discussed in greater detail, including some statistical analysis to supplement the qualitative nature of the study. Finally, this section concludes with a report of additional findings from each round of the study, which were not incorporated into the primary themes.

21st Century skills

In the final consensus check survey, the expert panel indicated a very high level of consensus with this theme. On a scale of 1 to 5, where 1 represented no consensus with the summary and 5 represented complete consensus with the summary, the mean response was 4.58, the median response was 5, and the mode was 5. The range of responses was 1.00 and the standard deviation was 0.51. Of 12 final participants, only 3 voiced additional comments. This is the theme in which the reader might have the highest level of confidence.

Research Question 1: Potential Benefits

MMORPGs might be useful for helping students to develop 21st Century skills such as critical thinking, creativity, comfort with computer use, fluency in multiple media, economic literacy, and global awareness. Success in an MMORPG requires strategic thinking, planning, decision making, judgment, and the ability to react to changing conditions, all while multitasking effectively. Players must balance their resource, prioritize their actions, manage multiple objectives, and understand in-game systems, including the game economy. Even information literacy skills are important as players seek to find, evaluate, and use information (both in-game and from other outside

sources). MMORPGs as a genre may be particularly beneficial for educational purposes because they focus on working within systems and processes rather than on achieving a single win-state. The challenges and systems in the game can be selected or designed to authentically parallel real-world scenarios.

MMORPGs might also provide an arena for developing skills of leadership (and followership), interpersonal communications and management. Additionally, the learning communities that players form around MMORPGs (in which they share codes and strategies) parallel the activities of 21st Century professionals in knowledge-based workplaces. Finally, MMORPGs might encourage risk taking by making failure safe and often fun.

Research Question 2: Potential Problems

These skills are very complex. An MMORPG in isolation is unlikely to develop them deeply unless complimented by a variety of other educational activities.

Also, if failure is too easy (or fun) within a game, it might lead players to become more risk-adverse in real life or else to have an unrealistic view of risk, failure, and consequences in real life. An educational MMORPG would have to balance providing an environment safe for student risk taking with in-game consequences that are significant enough to make the risk of failure real and disappointing. In-game consequences might even be irreversible. (In other words, students might not be allowed the luxury of starting over on a particular task within the game.) Though this might conflict with the replayability of a game, then the game could also be used to help students learn how to deal with failure, a key to real-world risk taking.

Another potential concern is the inclination of many MMORPG players to game the system or cheat in an effort to succeed in achieving in-game goals. This may reduce the effectiveness of the role-playing experience, may detract from (or eliminate) educational goals, and may encourage students to cheat the educational system outside of the game as well. Many existing MMORPGs will cancel a player's account if they are caught cheating. Educators might want to engage students in discussions about the ethical implications and consequences of cheating the system. Another way to manage the risk of such cheating is to build it into the game by expecting students to exploit or mod the game system to accomplish a task. In this way they will learn the underlying systems and assumptions well. In some respects the ability to exploit a system is another valuable life skill and perhaps should be part of the process of playing an educational game. In this respect, the potential of gaming or cheating the system is a minor if not insignificant concern.

It may also be difficult to assess whether or not MMORPGs are successful in helping students to develop such 21st Century skills and transfer them to real world situations. However, this difficulty in assessment does not mean that learning and transfer are not occurring. Educators guiding students from game scenarios into real world scenarios might explicitly facilitate transfer. Games will also need to be chosen or designed to include tasks that authentically mimic the real world tasks and situations in which students will be expected to demonstrate success – without being unnecessarily high fidelity to the point of boredom. The elements of fantasy and play are important to

the success of role-playing games. Regardless, without careful alignment and monitoring students could transfer learning that has a negative effect on their real world success.

Reflection

In the final consensus check survey, the expert panel indicated a very high level of consensus with this theme. On a scale of 1 to 5, where 1 represented no consensus with the summary and 5 represented complete consensus with the summary, the mean response was 4.67, the median response was 5, and the mode was 5. The range of responses was only 2.00 and the standard deviation was only 0.65. Of 12 final participants, only 3 voiced additional comments. This is the theme in which the reader might have the second highest level of confidence.

Research Question 1: Potential Benefits

With the guidance of an educator and with dedicated, structured, and frequent debriefing time, MMORPGs might offer an opportunity for students to reflect on their learning and problem-solving strategies. Educators might help students to realize the correlation between their in-game strategies and real world scenarios they might encounter. Something not unlike an after-action-review might be used for this purpose.

Due to the potentially global nature of an MMORPG, they might also provide an opportunity for students and teachers to reflect on cultural differences of others playing the game. Perhaps the most important lesson to be learned about culture is that people are more alike than different, and this can be learned in an online game environment as students engage in play with others from around the world and their cultural differences do not deter them from enjoying – and succeeding within – the game together.

Research Question 2: Potential Problems

Supporting student reflection is also a very complex process. New tools for capturing in-game experiences and representing them for later reflection may need to be developed as well. It might also be difficult to reflect on real world cultural differences in an online game when many of those differences would not be apparent in the game-world and the players' avatars. It may also be difficult for many teachers to facilitate reflections on cultural differences, particularly without exposure to different cultures themselves. Furthermore, debriefing may reduce the scalability, increase the cost of implementation, increase the time required, and limit the independent use of an MMORPG for educational purposes, especially if conducted in a face-to-face format.

However, such potential drawbacks do not outweigh the benefits of having students reflect on their game play. Without such explicit reflection activities the educational value of playing an MMORPG might largely be lost. To mitigate these concerns, though, games can be designed to scaffold reflection and to automate it to some extent. Even independent use of an MMORPG might include a report back to a teacher or peers.

Motivation and Engagement

In the final consensus check survey, the expert panel indicated a high level of consensus with this theme. On a scale of 1 to 5, where 1 represented no consensus with the summary and 5 represented complete consensus with the summary, the mean response was 4.17, the median response was 4, and the mode was 4. The range of responses was 2.00 and the standard deviation was 0.58. Of 12 final participants, 4 voiced

additional comments. This is the theme in which the reader might have the third highest level of confidence.

Research Question 1: Potential Benefits

MMORPGs may be engaging and motivating for many students. This may be true for some students because MMORPGs, like other forms of problem based or project based learning, require learning by doing that is active, challenging, and authentic. The elements of competition and peer pressure common in MMORPGs might also be motivating for some students, as might the social nature of the games. MMORPGs could even be used to teach sociology concepts, including social interaction, morals, and values. Opportunities for self-directed creativity and exploration might appeal to other students and might be beneficial for learning, provided the educational goals of the game are still the students' focus. The ability to take on a new role or identity within the game might also engage and motivate some students. In addition, the nature of MMORPGs could provide students accustomed to on-demand entertainment with an on-demand learning medium. MMORPGs embody the concept of Hard Fun; MMORPGs are fun because they are hard, not in spite of being hard.

In particular, the quest system common in many MMORPGs could be put to educational use, requiring students to conduct research, perform experiments, and apply academic skills to solve in-game problems. Ideally, such quests would provide an authentic and contextualized opportunity for skill use that would facilitate transfer into real-world scenarios. Using a scoring process that is non-trivial and corresponds to skill-acquisitions might be used to motivate students to undertake such learning quests. The

ability to provide immediate and meaningful feedback will also be critical to the success of such a system. Whatever the scoring and motivation systems used in the game, the game should be designed or chosen to rely as much as possible on intrinsic motivation rather than relying too heavily on extrinsic motivation.

Research Question 2: Potential Problems

MMORPGs might motivate players to endure the drudgery of repetitive simplistic tasks for the sake of grinding for experience and advancement in the game. If this is necessary in an MMORPG used for educational purposes, the experience of grinding could also be made educational in its own right. However, repetitive grinding for no purpose other than advancement in the game is antithetical to good constructivist learning, and such grinding is not a necessary element of MMORPGs. Other commercial MMORPGs have found different ways of motivating players. Educational game designers might design or use a more authentic system that corresponds more directly to real-world skills. Ultimately, including uninteresting tasks in an otherwise interesting world might undermine student engagement in the game.

If the game models socially destructive behavior (such as violent or sexist behaviors) this might have a negative impact on learning. Some students may not enjoy competition. Pressure from social circles to conform to cliques, participate in bullying, or ostracize certain students might be transferred into (or generated by) the game.

Unfortunately, the design of a system that provides educationally valuable quests that rely primarily on intrinsic motivation may be a difficult (or impossible) challenge for game designers. The content of the game, including the theme and specific experiences or

encounters, will also need to be as compelling as the medium in order to effectively engage and motivate students. If educational MMORPGs are selected or created in such a way that they are too hard for students, they will not be fun-and thus will not be engaging or motivating.

The possibility of players becoming addicted to the game or having "an unhealthy relationship with the game" is another common concern. However, if there were clear set learning outcomes that defined stopping points (or an end) to the game, this risk could be mitigated. Also, it may be that players' personalities and other environmental factors play a greater role in causing addiction than any particular game. Furthermore, it is unlikely that students would develop an addiction to a learning game – and educators might not consider it a bad thing if they did.

The engaging elements of the game might lead to a loss of focus on educational goals. Alternatively, a focus on educational goals might reduce the motivational power of a game. Ideally, if the game is well designed it will help students accomplish educational goals without sacrificing the motivational engagement of the game. This balance could be addressed during the usual iterations of alpha and beta testing. Even if the game is slightly "less fun" than a commercial game, it would most likely still be considerably "more fun" than a traditional classroom assignment.

Video games are not appealing to all students, and may require skills (or time) that not all students have. An educational MMORPG, though, could be designed to provide multiple paths to success, with some requiring less technical skill with the game.

Even among the students that are gamers not all are attracted to the same genre of games or to MMORPGs in particular.

Infrastructure and Logistics

In the final consensus check survey, the expert panel indicated a high level of consensus with this theme. On a scale of 1 to 5, where 1 represented no consensus with the summary and 5 represented complete consensus with the summary, the mean response was 4.33, the median response was 4.5, and the mode was 5. The range of responses was 2.00 and the standard deviation was 0.78. Of 12 final participants, only 3 voiced additional comments. This is the theme in which the reader might have the fourth highest level of confidence.

Research Question 1: Potential Benefits

MMORPGs may require fewer hardware resources than other video game genres. The costs of development and maintenance could also be distributed across many schools. In addition, self-organized groups of students similar to existing guilds might be consistent with the ideals of a constructivist learning environment.

Research Question 2: Potential Problems

MMORPGs may require fewer hardware resources compared to many other video game genres, but implementing MMORPGs in existing schools would include many challenges related to infrastructure and logistics. With current student to computer ratios, students might experience limited access to the game at school. Many computers in schools might not meet the hardware needs of modern MMORPGs. The bandwidth available at the school might also be limited. Technical problems with the software,

hardware, and network as well as the logistical and cognitive overhead necessary to play the games might outweigh the positive learning experience. (Outside of the school, many socio-economically disadvantaged students might also have limited access to the equipment necessary to play an MMORPG.) Filtering games for age appropriate content may also be a concern.

In addition, MMORPGs require thousands of players to feel inhabited and provide a persistent sense of community; it may be difficult to achieve such a population in an educational game, and allow students to play commercial games in schools raises concerns about appropriate content and student safety. However, it is possible to populate a game world with richly interactive nonplayer characters (NPCs) controlled by the computer. It may also not be necessary for educational online role-playing games to be massively multiplayer in order to take advantage of the benefits of being multiplayer. Smaller scale multiplayer games (or MORPGs) might be more appropriate; these games would not necessarily need to be persistent worlds.

Funding an educational MMORPG would be expensive to start and difficult to sustain. Even if an existing engine is used, it would be expensive to develop the game and attract players and teachers to the idea. However, the costs of development could be distributed across many schools and the potential benefits might justify the expense. Existing game engines, digital objects, and environments could also be imported from the entertainment industry. Gaming engines (and graphics) that are a generation behind the cutting edge would still be effective for creating an engaging educational game. Low cost

easy to learn tools would be ideal. A well-designed game concept could also attract the necessary developers, players, and educators.

The amount of time needed to implement such a game may be the greatest cost, including the time for students to learn the game and to spend time on the less educational fun elements of the game. MMORPG game play also does not fit neatly into traditional school schedules. In a truly massive multiplayer game, coordination of players with different school schedules (potentially even across different time zones) would also be a challenge. Single player training modes or the ability to solo might help alleviate some of these concerns. However, coordinating large numbers of students together in the game world might be in conflict with the ideals of a constructivist learning environment in which students are engaged in individualize inquiry-driven learning, and so might not be a desirable use of an MMORPG anyway; self-organized groups of students similar to existing "guilds" in existing games might be more desirable.

Cultural resistance to video games in schools might also prove a challenge. The primary barriers might not be technical, but rather psychological, political, and cultural, including sometimes unconscious beliefs, assumptions, and values. Many educators and parents may not accept the potential educational value of video games, including MMORPGs. Even if the games are accepted, there will be a need to establish appropriate norms and ethics for the educational use of MMORPGs. For a MMORPG to take root in the current environment of high-stakes testing, the game may need to be accepted in terms of what schools now value. Moreover, games would need to be based on non-violent, appropriate, and non-trivial subject matter and content – and would need to

include reasonable measures to ensure student safety. Naturally, student learning would need to be measurable and demonstrable as well. Unfortunately, this might reduce the engaging and motivating elements of the games, and as Prensky (2003) says, "suck the fun out" (p. 1).

A great deal of organizational change will also be necessary if games are to be accepted and supported in existing educational organizations. There would be a significant need for teacher professional development in order to ensure that teachers would have the necessary understanding to effectively implement the games and guide students with their reflection and transfer of skills. Establishing pilot programs that follow models set by similar technologies already in use would be critical to successful implementation.

However slowly, educational institutions are moving inexorably towards the ability to overcome these hindrances.

Context-Embedded Learning

In the final consensus check survey, the expert panel indicated a high level of consensus with this theme. On a scale of 1 to 5, where 1 represented no consensus with the summary and 5 represented complete consensus with the summary, the mean response was 4.17, the median response was 4, and the mode was 5. The range of responses was 2.00 and the standard deviation was 0.83. Of 12 final participants, 4 voiced additional comments. This is the theme in which the reader might have the fifth highest level of confidence.

Research Question 1: Potential Benefits

MMORPGs might be valuable in providing a safe context for active student learning. Game worlds can be more concrete, immersive, and open-ended than textbooks, and can be used to represent other places, historical periods, and environments (or systems) that would be impossible to recreate in a classroom, including models for chemistry or other sciences. Moreover, the game world can reach beyond the classroom due to the networked nature of MMORPGs.

Students can take on new roles and safely explore new identities in an MMORPG game world, including academic or professional identities that might serve them well in the future. This ability to experiment with new identities might also reduce negative stereotyping and allow leaders to emerge who might not in a traditional classroom.

Students could even play a role in modifying the game environment in an MMORPG. Some games allow players a great deal of influence over the game environment. Others allow "modding" of game environments and scenarios.

Replayability of scenarios is one of the most valuable elements of an educational game or simulation. MMORPGs can also allow replayability, though this is not necessarily an element of such games and may need to be explicitly selected or designed for educational purposes.

The context provided by MMORPGs may allow more effective transfer of skills from the learning environment to the real world. The games might be most valuable if modeled on real world professional training, such as internships. The reward system in

most MMORPGs might lend itself to this sort of design, as success in these games often requires hard work and considerable time to develop the necessary resources or money.

A well designed game could scaffold the development of skills, including those necessary to use the game interface. A fantasy or stylized setting may also be better suited to teaching some skills than a realistic simulation or even real-life. In any case, students who play such a game before beginning a real-world internship would likely be better prepared than those who don't play the game.

Research Question 2: Potential Problems

Traditional textbooks and classrooms are likely to serve a complementary roll in supporting students' game-based educational experiences. Games and simulations may even be best used in conjunction with more traditional educational techniques.

Successful transfer of skills may be dependent on the fidelity of the models used in the game. While removal of some real-world complexity is necessary in any game or simulation, commercial MMORPGs tend to distort or exaggerate aspects of the real world for the sake of entertainment rather than education. The models used in educational MMORPGs will need to be selected or designed primarily to help students meet learning goals – while still maintaining high levels of motivation and engagement.

Also, in order for transfer to be effective the academic "content" presented within the game would need to be accurate, though not necessarily in the same way as text books; for instance a historical simulation might accurately model systems content though players' choices might generate different specific events than actually occurred in history. In this way games and texts might be used in a complementary fashion – games

to teach systems content and soft skills such as leadership or decision making, and texts to teach real-world specifics.

Similarly, the fidelity of game models does not necessitate a "real world" setting. Just as in text-based stories, a fantasy world might be used to teach a real lesson. For instance, students can learn the basics of entrepreneurship in a science fiction setting. Such fantasy settings might help students to learn skills that might be too specific or too uninteresting to many students in a real world scenario.

It may be difficult to assess if students have learned the "content" and even more difficult to assess if they have learned "soft skills" such as leadership. It is also possible that students' learning would not transfer well from the relatively safe environment of the game to the riskier environment of real world consequences. Ultimately, transfer may need to be supported through reflection, an aspect that existing MMORPGs do not stress and which may need to be guided by a teacher. Game worlds might also include a safe area explicitly meant for reflection.

Unfortunately, the MMORPG interface might require students to acquire new skills before being even minimally successful in the virtual context. However, a well designed game could scaffold the development of such skills.

A simulation or game might not ever be able to replace the experience of working with an actual practitioner in a real-world internship. As with any form of eLearning, the computer mediated context of an MMORPG might be missing valuable elements of a face-to-face learning environment. However, activities in the virtual environment can supplement (or be supplemented by) face-to-face interaction in a classroom. MMORPGs

might also extend into the physical environment through new interfaces such as are now common in games like *Dance Dance Revolution* or any game that runs on the Nintendo Wii system.

<div align="center">*Social Learning*</div>

Though this theme received the lowest consensus level ratings on average, in the final consensus check survey, the expert panel still indicated a high level of consensus with this theme. On a scale of 1 to 5, where 1 represented no consensus with the summary and 5 represented complete consensus with the summary, the mean response was 3.92, the median response was 4, and the mode was 4. The range of responses was 3.00 and the standard deviation was 1.00. Of 12 final participants, 4 voiced additional comments. This is the theme in which the reader might have the sixth highest level of confidence.

Research Question 1: Potential Benefits

MMORPGs often promote collaboration over individualism and can facilitate social negotiation of meaning. Students who play such games might develop communication skills, including negotiation skills, and valuable new social roles. Cooperative problem-solving and teamwork are often necessary to achieve goals within the game. In-game competition can also lead to collaborative learning.

The social learning needs of each student are different. MMORPGs might provide an alternative means for engaging a student less adept at interpersonal communication, and might help such students develop new social skills in a safe environment.

MMORPGs can also serve to bring distant learners together in a meaningful way, although this may require additional technical skill on the part of the players. In addition, students can socialize outside the games about the games, or even build a learning network around the game.

MMORPGs may also be used or designed in such a way that they allow players to see things from another's perspective. In this way the games might be used to address controversial social issues, to teach about other cultures, or to effect positive social change.

Video games, including MMORPGs, can constantly challenge a player within his or her ZPD by constantly adapting to the player's skill level. The social structure of an MMORPG can also help provide the scaffolding necessary for individual students to succeed and grow. For instance as some players develop skill in the game they can work in groups with other newer players.

Students who are more reserved or shy might blossom in a game-world, especially through the use of an avatar. The game environment might also allow for a "psychosocial moratorium" that encourages growth and development, particularly in adolescents. Additionally, communication within a game or virtual reality can create relationships that transcend what may be achieved by the player in a real-life situation.

Research Question 2: Potential Problems

Educational MMORPGs will need to include tasks that require cooperation or competition, and a means for tracking such collaborative play; otherwise, some students

may not participate in and benefit from collaborative learning. Teachers might also establish out-of-game incentives for cooperating and competing in the game.

Unfortunately, MMORPGs that include competitive elements, particularly Player versus Player (PvP) elements, may foster aggressive competitiveness and may cause emotional distress for those who lose or do not win. If some students are ostracized for their lack of skill or success in the game this can lead to bullying, embarrassment, or other victimizing behavior. However, even when negative social interactions occur as a result of cooperative or competitive play, these episodes can be used as opportunities to provide students with strategies to cope with such interactions. Also, the anonymity of players in MMORPGs may contribute to this sort of behavior. Alternatively, anonymity might mitigate some of the effects of this behavior in the real world, so educators planning to use such a game would need to be thoughtful in their decision to allow anonymity or not. Teachers and students might also benefit from working together to establish the social rules of the game and the consequences of infractions. A well-designed MMORPG might also help to address these issues and have a positive effect on potentially disruptive students by providing them a new social environment in which to take on new more positive roles.

Violent and male dominated social structures of many commercial MMORPGs may be inappropriate for use in an educational setting. Also, if students are free to choose the roles they play, teachers may find that not all roles are filled. Some students may also choose to play roles that might operate counter to educational goals. On the other hand, it is possible to play most existing commercial MMORPG in a non-violent way and still

progress and succeed in the game. MMORPGs also usually allow players to choose male or female avatars and to undertake quests and other activities that are likely to appeal to female players. In a well-designed open-ended game it would not be necessary for all roles to be filled for each student to find success. Most MMORPGs are already designed to support players interested in achieving, exploring, and socializing – and most games discouraging disruptive behavior by design. Educational MMORPGs can be selected or designed to follow this model and to avoid violent or gender-biased game play.

With MMORPGs, there is a risk of including a potentially malicious person in the game or in the metagame social circles; most distance learning takes place in a "walled garden" such as a password protected content management system.

It is unlikely that a transformational shift in students' cultural beliefs will occur unless complemented by a variety of other educational activities. Students are also likely to "see through" anything they perceive as manipulation in such an effort to change their beliefs or values.

As with other video games, MMORPGs can constantly challenge a player within his or her ZPD. However, MMORPGs may have less flexibility to adapt to individual players' needs because changes in the game world may affect others as well.

The computer mediated social environment does not provide the same level of interactivity as face-to-face communication and might re-enforce solitude and antisocial behavior, or accentuate problems such as bullying, creating new channels for certain individuals to be ostracized. Admittedly, traditional classrooms and other school activities such as sports might are at least as likely to create this scenario. However,

Also, a player may come to identify too strongly with their avatar (just as a football player might come to identify too strongly with his role on the football team), which represents only a small portion of the player's personality, a fact that may need to be communicated to and reinforced for students.

Levels of Consensus

The primary purpose of the final consensus check was to gather feedback from the participants regarding their level of consensus with the summaries above. In this case, feedback was gathered quantitatively in order to allow some statistical analysis and comparison of the summaries.

For the purposes of this study, consensus was defined for the participants as the state in which the results are "at least acceptable to every member [of the expert panel], if not exactly as they would have wished." (Reid, 1988, as cited in Williams & Webb, 1994, p. 182). Then, participants were asked to rate their level of consensus with each thematic summary using the following scale:

5. Complete Consensus – I am in agreement with everything stated in this summary. The results are acceptable to me, if not exactly as I would have wished.

4. High Level of Consensus – I agree with most of what is stated in this summary, and I disagree in only minor or insignificant ways. The results are acceptable to me.

3. Moderate Level of Consensus – I agree with much of what is stated in this summary, but I also disagree in some ways. The results are acceptable to me.

2. Low Level of Consensus – I agree with some of what is stated in this summary, but I also disagree in some major or significant ways. However, the results are still acceptable to me.

1. No consensus – I disagree with most or all of what is stated in this summary. The results are not acceptable to me.

The mean, median, mode, range, and standard deviation were found for the responses to each of the six thematic summaries (See Table 1 below). Based on the mean response, each summary was assigned a level of consensus: very high (4.51-5.00), high (3.51-4.5), moderate (2.51-3.5), low (1.51-2.5), or none (0.00-1.50).

Table 1

Statistical Analysis – Levels of Consensus (Reported by 12 Panelists)

	Motivation	Context	Social Learning	21st Century	Reflection	Logistics
Mean	4.17	4.17	3.92	4.58	4.67	4.33
Median	4	4	4	5	5	4.5
Mode	4	5	4	5	5	5
Range	2	2	3	1	2	2
StDev	0.58	0.83	1	0.51	0.65	0.78
Level	High	High	High	Very High	Very High	High
Comments	4	4	5	3	3	3

The statistical analysis represented in Table 1 reveals several key data points and trends. First, the summary with the highest mean level of consensus was the one related to the importance of providing opportunities for reflection on game play, with the second highest being the summary related to 21st Century skills. Similarly, the summary with the lowest level of consensus was the one related to the social learning that happens in MMORPGs.

The summary with the most consistency in participant responses (or the least standard deviation) was the one related to 21st Century skills, with the sections on motivation and reflection not being far behind. Again, the summary with the least consistency in participant responses (or the highest standard deviation) was the one

related to the social learning that happens in MMORPGs. Not surprisingly, the social learning summary also had the highest range among its answers and generated the highest number of additional written comments on the final consensus check. However, the median, and mode responses were still relatively high, suggesting that the reader might still have a high degree of confidence in the social learning results.

In order to determine which findings readers might have the greatest level of confidence in, the six summaries were ranked in three ways. First, they were ranked according to their mean response; this indicated which summaries represented the highest levels of consensus among the participants (See Table 2 below).

Table 2

Ranking of Topics by Mean Level of Consensus

Rank	Topic	Mean
1	Reflection	4.67
2	21st Century	4.58
3	Logistics	4.33
4	Motivation	4.17
5	Context	4.17
6	Social Learning	3.92

Next, the summaries were ranked according to the standard deviation of the responses, thus indicating the level of consistency among the participant responses (See Table 3 below). A low standard deviation indicates low variability in the level of consensus reported by participants. A high standard deviation indicates a wide variety in the level of consensus reported by participants.

Table 3.

Ranking of Topics by Consistency of Consensus Level

Rank	Topic	StDev
1	21st Century	0.51
2	Motivation	0.58
3	Reflection	0.65
4	Logistics	0.78
5	Context	0.83
6	Social Learning	1.00

Finally, the rankings in these two previous charts were combined to produce a

third composite ranking meant to indicate which summaries received both a high level of

consensus and a high level of consistency, thus suggesting that readers might have a

higher level of confidence in those findings (See Table 4 below).

Table 4.

Ranking of Topics by Confidence Level (Combined Ranking)

Rank	Topic	Combined
1	21st Century	3
2	Reflection	4
3	Motivation	6
4	Logistics	7
5	Context	10
6	Social Learning	12

Based on this final ranking, the researcher suggests that readers might have the

highest level of confidence in the results related to ways MMORPGs might be used to

develop players' 21st Century skills. Similarly, readers might have the lowest level of

confidence in the results related to the social learning that might happen in MMORPGs.

However, the researcher suggests that the level of consensus was high or very high with

respect to all of these summaries and thus a reasonably high degree of confidence might be attributed to each summary, including those ranked lowest in Table 4 above.

Other Findings

Following each round of data collection, the researcher composed a summary of participant responses. These summaries were organized by theme to reduce redundancy in the original responses, to focus the study on elements of consensus, and to eliminate irrelevant responses. For this reason, not all ideas present in participant responses were represented in the summaries. However, many of these other ideas are noteworthy in their own right. This section includes a brief description of other findings generated during each round of data collection.

Round 1

Though they were not represented in the Round 2 summaries, many ideas expressed by participants in first round responses supported the general concept that there are many benefits to using MMORPGs as constructivist learning environments. In summary, MMORPGs have the potential to facilitate constructive learning that is active, creative, and deep. Players learn by doing. The open ended nature of the games could allow learning to be student-lead and differentiated to meet players' needs, and it could incorporate many elements of project-based learning, including problem solving. Moreover, they might encourage creativity in students and passion in teachers. However, such games would face the same challenges to sustainability as other constructivist learning environments in formal k-12 education, not the least of which would be the

incompatibility between current educational institutions and constructivist learning philosophy.

With respect to social change, MMORPGs might provide opportunities to reinforce a value system or qualities for success and continuous improvement. Games can also reinforce certain world views, for better or for worse.

Some participants also suggested that other benefits of using MMORPGs in education might include cost effective implementation at scale, increased accessibility for special education students, and increased opportunities for all students to practice reading. One even suggested that the use of MMORPGs in education might result in higher test scores. Conversely, additional concerns included the difficulty of assessing the sorts of learning that could occur in an MMORPG and the possibility of cognitive overload among players.

Round 2

Several other ideas appeared in Round 2 responses that were not represented in the summaries participants saw in Round 3. For instance, one participant suggested that interaction between avatars in an MMORPG might provide many teachable moments, during which students might even be able to learn about culture, society, norms, and values.

The role of the teacher in facilitating the use of MMORPGs was a recurring theme in Round 2 responses, though not often enough to merit inclusion in the Round 3 questionnaire. Still, one participant suggested that it will be important to have a teacher that understands the nuances of an MMORPG well enough to teach the games, align

specific objectives and outcomes, and build authentic assessments. Others suggested that the teacher's ability to guide students through game play and through the following reflection will be critical to the success of the games in an educational context.

Participants cited several other potential benefits during Round 2 data collection. The importance of integrating the games over time was mentioned, as was the need to tightly integrate educational goals into the gameplay in a way that is meaningful and motivating. One participant listed a variety of potential benefits, including the abilities to easily collect rich assessment data, to be a cost-effective means of distance education, to allow students to develop design skills, to improve student reading fluency, and to better serve special education populations.

Once again, other concerns included "the difficulty of assessing student game play and the possibility for cognitive overload in students learning and playing the game." Another participant suggested that the level of violence in games like *World of Warcraft* might also pose a problem. Finally, one participant suggested that some concerns might be alleviated by looking to early adopters of similar technologies in education as models and by implementing small pilot programs at the outset of any implementation.

Round 3 and the Final Consensus Check

Round 3 questions were well focused and did not result in any additional findings. However, Round 3 was structured in such a way as to draw out any dissenting opinions, which will be reported in the section below. Similarly, the Final Consensus Check was focused only on the six thematic summaries. However, some participants' optional

written responses amounted to additional comments rather than dissenting opinions. Both are reported in the section below.

<p style="text-align:center">Dissenting Opinions and Additional Comments</p>

Discrepant cases, or dissenting opinions, are particularly important to a Delphi study. As an attempt is made to identify consensus among the participants, it is critical not to minimize or marginalize dissenting opinions. As Glesne (1999) articulates, "because real life is composed of different perspectives that do not always coalesce, discussing contrary information adds to the credibility of [a study]" (p. 196). In order to enhance the confirmability of this study, the researcher actively sought and documented any dissenting opinions among the panel of experts (Trochim, 2003, p. 163). This section reports the dissenting opinions and other comments collected and identified during each stage of the Delphi process.

<p style="text-align:center">Round 1</p>

Round 1 did not generate any dissenting opinions, largely because there was not yet any consensus opinions for participants to disagree with; Round 1 was purely data collection in response to two broad questions. None of the initial responses were significantly different from the others to yet qualify as a dissenting opinion.

<p style="text-align:center">Round 2</p>

One of the most common concerns expressed in Round 2 was related to the use of the term 21st Century skills. Despite the fact that the researcher provided a working definition of 21st Century skills, two participants were concerned about the use of this label. It was suggested that these are not new skills, that most were just as necessary for

success in the 20th century and before. Another participant suggested that there is nothing unique about an MMORPG being useful for teaching these skills, because so could many other media and pedagogy. Finally, another was concerned that there is little or no existing proof that MMORPGs can be used to teach such skills.

Other concerns raised during Round 2, which were not represented in the summaries for Round 3, included a concern that educational MMORPGs don't yet exist, and that even if the did they wouldn't be adopted by many educators. Two other participants were also concerned that MMORPGs would lose any ability to motivate students if students were forced to play the game for academic purposes. Again, a participant was concerned about the need for teachers qualified to implement such games in an educational setting. Another disagreed that MMORPGs would be costly to implement, suggesting that could be particularly cost effective to implement.

Most notably, one expert vehemently disagreed with the notion that educators should ever be designing games. He explained in colorful language:

> No, nyet, nie, nien, no. We must stay away from 'education games.'
> Blech. They inevitably suck, and totally miss the point of 'games.' It's far
> better to use a COTS game, for tons of good reasons – but listen, man.
> Teachers can't make games. That's why they (we) are teachers and not
> game designers.

Round 3

The primary purpose of Round 3 was to allow any dissenting opinions to come to the surface. Most concerns were incorporated into the final summaries, but several others are notable and deserve recognition here as dissenting opinions.

First, the expert who expressed his dissatisfaction with the idea of teachers creating educational video games in Round 2 voiced his opinion again in Round 3:

> --> EDUCATORS SHOULD NOT TRY TO MAKE GAMES <-- We basically suck at it, and the people who make games are really good at it. Our jobs, as educators, is to look at existing games and use them to fit in our learning objectives into, right? Let the people who are good at making games, make games. We already know a "well-designed" game is intrinsically educational. So all it takes is a teacher who knows the game world to play it and use it with their students.

Another participant disagreed that the quest system common in MMORPGs could be put to educational use, saying that such a design might not only be nontrivial but perhaps impossible. He also pointed out that due to the number of paths to success in an MMORPG alignment with "even the most progressive curriculum" might be impossible.

Others took issue with the suggestion that the transfer of skills from a game to the real world might depend on the fidelity of the models used in the game. One pointed out that high fidelity simulations might be too boring to be of any educational value. Another expanded on the issue in this way:

> All simulations remove *some* of the complexity in the world. Commercial games may alter the real world for entertainment, but effective MMORPG design should also consider altering the world in specific ways to achieve the synergistic effects of education and engagement. Say, if a particular relationship is really important when it occurs, but it doesn't occur that often, it might happen more frequently than a realistic pattern of occurrences. The point being that fidelity is not the most pressing design issue, but rather the learning outcome is, and the world may be altered to facilitate that.

Some participants took exception to the suggestion that "the violent and male dominated social structures of many commercial MMORPGs may be inappropriate for use in an educational setting." One pointed out that MMORPGs are designed to support multiple types of players, including those interested in achieving, exploring, and socializing. Another pointed out that in MMORPGs, unlike many other games in which violence plays a role, it is actually possible for players to advance to the highest levels without engaging in violent behavior. MMORPGs also allow players to choose male or female avatars and offer many quests that may appeal to more (stereotypically) female players.

Another participant disagreed with the summary that "games would need to be based on non-violent, appropriate, and non-trivial subject matter" on the grounds that violence is a part of reality, is engaging in a game context, and is relatively harmless in a virtual world. This participant further suggested that "in game violence may be an excellent tool to teach many things (including the value of nonviolence)." Similarly, this participant suggested that trivial content might provide engage players in game-play that is non-trivial, such as pattern recognition and strategy.

Though it was not necessarily a dissenting opinion, one participant suggested that it was too mild to claim that there "would be a significant need for teacher professional development." This participant was "positive that no amount of teacher PD would ever be enough to get teachers to actually do this if they didn't already have an inclination to use games in this way in the first place."

Regarding the social learning summary, one participant felt that "everything about this can be confirmed and refuted at the same time," seemingly dismissing the summary as somewhat worthless. Nevertheless, all participants, including this one, reported at least moderate level of consensus with this summary, meaning that the results were at least acceptable to all participants.

Final Consensus Check

The final consensus check collected primarily quantitative data, but also offered participants the opportunity to respond to each summary by expressing dissenting opinions or additional comments. These responses did not have an opportunity to be incorporated into or addressed by a subsequent summary. Such comments were also small in number; only three to five participants commented on each summary. Therefore, all dissenting opinions and additional comments expressed by participants during the final consensus check will be reported in this section.

Few of the opinions participants expressed in response to the six summaries can be truly considered dissenting opinions. Where they were in dissent with the summary, they were usually arguing against qualifying points in the summary. In other cases, they merely delved into greater detail regarding a particular issue or means of implementation. These comments speak to both the potential value of MMORPGs as an educational medium and to the complexity of the issues that will likely be involved with any implementation of MMORPGs in schools.

Motivation and Engagement

Four participants commented on the motivation and engagement summary. The first of these addressed three main points: repetitive actions, anonymity of players, and the educational value of existing MMORPGs. This participant argued that "repetitive action in and of itself is not bad" because this is exactly how many things are learned. In addition, this participant felt that anonymity between players would allow them to "explore new ideas and actions without real-world social reprisals" and suggested that schools could register students' roles within the game confidentially in order to still ensure accountability for their actions. Finally, this participant expressed his belief that existing MMORPGs "are educational as they are" because they players can learn computer skills, communication skills, teamwork, and more.

A second participant stated that his "only quibble would be that it would be possible to create an experience that would be highly transferable to the real world," which is not so much a dissenting opinion as it is a clarification. Similarly, another suggested simply that the summary was "too negative about how hard it is to develop intrinsic motivation." Finally, the participant who was concerned about educators designing games reiterated his point:

> Whenever I read "An educational MMORPG, though, could be designed"
> I cringe. I don't think we should even think of trying to design an
> educational MMORPG – I think we should use what is out there.

Context-embedded Learning

Four participants commented on the context-embedded learning summary. The first took exception to the suggestion that "MMORPGs might be most valuable if modeled on real world professional training, such as internships," stating that professional training models are designed with well established and standardized procedures meant to streamline the learning process for efficiency's sake. This participant found more value in the ability of an MMORPG to offer more holistic flexibility in the learning process in ways that may be difficult to model, concluding that "new learning models need to be explored."

One other participant also expressed some worry "about the notion that the context has to be relatively real, whereas in many cases we remove complexity or alter probabilities for instructional purposes." Similarly, another felt that the entertaining elements that replace real-world complexity in commercial games cannot simply be replaced with educational elements, explaining that commercial games "are fun because the game play is tuned for fun and engagement." This participant believed that "if the top design goal of the game isn't to create a fun game, it won't be a fun game." This same participant also felt that assessment was a problem because it would be difficult to assess traditional academic skills in this medium and that "soft" skills such as leadership are difficult to assess in any medium.

One more participant directly stated that "MMORPGs will not provide more transfer" of skills to the real world because "that is the role of reflection and application to new situations." This same participant indicated frustration with the preoccupation

with the safety of virtual worlds, suggesting not only that virtual worlds are inherently safer than the real world, but also that a focus on safety might restrict the creativity needed to create the content needed to engage students.

Social Learning

Five participants commented in response to the final social learning summary, the most comments out of the six summaries. The first comment was not so much a dissenting opinion as an attempt to refocus the discussion of the topic from the question of whether MMORPGs are education to how educators can enhance the educational value so that more skills and knowledge can be transferred. This participant did note that MMORPGs used for educational purposes do need to provide a safe environment for the protection of all players, and need to mitigate the risk of malicious people disrupting the experience for others. This participant also pointed out that all traditional classroom environments also have difficulty transforming students' cultural beliefs, and suggested that at least MMORPGs the ability to interact with others from different cultures. Finally, this participant expressed the fact that he was not concerned about players identifying too much with their avatar because this is easily dealt with.

The second participant to comment took exception to the suggestion that the computer mediated social environment does not provide the same level of interactivity as face-to-face communication and might re-enforce solitude and antisocial behavior, or accentuate problems such as bullying by creating new channels for certain individuals to be ostracized. This participant reported that having spent considerable time in Second Life and World of Warcraft, the opposite seemed to be true; "the virtual or MMORPG

environment may actually make people feel as though they are more closely connected to other players." The participant did acknowledge that this can lead to misunderstanding, especially where chat is used in place of voice.

Conversely, a different participant obviously did not agree with the concern that players may come to identify too closely with their avatar. This participant wrote sarcastically, "Come to identify to closely with their avatar? Who has been taking this survey?"

A fourth participant was concerned about the feasibility of assessing the sort of social learning described in the summary, stating that "the real world the problem would be capturing [social learning] in any way that was embedded into the game." This was in part because the participant believed it would be "too easy to game the game if the players knew they were being graded on teamwork or other social aspects." Ultimately, this participant concluded that "you have to trust the teacher as a profession to [assess] these things, not the game."

Finally, one of the participants disagreed with the statement that aggressive competitiveness may cause emotional distress for those who lose or do not win because "one of the unique things about games is that kids do not suffer from high-levels of distress when they fail" and because "failure is often shrugged off or encourages the player to keep trying, and learn from their mistakes."

21st Century skills

Only three participants left a comment on the 21st Century skills summary. The first of these took issue with the concern that if failure is too easy (or fun) within a game,

it might lead players to become more risk-adverse in real life or else to have an unrealistic view of risk, failure, and consequences in real life. This participant wrote "let's be sure the student understands this is a game" and also hoped that the game would teach players that calculated risks are a way to excel in life and that failure is a part of the process." In addition, with respect to the cheating that can occur in an MMORPG, this participant expressed an opinion that "the benefits of gaming can far outweigh the affects of the cheaters."

The second participant to comment began by reiterating a view that the skills grouped together as 21st Century skills "don't really hang together and overlap a lot with other sections." This participant then went on to elaborate on additional concerns about cheating (or gaming) the system, saying that "this has to be an open discussion and a huge part of the reflection" and that "cheating and discussions of rules is probably one of the most educational parts of these games."

The final participant to comment also weighed in on cheating, writing, "I'm not sure cheating is as big of a deal as you are making it – again, I think commercial MMORPGs are the best way to go here, and they are pretty good at finding cheaters."

Reflection

Only three participants commented on the reflection summary, and one of these was merely to say, "I agree that reflection is another key difference for educational gaming." Another participant also reiterated that reflection was the most important aspect of an educational game, but also suggested that "in-game reflection would be valuable because it would of necessity break into game play." The last participant to comment was

also concerned that the summary didn't "mention the difficulty in having instructors who can provide the reflection guidance needed" in general, not just with respect to reflections on culture.

Infrastructure and Logistics

Only three participants commented on the infrastructure and logistics summary. One felt that students can "play nicely with each other" despite a high student to computer ratio. This participant also reiterated his view that explicitly educational MMORPGs are a bad idea and that using current COTS MMORPGs would be more valuable.

Another participant took exception with two points presented in the summary. First, this participant stated that "people don't take pilots seriously [because] no amount of 'proof' changes [their] deep down beliefs" and that "it's naïve to suggest pilots or research studies would change anything." In a similarly fatalistic manner, this participant suggested that schools are "becoming more rigid and resistant to change."

The last participant to comment offered a wide range of comments that amounted to thoughts on proper implementation. Issues such as costs, infrastructure, and scalability were mentioned, as was the unlikely return on investment for developers. This participant, too, thought it was critical that existing MMORPGs be adapted for educational purposes, suggesting that storylines and quests might be adapted for educational use through a process similar to localization of a game in a new language. This participant also acknowledged that cultural resistance to video games might be a

"huge barrier" and that parent education might be the key to overcoming this obstacle. The need for teacher professional development was also reiterated.

Evidence of Quality

Several methods were used to ensure the quality of the study and the results reported in this chapter. First, the iterative nature of the Delphi method itself ensured that participants had multiple opportunities to offer feedback on the researcher's interpretations of their questionnaire responses and to express dissenting opinions if necessary. A final consensus check even allowed participants to indicate their level of consensus with the final summaries of previous rounds' responses. Other measures were taken to enhance the confirmability of this primarily qualitative study, including member-checking, thick rich description, triangulation, prolonged time in the field, and bias clarification. The researcher also took advantage of peer debriefing, an external auditor, and a devil's advocate to allow colleagues to review and react to his methods and findings. The result of each of these measures is reported below.

Dissenting Opinions

During the second round of the Delphi process and in each subsequent round, the researcher offered participants brief thematic summaries of the previous round responses. Participants were then able to offer feedback on the summaries and if they disagreed with any elements in the summary were invited to express dissenting opinions.

None of the dissenting opinions and additional comments expressed by participants throughout the study and reported in the section above indicated disagreement with the central findings of this study: that MMORPGs might be valuable if

used as constructivist learning environments for students. One participant disagreed strongly that explicitly educational MMORPGs should be developed (and particularly not by educators), but believed that existing commercial games could provide the benefits discussed in the findings section. Other participants went into greater detail than what was expressed in the final summaries or else wanted to qualify something said in the summary. The nature of the final comments shared above thus speaks to the strength of consensus reached in this study.

Final Consensus Check

The final consensus check allowed participants to rate their level of consensus with each of six thematic summaries of previous rounds' responses. In addition, participants had the option of responding with additional comments, including dissenting opinions. In the end, all participants reported a moderate, high, or complete level of consensus with each summary, except in one case where a single participant reported a low level of consensus with a single summary. No participants indicated "no consensus" with any summary. Each summary received an average level of consensus between 4 and 5 (on a 5-point scale), except for one, which received an average level of consensus of 3.92, a value well inside the range identified as a high level of consensus (See "Levels of Consensus" above). In short, the level of consensus with each thematic summary was high or very high (See Table 1 above). As reported above, none of the additional comments disagreed with the central findings of the study.

Confirmability Measures

Trochim (2003) recommends several confirmability measures to enhance the accuracy of qualitative research, including member-checking, thick rich description, triangulation, prolonged time in the field, and bias clarification. Trochim (2003) defines member-checking as the practice of "taking the final report or specific descriptions or themes back to participants and determining whether these participants feel that they are accurate" (p. 196). This happened three times throughout the iterative Delphi process used in this study: in rounds two and three, and in the final consensus check. Participant feedback largely supported or improved upon the researcher's conclusions.

Trochim (2003) also suggests that qualitative researchers "enhance transferability by doing a thorough job of describing the research context and the assumptions that were central to the research" (p. 162). The researcher has attempted such an approach in this report, by sharing the detailed summaries provided to the participants, the participants complete final comments, and detailed descriptions of the process, including these confirmability measures and other evidence of quality.

In a sense, the researcher has also employed a kind of triangulation by "examining evidence from [different data sources] and using it to build a coherent justification for themes" (Trochim, 2003, p. 196). In this study, the various expert participants served as different data sources which the researcher could triangulate (in a qualitative sense) to establish themes for use in subsequent rounds of the Delphi process and in the final report.

The researcher has also spent a prolonged time in the field. His review of literature was ongoing from the summer of 2004 until the summer of 2007, and he continued literature realignment through the spring of 2008 when this report was composed. In the meantime, though he would not consider himself a gamer and had never played an MMORPG at the outset of the study, over the course of these four years the researcher subscribed to and played many of the commercial MMORPGs that were mentioned in the literature, that were popular at the time, and that were relevant to this research, including *Everquest* (Platinum Edition), *Star Wars Galaxies: An Empire Divided*, *Final Fantasy XI, World of Warcraft*, and *Eve Online*. He also explored many other relevant role-playing games mentioned in the research, including *Star Wars: Knights of the Old Republic*, *Neverwinter Nights* (Platinum Edition), and *Final Fantasy XIII*. Countless other PC and console games were explored as well. Over this period of time, the researcher also completed many related projects for professional purposes: he interviewed many authors and experts in the field for professionally produced webcasts, led hands-on workshops for teachers helping them to integrate video games into their classrooms, presented on the topic at numerous conferences, and wrote articles on the topic for the journals of non-profit educational organizations.

Peer Debriefing

The process of peer debriefing "involves locating a person (a peer debriefer) who reviews and asks questions about the qualitative study so that the account will resonate with people other than the researcher" (Trochim, 2003, p. 169). In this case the researcher enlisted the help of a colleague who had recently completed his doctorate in educational

leadership with a focus on educational technology. This colleague's dissertation was a qualitative study investigating the implementation of a new technology with over a thousand students at two middle school sites.

The researcher explained the topic of this present study, the research questions, and the method of inquiry. The peer debriefer verified the data analysis process by reviewing sample participant responses and the researcher's conclusions. The peer debriefer also reviewed the researcher's findings and provided feedback. He highlighted certain elements of the study, expressed concerns about others, and provided several additional ideas, responses, and suggestions for the study.

The peer debriefer highlighted several elements of the study. He felt it was important that 21st Century skills had the highest level of confidence among the final findings; he felt that this potential benefit of using MMORPGs in education is probably the most important to students. He also acknowledged that students do in fact expect their learning to be on-demand, and he expressed his agreement that it is important that students are able to learn about other cultures while online. In addition, he noted that he agreed with the fact that competition is not necessary for collaborative learning – that cooperation and teamwork could be encouraged as well. In particular, he noted that even "troublemakers" love helping other kids; it contributes to their sense of self worth, especially if school and home life don't. Finally, he felt that the focus on cultural resistance to video games is important, noting that people have long standing beliefs about what school should be – and that games are "fun" not "learning." In addition, he

shared that in his experience and research, teachers in general tend to be resistant to any new educational technologies.

The peer debriefer also expressed several concerns related to the study. When reviewing the motivation and engagement findings, he reiterated that gender is a primary concern if MMORPGs are to be used in schools. (Later, he noted that other games are beginning to change; the Wii for instance is "not just for geeky guys anymore.") Another concern he had was one some of the participants had identified as well; he asked how students would be assessed or graded on their learning in an MMORPG. Similarly, he noted that the organizational change needs are important, and he thought the financial needs mentioned in the findings required more detail, specifically when it came to the cost of training teachers to use MMORPGs effective. Finally, concerning the fidelity of simulations used in educational games, he initially suggested that it should be "realistic." For instance, he suggested that a student playing a Confederate soldier in January 1865 shouldn't be able to win the Civil War due to factors such as a lack of supplies. However, the peer reviewer was also open to the need for a balance between fidelity and fun in a game.

In response to reviewing the findings, the peer reviewer had three other ideas. First, he suggested that the time needs might be met if the school day were seen as more flexible than a traditional "eight to three day." He also felt that the role of the teacher should change; part of the responsibility should go to the game and the teacher should become more of a coach or facilitator, in keeping with constructivist ideals. Additionally,

he suggested that the new breed of virtual schools becoming available to students might be a good place to target implementation of games such as those mentioned in the study.

Finally, the peer debriefer had one specific suggestion for the researcher's presentation of the qualitative findings. He suggested incorporating more direct quotes from the participant responses into the thematic summaries. He also suggested incorporating direct quotes into the dissenting opinion sections and in the discussion in chapter five. On these last two points, the researcher has heeded the peer debriefer advice, though he has decided to report the final thematic summaries in the same format in which they were last presented to the participants.

In summary, the peer debriefer said that his feedback on the study overall was positive, and that the six themes identified by the researcher were "solid and concise." These comments, and the way in which the peer reviewer engaged the content of the study shared above, speak to the quality of the study overall.

External Auditor

The researcher also used an external auditor to review this study and provide an assessment of the project at its conclusion (Trochim, 2003, p. 169-170). For this purpose, the researcher enlisted the help of another colleague. This person had also recently completed his doctoral degree, specifically a Ph.D. in educational technology. The methodology used for his dissertation was a traditional Delphi method, and he went on to complete and publish another international Delphi study focused on educational technology following completion of his dissertation study. It was therefore appropriate that this external auditor focused primarily on the methodology used in this study.

Following his review the auditor had four concerns about the study and an additional observation.

The first concern that the auditor expressed was a concern about the small number of participants to complete the study, being only 12. However, although the studies he had conducted utilized larger samples, he agreed that this sample size was sufficiently well supported by the literature cited in chapter 3.

His second concern was that Delphi studies usually include some reference to the future – that participants are expected to come to a consensus regarding a prediction or predications. However, he understood that the future was implied in the "potential" applications and drawbacks of MMORPGs being investigated in this study. Later noted the many different varieties of Delphi studies and ways of implementing them, and he acquiesced that there are indeed some studies that focus solely on consensus building in order to make a decision, which is necessarily in the future. He even suggested that perhaps the Delphi method needs to be seen as a consensus building exercise to be used when an informed decision needs to be made, which was part of .

The third concern expressed by the auditor was related to how the themes were generated from participant responses. He noted that some of the themes appeared first in the literature review prior to data collection. However, upon closer inspection, he understood that it was not surprising that the researcher would uncover similar themes when consulting the literature and when consulting experts in the field. Still, he questioned the choice to direct the participants toward advantages and disadvantages in

the first round rather than providing a single open ended prompt about the topic, but this is a choice the researcher remains comfortable with.

Finally, the auditor was concerned that the element of ranking was largely missing in this study. He explained that in a traditional (quantitative or mixed) Delphi study, participants rank a number of predictions or issues during several iterations of the Delphi questionnaire. In this way the researcher understands what is most important to the expert panel. Because this study was purely qualitative until the final consensus check, this element of ranking was missing. Still, the auditor recognized that ranking of responses still played a roll at two points in this study. For Round 2 question five, participants were asked to identify one topic from among many that they felt was most important and to write about why they agreed or disagreed with the researcher's summary of previous responses. In this way, the final two themes were identified, including the importance of reflection, which was one of the themes with the highest consensus and consistency among participants' responses on the final consensus check. Ranking also played a role in the final consensus check itself, as participants were asked to rank their level of consensus with each summary on a quantitative scale in a manner consistent with more traditional Delphi methods.

The external auditor offered an additional observation. He noted that it seemed like a lot of work for the researcher – and for the participants. However, this was necessary in order to provide the rich thick description necessary for a qualitative study and to ensure the quality of the study.

Devil's Advocate

A third colleague was recruited by the researcher to serve as a devil's advocate to the results of the study. This person was a Ph.D. student pursuing a degree in Educational Technology, and she approached the study from three perspectives. She also offered straightforward feedback regarding information that was missing or unclear throughout the draft of the results. In each case, the researcher made the suggested changes.

First, the devil's advocate expressed some concerns with the Delphi method and the way it was implemented. As with any Delphi study, the confidence readers can have in the results is entirely dependent on the expertise of the panel. The devil's advocate questioned the make-up of the panel, suggesting that "they sound like teachers who already have an opinion about using games as a teaching tool." While this was the case for three of the final 12 panelists, these people were considered experts on account of their experience implementing video games in their classrooms. Their perspectives were tempered by eleven other experts including University researchers, serious game developers, and authors of a books and articles on the subject.

Second, the devil's advocate questioned the value of some of the results. In particular, she thought the study illustrated that MMORPGs might be useful in Social Studies or English classes (and perhaps in Science), but she wondered how they might be used to teach Algebra or other subjects. In general she wondered how a fantasy world could be used to teach things like abstract math, ethics, risk taking, or leadership, particularly if students are simply playing to progress in the game. She further questioned the suggestion that any reflection or development of metacognitive skills is happening

when students play current MMORPGs, and was doubtful that "a bunch of old school

teachers [could] come together on this issue and spend time that administrators call

professional development" learning to implement MMORPGs in their classrooms. She

also expressed a belief that MMORPGs are designed to let the player act with a lack of

accountability that teachers generally don't know how to deal with, suggesting that if

teachers did know how to handle this, they wouldn't have the behavior problems they do

in class.

Third, the devil's advocate took a surprising approach to criticizing the results;

she spoke from the perspective of a student. She did so in a way that struck the researcher

as authentic and likely typical of the difficult reactions teachers may encounter when

attempting to implement MMORPGs in the classroom. She portrayed some students as

having an attitude such as this:

> Yup, you are developing my leadership skills alright. Look who is in
> charge around here now! So, what I am learning here, teamwork,
> creativity, community, 21st Century skills? Not me, I am learning to put
> number one first and maybe a few "schooly" things next. What teacher
> can deal with my attitude? I hate school; I do not respect this effort on
> your part to teach me things when I am not sure what you are even trying
> to teach me! Just let me go out and chose the games I want to play!

She went on to make some very specific criticisms that might be beneficial for

potential developers of MMORPGs to heed:

> If you try to send me on some quest, you had better like the answers I give
> you, and let me advance, or I am just going to lose interest and, well,
> maybe I will just begin to sabotage the others in the game. Now that
> would be fun. Explain to me, will ya, how that immediate and meaningful
> feedback is a good thing? If I have to read it, forget it. If I have to listen to

it, and it gets in the way of my game, I will just want to get past it. Okay, so I did something right, but who are you to say what is right? You know that one you say I missed, well you were wrong and I was right. It is all about the game, not the stuff you are trying to teach me!

From the perspective of a student, the devil's advocate also pointed out that the implementation of MMORPGs in the classroom is unlikely to be uniform, illustrating her point with an imaginary student response: "I sure hope I do this in Miss G's class (and not in Mrs. B's class) because she lets everything slide and never notices how anyone acts!"

Though the devil's advocate directly contradicted or challenged few specific findings from the expert panel responses, she did illustrate the distance between the vision the expert panel built consensus around and the reality in existing schools. The highly qualified statements in the findings themselves reveal some of the complexity that will undoubtedly accompany any effort to implement MMORPGs in education, but the devil's advocate served to highlight the complex nature of the related issues. This complexity will be addressed in greater detail as part of the discussion in the following chapter.

<div align="center">Summary and Conclusion</div>

As stated in chapter 1, the study reported here inquired into potential applications for MMORPGs as constructivist learning environments in formal K-12 education, and aimed to explore the potential benefits and drawbacks of such applications. This chapter reported the results of this inquiry and exploration. First, the data collection process was explained as were the researcher's systems for keeping track of data and emerging

understandings. The findings were then reported in six thematic summaries of participant responses; this is the heart of the chapter and includes the elements of consensus reached by the expert panel. Next, dissenting opinions and additional comments were also reported in detail. Finally, this chapter concluded by presenting evidence of the study's quality, including confirmability measures such as the researcher's log, peer debriefing, and an external auditor.

In conclusion, the expert panel came to a high degree of consensus around the central findings of this study: MMORPGs might be valuable if used as constructivist learning environments for students. Specifically, they found that MMORPGs might be motivating and engaging for students while providing a context for learning and opportunities for social learning and developing 21st Century skills, particularly if coupled with structured reflection time. They also came to a high degree of consensus regarding the infrastructure and logistical changes necessary for this to happen in existing educational institutions. The following chapter will offer discussion and interpretation of these findings and provide recommendations for educators, game designers, and academics interested in pursuing the use of MMORPGs for educational purposes.

CHAPTER 5:

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

This final chapter of the dissertation begins by reviewing the problem statement and methods of this study. The results of the study are summarized as well. Next, an interpretation of the findings is presented, followed by an explanation of dissenting opinions and participants' additional comments. The relationship of this study to previous research is also covered. Finally, the implications of the study are discussed and followed by recommendations for educators, game designers, and academics – including recommendations for further research. The chapter ends with a reflection on the researcher's experience and a concluding statement.

Statement of the Problem

Formal K-12 education remains much as it did a century ago, but in the era of the Internet, cell phones, and video games, students have changed. Video games and simulations show potential as engaging and motivating learning environments. MMORPGs in particular have social and cooperative elements that might be valuable for educational purposes. However, despite a breadth of research about video games and learning in general, there have been no studies focused on the potential uses of MMORPGs in formal education. With the notable exception of Steinkuehler (2004a, 2004b, 2005a, 2005b), who investigated the sort of informal apprenticeship learning that takes place in MMORPGs, there was a significant gap in the literature regarding learning and MMORPGs. Other video game theorists, including Prensky (2001, 2006) and Aldrich

(2004, 2005) discussed MMORPGs as a learning platform, but only briefly, and when they did, they disagreed about the value of the games for learning. Therefore the aim of this study was to inquire into potential applications for MMORPGs as constructivist learning environments in formal K-12 education, and to explore the potential benefits and drawbacks of such applications.

Review of the Methodology

This qualitative study employed a social constructivist research paradigm and a Delphi method of inquiry. A panel of experts was asked to make predictions in response to multiple iterations of a questionnaire. After each iteration, the researcher conducted a content analysis. Responses were coded and analyzed by the researcher. Following iterations were modified in light of these responses. Summaries of participants' responses were also anonymously shared with the other participants so that they had an opportunity to alter their predictions prior to the next iteration. Through this process, the panel moved toward consensus in their predictions. Dissenting opinions and additional comments were given special consideration by the researcher as well.

The research population was a panel of 12 experts drawn from the field of video games and learning. Both industry professionals and academics were represented in the population. The researcher drew upon the expertise of this population by asking them to complete three iterations of a Delphi questionnaire over a period of 8 weeks.

Research data were collected in the form of participants' written responses to the Delphi study questionnaire. This data were coded and analyzed by the researcher after each iteration so that results could be presented to the participants and the following

iteration of the questionnaire could be composed. A final consensus check completed the study by allowing participants to quantitatively indicate their level of consensus with the final six thematic summaries of participants' prior responses, and to comment on these summaries if they chose. A more detailed discussion of the research method appeared in chapter 3.

Research Questions

The study was guided by the following two overarching questions:

1. What are the potential benefits of using MMORPGs as constructivist learning environments in formal K-12 education?

2. What are the potential problems related to using MMORPGs as constructivist learning environments in formal K-12 education?

Summary of the Findings

The expert panel came to a high degree of consensus around the central findings of this study: MMORPGs might be valuable if used as constructivist learning environments for students. Specifically, they came to consensus around six specific predictions regarding the potential benefits of using MMORPGs in this way. The prediction that readers can have the highest degree of confidence in is the suggestion that MMORPGs might be able to help students develop various 21st Century skills, as defined by NCREL and the Metiri Group (2003). The prediction that readers can have the next highest degree of confidence in is the suggestion that these games will have the greatest educational value if students are offered structured opportunities for reflection on their learning. The expert panel also believed that MMORPGs can be motivating and engaging

for students. In addition, they came to a high degree of consensus around the prediction that many infrastructure and logistical changes would need to be made to implement these games in existing educational institutions. Finally, they projected that MMORPGs can also provide opportunities for context-embedded learning and social learning. Each of these predications was qualified by potential drawbacks as well. These drawbacks were presented in chapter 4 and are also discussed in the interpretation, implication, and recommendation sections below.

<div align="center">Interpretation of the Findings</div>

This section of the chapter presents an interpretation of the findings, including conclusions that address both research questions. It contains references to outcomes in chapter 4, covers all the data, and is bound by the evidence collected. It also relates the findings to a larger body of literature on the topic, including the conceptual/theoretical framework. This section is organized based on the thematic summaries of the Delphi panel's consensus presented in chapter 4.

<div align="center">*21st Century skills*</div>

Constructivists have long recognized the need for educational institutions to change their focus from traditional content areas to new skills that will better serve students in the future. As Vygotsky (1997) wrote, "adapting the child to the environment in which he will have to live and function is the ultimate goal of every form of education" (p. 205). Forty years ago Bruner (1966) realized that global society was "entering a period of technological maturity in which education will require constant redefinition, [and that] the period ahead may involve such a rapid rate of change… that narrow skills

will become obsolete within a reasonably short time after their acquisition" (p. 32). It follows that the current educational establishment might serve students better by leaving behind (or at least moving beyond) specific skill-based standards and focus instead on helping students develop the meta-skills they will need to succeed in the 21st Century.

It was this sort of thinking that led Papert (1996) to base his book *The Connected Family* on the premise that there are "many more important and long-lasting topics than office computer skills" (p. 28) for students to learn, among them "the study of learning" (p. 28). Aldrich (2005) also believed that learning how to learn is one of the most important things people can learn from playing computer games (p. 137). Prensky (2006) agreed, explaining that "the kids who play today's 'complex' video games… learn to think: through experimentation and what real scientists call 'enlightened trial and error,' they learn to understand and manipulate highly complicated systems" (p. 8). Prensky understood that "in order to 'beat' their complex games kids must learn, through complex reasoning, to create strategies for overcoming obstacles and being successful – skills that are immediately generalizable" (p. 8). Shaffer (2006b) took this one step further with his belief that "young people today need to be able to use their learning muscles to innovate and create, and ultimately to adapt and transform themselves several times over in one lifetime" (p. ix). This is why his epistemic games were "fundamentally about learning to think in innovative ways" (p. 10). Ultimately, his work focused on using computer games to help students "develop the skills, knowledge, and attitudes they need to succeed in a changing world" (p. 13). Even pop culture critic, Johnson (2005) acknowledged that the important learning that happens during gameplay is "the collateral learning that goes

beyond the explicit content of the experience" (p. 40). In short, video games may be useful in helping students develop the sort of 21st Century skills constructivists would advocate.

Research Question 1: Potential Benefits

The results of this study suggest that MMORPGs may be one genre of video game especially well suited for accomplishing this. As reported in the previous chapter, the expert panel reached a very high level of consensus around the prediction that MMORPGs might be useful for helping students to develop 21st Century skills, as defined by NCREL and the Metiri Group (2003). This broad spectrum of 21st Century skills was organized into four categories: Digital Age Literacies, Inventive Thinking, Effective Communication, and High Productivity.

Many digital age literacies can potentially be addressed when playing an MMORPG. As many of the participants noted in round 1, players develop "comfort with manipulating technology," or technical literacy, a point that appears often in the literature on video games and learning (Aldrich, 2005; Gee, 2003; Papert, 1993; Prensky, 2006; Steinkuehler, 2008). As another participant pointed out, "even information literacy skills are important as players seek to find, evaluate, and use information (both in-game and from other outside sources)." This too, plays out in the literature of Shaffer et al. (2005). A participant believed that MMORPGs may be "a good place to start in promoting intercultural awareness," and the literature, too, suggests that multicultural literacy and global awareness can be developed through video game play (Aldrich 2005; Gee, 2003; Shaffer, 2006b; Squire & Steinkuehler, 2006). Shaffer's (2006) work also suggests that

students can develop their scientific and economic literacies through video game play. The results of this study suggest that in addition to other genres of video games, MMORPGs can help students develop their digital age literacies.

Inventive thinking skills can also potentially be exercised during MMORPG play. A participant in round 1 explained that players "practice at strategic thinking, planning, decision-making, and judgment." Others suggested that MMORPGs can help encourage risk taking because "failure is safe and often fun," or as another participant put it, MMORPGs require "experimentation" in a virtual world. The literature on video games and learning supports the idea that games require and reward risk taking (Aldrich 2004, 2005a; Gee, 2003; Prensky, 2001a; Quinn, 2005; Salen and Zimmerman, 2004; Shaffer, 2006b). Perhaps more importantly, students might express their creativity through their solutions to in-game problems and even through "creating content for games." These comments are in alignment with the literature on video games in general, which suggests that curiosity and creativity can be promoted by good video games and simulations (Shaffer, 2006b). The literature also suggests that games and simulations can allow students to develop adaptability and practice managing complexity (Gee, 2003; Prensky, 2006; Squire & Jenkins, 2004), as well as promoting higher-order thinking and sound reasoning (Iverson, 2005; Johnson, 2005; Prensky, 2006; Shaffer, 2006b). As one participant suggested in round 2, "when kids play [MMORPGs], they are using a computer, and learning a highly complex system," which can lay the foundation for teaching the students the sort of systems thinking advocated by business experts, a point that was made often in the broader literature on video games (Aldrich 2004, 2005a; Gee,

2005a; Johnson, 2005; Koster, 2005; Squire, 2003). According to Steinkuehler (2005a), MMORPGs players are frequently adapting and managing complexity by "researching equipment, making maps, managing resources, investing currencies, building models, designing strategies, debating facts and theories, and writing" (p. 2). An MMORPG often includes "several overlapping well-defined problems as its core mechanics… with a host of ill-defined problems enveloping them" (Steinkuehler, 2006, p. 3). The results of this Delphi study support Steinkuehler's ethnographic results, and suggest that MMORPGs might be as effective as other genres of video games (if not more so) in helping players develop inventive thinking skills.

MMORPGs might help students become effective communicators as well. One expert mentioned in the first round that the games might "provide an arena for developing… interpersonal communications." Very little can be accomplished in an MMORPG without the player being able to effectively communicate with other party members, guild members, and other players. Additionally, the learning communities that players form around MMORPGs (in which they share codes and strategies) parallel the activities of 21st Century professionals in knowledge-based workplaces. Gee's (2003) Semiotic Domains Principle touched on the importance of learners being able to participate in an affinity group associated with a domain of study (p. 49). This includes elements of "teaming and collaboration" (NCREL and The Metiri Group, 2003, p. 48), as well as "social and civic responsibility" (p. 54), and "interactive communication" (p. 56). Naturally, a large part of the purpose of Aldrich's (2004) Virtual Leader was to provide players the opportunity to develop their interpersonal skills of effective

communication in the workplace. Good video games can also help develop intrapersonal skills, as Gee's (2003) self-knowledge principle suggests (p. 67). As the games for change movement demonstrates, video games can also be an effective way for students to develop a sense of personal, social, and civic responsibility-or to learn ethics (Gee, 2003; Michael & Chen, 2006; Prensky, 2001a, 2006). The results of this study support the suggestion that MMORPGs, too, can help students to develop their skills of effective communication.

Similarly, MMORPGs can help players become highly productive using real world tools. As a participant responded in the second round, players "are interacting with symbols, working with people, literally across the globe, and are communicating using… 21st Century tools." In addition, the panel came to consensus around the belief that the challenges and systems in the game can be selected or designed to authentically parallel real-world scenarios. Gee's (2003) design principle and Shaffer's (2006) epistemic games support this belief as well. The results of this study suggest that in addition to the games studied by other scholars, MMORPGs can provide players with opportunities to be highly productive and develop skills with real world tools.

Research Question 2: Potential Problems

Despite these apparent advantages, the panel also warned of several potential drawbacks related to using MMORPGs to help students learn 21st Century skills. First and foremost, they acknowledged that these are very complex skills, and that an MMORPG in isolation is unlikely to develop them deeply unless complimented by a variety of other educational activities. This perspective is also evident in the literature of

constructivists (Dewey, 1926; Bruner, 1996) and video game scholars (Aldrich 2004,

2005; Shaffer, 2006; Shaffer & Gee, 2005). The panel also noted difficulties in

determining an effective level of risk taking, in controlling or allowing cheating (or

gaming the system), and in assessing the transfer of such complex skills to real world

scenarios. However, each of these potential drawbacks speaks more to the complexity of

the educational issues involved than to any deficiencies in the medium of MMORPGs.

Conclusion

The panel may have come to the highest level of consensus around this topic

because it may be the most important potential benefit; it is a clear and present need in

current schools. As chapter 1 established, formal K-12 education remains much as it did a

century ago, but in the era of the Internet, cell phones, and video games, students have

changed; students are now digital natives who expect an education that will be relevant to

their lives (Prensky, 2001b). As a participant put it in the first round of the Delphi

process, one of the potential benefits of using MMORPGs as constructivist learning

environments is that they can help students develop 21st Century skills, "unlike

behaviorist pedagogies currently being used." Another participant pointed out that while

today's schools traditionally have a difficult time teaching soft skills such as leadership,

MMORPGs "might also provide an arena for developing skills at leadership (and

followership)… and management." Yet another participant suggested that this is already

happening in Commercial Off The Shelf Games, a point that is in alignment with recent

research into how the gamer generation is excelling in, and reshaping, the business world

(Beck & Wade, 2004). In this way, MMORPGs can (and perhaps should) be used to

supplement traditional education to teach 21st Century skills that schools generally do a poor job teaching.

Reflection

Reflection can be a powerful mechanism for meaning-making, particularly as students sort out relationships between the actions they take, the consequences of their actions, and other variables affecting their experiences. This sort of active and purposeful reflection is a fundamental property of constructivist learning environments, including those supported by educational technologies (Bruner, 1986, 1996; Dewey, 1916, 1938; Jonassen, 2003). Literature related to video games and learning suggests that video games may be a natural technology for encouraging reflective learning (Aldrich, 2004; Gee, in press, as cited by Squire and Steinkuehler, 2006, p. 16; Prensky, 1996, 2006; Shaffer, 2006b; Squire, 2003).

Research Question 1: Potential Benefits

The results of this study suggest that MMORPGs might also offer an opportunity for students to reflect on their learning and problem-solving strategies. In the first round, one participant articulated the core belief that MMORPGs provide players with "active learning based on experience… that includes frequent opportunities for reflection." Another suggested that problem-solving that happens during MMORPG-play "can also be reflected upon and transferred" to the real world. This is especially true if the game is played with the guidance of an educator and with dedicated, structured, and frequent debriefing time. In fact, the expert panel came to a very high level of consensus around

the belief that much of the educational value of MMORPGs would be lost without such supporting reflection.

As one participant recommended, students can play MMORPGs "with other participants lead by an educator so that guidance and reflection are a part of the process." Another expressed this as a necessity, writing in the second round that:

> If you solve all the adoption issues, MMORPGs will still fail without expert teacher guidance… it's the skill of the teacher to create a context that takes the MMORPG use beyond the clicking. It's also the 'last mile' in the chain of concerns that block potential MMORPG use for real learning.

Another participant expressed a similar view, warning that "it's the ability to guide… [but] it's reliably a problem for teachers to be capable of incorporating technology into the classroom and scaffold effective reflection, and this isn't going to be any easier!" Providing dedicated, structured, and frequent debriefing time lead by an educator may be important precisely because it is often overlooked by K-12 educators and is a critical need in schools. It is also largely missing from most commercial off the shelf games.

On the other hand, other participants argued that the reflection could be built into an MMORPG, which would allow the game to be implemented on a wider scale. One participant wrote that:

> Debriefing can help maximize the learning experience, but should not be necessary and may detract from the other benefits of providing an educational environment that is scalable to operate, and independent enough for the student to move at their own pace.

Whether the debriefing takes place during the game or after, this study suggests that MMORPGs, like many other genres of video games identified in the literature review, can be valuable for offering students opportunities for purposeful reflection.

Research Question 2: Potential Problems

The expert panel also acknowledged potential drawbacks to using MMORPGs to support reflective learning. For instance, teachers experienced in supporting reflection would be necessary, and even if they were available the costs of debriefing game play in a face-to-face fashion might limit the scalability of the game.

One participant warned that "it's reliably a problem for teachers to be capable of incorporating technology into the classroom and scaffold effective reflection, and this isn't going to be any easier!" Providing dedicated, structured, and frequent debriefing time lead by an educator may be important precisely because it is often overlooked by K-12 educators and is a critical need in schools. It is also largely missing from most commercial off the shelf games.

Conclusion

The panel was clear that the potential drawbacks do not outweigh the benefits of having students reflect on their game play. They believed that without such explicit reflection activities the educational value of playing an MMORPG might largely be lost. This belief may account for the very high level of consensus reached around this theme.

Engagement and Motivation

One of the fundamental properties of an effective constructivist learning environment is that it engages and motivates students. Constructivists have long

considered play a valuable learning process (Bruner, 1966; Dewey, 1926; Dixon-Krauss, 1996; Piaget, 1950; Vygotsky, 1978). Today, Modern game scholars share these perspectives (Aldrich, 2004, 2005; Gee, 2003, 2004, 2005c; Koster, 2005; Prensky, 2001a, 2005b, 2006; Salen & Zimmerman, 2004; Shaffer, 2006b; Slator et al., 2006). There seems to be little doubt that modern video games are deeply motivating and engaging to many of the same students who struggle to pay attention in school – despite the fact that games continuously and consistently challenge students, often to the brink of frustration (Caperton, 2005; Jenkins, 2005; Jenkins & Wright, 2005; Johnson, 2005; Papert, 1993; Shaffer, 2006b). MMORPGs in particular often require players to perform repetitive tasks that seem suspiciously like work, and yet these games are among the most compellingly immersive experiences available (Bartle, 1996; Shaffer, 2006b; Steinkuehler, 2006a). Now, the results of this study suggest that MMORPGs may be an effective medium for engaging and motivating students in an explicitly academic context.

Research Question 1: Potential Benefits

The expert panel came to a high degree of consensus around the prediction that the motivational properties of an MMORPG might be taken advantage of for academic purposes. In the first round of the Delphi process, one participant articulated this belief by writing that "a 'game' will grab and hold the attention of a child more than other methods of teaching." Others cited potential benefits of MMORPGs as "students enjoy playing games," "motivational benefits," and the games' ability to keep students "motivated and interested." The reason for this may be, as one participant suggested later in the process,

that "MMORPGs have very high production value; encouraging engagement and motivation."

In particular the experts felt that MMORPGs supported the sort of hard fun advocated by Papert (n.d.) and other constructivists and video game scholars. As one participant articulated it "MMORPGs are continuously challenging – mastery is tremendously difficult." This is true, as another participant pointed out "for different types of players and different levels of ability." Furthermore, the panel often expressed a belief that MMORPGs can be engaging for students, that "role-playing, and learning through this process of role-playing, can be a lot more immersive than a conventional classroom learning session, [thus making] the learning experience a lot richer and more meaningful." As one expert explained, the MMORPG interface offers students "an engaging 'Alice in Wonderland' experience in… a graphical virtual context."

Research Question 2: Potential Problems

However, the panel also acknowledged several potential drawbacks of MMORPGs, including the tendency of commercial MMORPGs to motivate players to endure the drudgery of repetitive simplistic tasks for the sake of advancement in the game. They also expressed concerns about the socially destructive behavior modeled by some MMORPGs and about the potential for the games to encourage cliques, bullying, or other antisocial behavior, including addiction to the game. They also noted the potential design challenges inherent in striking the right balance between fun and educational goals, in creating an authentic motivation (or scoring) system, and in creating games that will appeal to a wide variety of students. Again, each of these potential drawbacks speaks

more to the complexity of the educational issues involved than to any deficiencies in the

medium of MMORPGs, and panel members had suggestions for overcoming each

challenge.

Conclusion

As with the belief that MMORPGs can help students develop 21st Century skills,

the belief that MMORPGs can engage and motivate students may be most important

because it addresses a critical need in schools; a student not engaged is a student not

learning. Though the engagement and motivation summary generated the third highest

mean level of consensus among the expert panel, it actually generated the lowest level of

consensus when the length of the summary is taken into account (see Figures 2 and 3 in

the context-embedded learning section below). This may be in part because, as the

literature indicated in chapter 2, video games are no panacea and are not appealing to all

students (Littleton, 2005; Squire, 2005). Some participants expressed similar concerns; as

one pointed out, "some students don't like or aren't good at computer games."

Ultimately, the panel came to consensus around the conclusion that video games are not

appealing to all students (even among the students that are "gamers" not all are attracted

to the same genre of games or to MMORPGs in particular), but that an educational

MMORPG, though, could still be designed to provide multiple paths to success, with

some requiring less technical skill with the game.

Infrastructure and Logistics

The logistical issues inherent in attempting to implement constructivist

educational ideals in educational institutions have been recognized as a challenge for

decades (Bruner, 1966). Educational technologists, too, acknowledged the difficulties of implementing new technologies in the classroom, particularly in support of constructivist teaching (Jonassen, 2000). Although they encourage overcoming the obstacles, video game scholars such as Prensky (2001a) also recognized the obstacles that stand in the way of creating and implementing effective educational games. Aldrich (2004) chronicled the difficulties his design team experienced when developing *Virtual Leader*, a serious game meant to teach the difficult-to-assess skill of leadership, and he identified several paradoxes inherent in developing educational simulations. Shaffer's (2006a) work also dealt with the complex issues surrounding implementation of serious games in the classroom, including the role of the teacher in supporting the games.

Research Question 1: Potential Benefits

Though the expert panel focused on the infrastructure and logistical challenges related to implementing MMORPGs in schools, the results of this study suggest that there would be some potential advantages. For instance, MMORPGs may require fewer hardware resources than other video game genres. The costs of development and maintenance could also be distributed across many schools. In addition, self-organized groups of students similar to existing guilds might be consistent with the ideals of a constructivist learning environment. These are reasons to consider MMORPGs as not only an appropriate genre for educational video games, but also a potentially pragmatic genre for implementation.

Research Question 2: Potential Problems

The expert panel came to a high degree of consensus around the prediction that implementing MMORPGs in existing schools would include many challenges related to infrastructure and logistics. Such challenges include access to powerful enough network computers both in and out of school, the need for thousands of players, the potentially high cost of implementation, the potentially even greater cost in time, cultural resistance, and the need for significant organizational change before the games could be included and accepted. "The challenge facing anyone designing MMORPGs for educational use," said one participant in Round 1, "is to ensure that the amount of learning that accrues is not outweighed by the logistical and cognitive overhead required to implement and play the game." Another participant acknowledged that "it's difficult to sustain ANY constructivist learning environment in formal K-12 education, [and that] this would be no different." These concerns are consistent with existing literature related to school change, which can offer guidelines for change agents hoping to implement MMORPGs in K-12 education, but such a discussion is beyond the scope of this study.

As one participant noted, "resistance to effective teaching methodology is nothing new" and the existing literature can offer guidance for those who wish to incorporate MMORPGs into formal K-12 education on a large scale. On a smaller scale, resistance may not be that great. One participant, a practicing classroom teacher related that in his use of commercial off the shelf games in the classroom he had encountered only mild resistance. (Even he acquiesced that massively multiplayer games might encounter greater resistance.)

Conclusion

Regardless of the scale or the actual barriers to use, concerns related to infrastructure and resistance cannot be ignored in any discussion of, or planning for, potential applications of MMORPGs in existing educational institutions. Most importantly, consideration must be given to the time necessary to implement such a change, and to implement the game itself. As one participant articulated it, "The amount of time needed to implement such a game may be the greatest cost, including the time for students to learn the game."

Context-Embedded Learning

Perhaps the most fundamental property of a constructivist learning environment is that it offers a context for student learning. Ideally, this learning context allows learning by doing, achievement of a flow state, exploration of microworlds, transfer of skills to the real world, situated and distributed learning, and development of new identities.

While traditional teaching and learning tends to be a passive experience for the student who receives knowledge from the teacher, constructivist pedagogy emphasizes learning by doing, learning from experience, and problem solving in context (Bruner, 1966, 1996; Dewey, 1915, 1938). Modern video game scholars have argued that video and computer games can help provide such a context for learning (Aldrich, 2004; Gee, 2003, 2004, 2005a, 2005b; McMahan, 2003; Prensky, 2001a, 2005a, 2006; Shaffer, 2004, 2006; Shaffer & Gee, 2005). They have also argued that when students learn by doing in a video game, ideally they will be challenged without being frustrated, and thus remain in a state of flow, an ideal state of learning (Csikszentmihalyi, 1997; Shaffer, 2006b).

Furthermore, the literature reveals that video games are in fact well-designed

microworlds that require players to master each environment before moving onto the next

one (Aldrich, 2004; Gee, 2003; Jenkins et al., 2003; Jonassen, 2000; Prensky, 2006;

Shaffer, 2006b; Shaffer et al., 2005; Squire, 2003; Squire & Jenkins, 2003; Steinkuehler,

2005b). Perhaps for this reason, several video games designed or used for educational

purposes have been successful in achieving the goal of transferring skills from a learning

situation (such as a microworld) to a real-world scenario (Holland et al., 2003; Pillay,

2005; Shaffer, 2006b; Squire, 2002). This success may also be due to the way many

video games provide environments in which situated and distributed learning can occur

(Dede, 2005; Gee, 2003; Shaffer, 2006b; Shaffer et al., 2005; Steinkuehler, 2008). Also,

as Shaffer et al. (2005) believed, "the virtual worlds of games are rich contexts for

learning because they make it possible for players to experiment with new and powerful

identities" (p. 106). Steinkuehler's (2004a, 2004b, 2005a, 2005b, 2006a, 2006b, 2008)

work touched on ways in which MMORPGs offer a medium for context-embedded

learning, but her research did not address an explicitly educational use of the games.

Research Question 1: Potential Benefits

The results of this study suggest that MMORPGs are indeed a genre of video

game well suited to providing students with opportunities to learn by doing, achieve flow

states, explore microworlds, transfer skills to the real world, learn in situated and

distributed ways, and develop new identities. Participants came to a high degree of

consensus around the prediction that MMORPGs might be valuable in providing a

context for student learning that can be more concrete, immersive, and open-ended than

textbooks, and can be used to represent other places, historical periods, and environments (or systems) that would be impossible to recreate in a classroom. Individual participants highlighted the ability of MMORPGs to allow students "to play with identity," to "actively engage in experiences with the avatars of other participants and with computerized agents," and to "practice with virtual clients, mentors, or collaborators." The participants also focused on the power of MMORPGs to "construct shared simulated experiences otherwise impossible in school settings," to "suspend space and time limitations for learning," and to provide a "multi-sensory learning environment" suitable for multiple learning styles.

Research Question 2: Potential Problems

However, the panel acknowledged several potential drawbacks to using MMORPGs to provide a context for student learning. Most of the concerns were design related. The need to balance fidelity with fun and educational effectiveness was noted, as was the need to ensure accurate content and models used within the game. Once again the difficulty of assessing learning that happens in the context of the game was noted as well. The panel also recognized that students would need to learn the game interface before being successful in a virtual context. The panel also noted that MMORPGs might be missing valuable elements of a face-to-face learning environment and might best used in conjunction with more traditional educational techniques. Good educational media is often difficult to design and often requires a sophisticated approach to implement; MMORPGs would be no different.

Conclusion

Consensus and consistency in the panels responses to this theme were relatively low compared to the other themes, and lower than the researcher expected. This may be in part due to the length of the thematic summaries presented to the panel and the number of concepts bundled together under a single theme; the length may have made it more likely that each participant would find something to disagree with in the summary (See Figures 2 and 3, and Tables 5 and 6, below). It may also be that themes such as 21st Century skills and Engagement and Motivation spoke directly to results that educators would hope to achieve in their classes, while a learning context is a more abstract means of achieving those results.
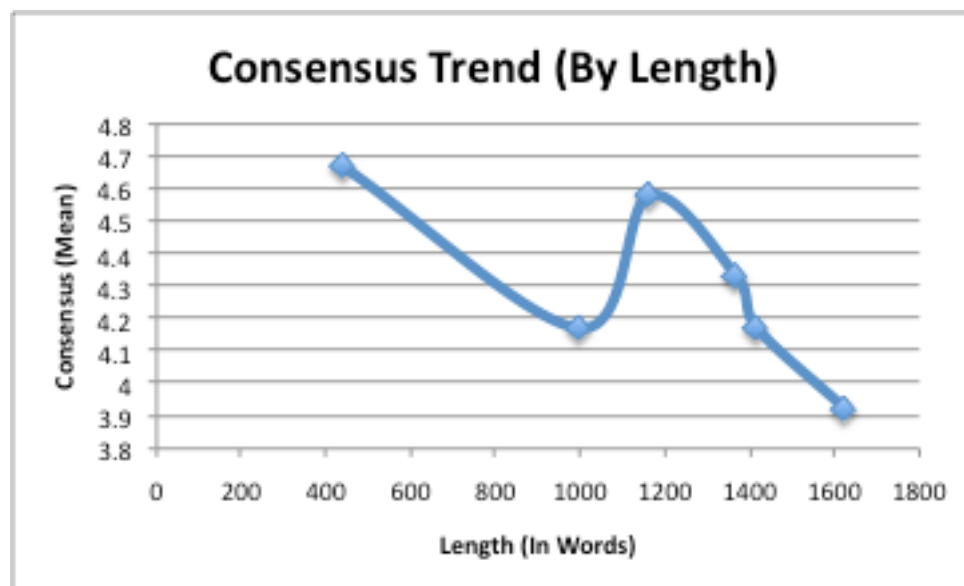
Figure 2: Consensus Trend (By Length of Summary)

Table 5.

Length of Summary and Mean Level of Consensus

Length	Consensus	Subject
439	4.67	Reflection
996	4.17	Motivation
1160	4.58	21st Century Skills
1365	4.33	Logistics
1414	4.17	Context
1622	3.92	Social Learning
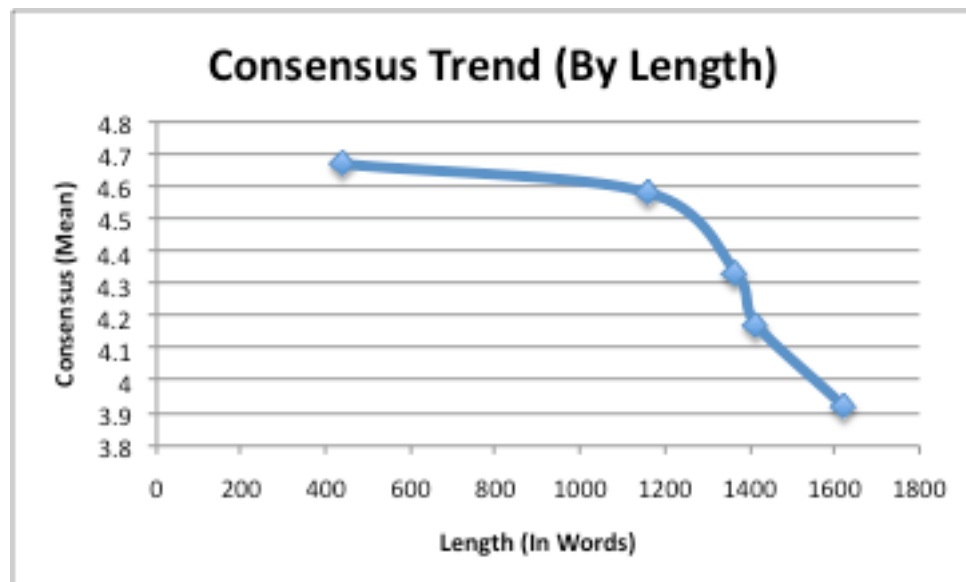
Figure 3: Consensus Trend (By Length of Summary) – Without Outlying Value

Table 6.

Length of Summary – Without Outlying Value

Length	Consensus	Subject
439	4.67	Reflection
1160	4.58	21st Century Skills
1365	4.33	Logistics
1414	4.17	Context
1622	3.92	Social Learning

Social Learning

A constructivist learning environment does not leave a student in isolation, but rather facilitates social learning. Early constructivists came to believe that meaning is not so much made within an individual mind, but socially negotiated and shared between individuals (Bruner, 1986, 1996; Cutts-Dougherty, 1991, as cited in Dixon-Krauss, 1996; Dewey, 1916). These philosophies are now evident in many modern volumes on video games and learning (Gee, 2003; Squire & Jenkins, 2003; Shaffer, 2006b).

Video games and simulations can be used to offer students scaffolding – opportunities for error correction, the expansion of their horizons, and the development of new patterns of investigation (Jenkins et al., 2003; Shaffer, 2004; Squire & Jenkins, 2003). Existing MMORPGs already inherently provide a measure of social scaffolding (Steinkuehler, 2004b; 2006b). Video game scholars have also found value in games as a framework for cooperative and collaborative learning (DeKanter, 2005; Gee, 2003; Shaffer, 2004). However Aldrich (2004, 2005) dismissed MMORPGs as an ineffective format because of the logistical issues. There is no disagreement in the literature, though, about the fact that MMORPGs are inherently social, and that communities of practice are

commonplace in MMORPGs (Jenkins et al., 2003; Jonassen, 2003; Steinkuehler, 2005a, 2005b, 2006a, 2008). In general, video game scholars maintain that video game playing is often a deeply social experience and that well designed games can provide an environment that facilitates social learning (Shaffer, 2005; Shaffer et al., 2005; Squire, 2003).

Research Question 1: Potential Benefits

The results of this study suggest that MMORPGs are not only an inherently social entertainment medium, but that they might also be an effective medium for social learning in a formal K-12 educational context. The expert panel came to a high degree of consensus around the belief that MMORPGs can facilitate social negotiation of meaning, collaborative learning, and distance learning in an environment that meets the social learning needs of each student while constantly challenging and scaffolding each student with his or her ZPD. As individual participants pointed out, MMORPGs could "introduce interactive goal achievement as kids do quests or missions" and offer them an opportunity to develop collaboration skills "essential to [their] ability to live and work in the world." After all, in an MMORPG "many obstacles can only be overcome in a team (guild, corp, whatever)." In addition MMORPGs might "attenuate the normal social hierarchies that can develop among learners, and create a more level playing field for individuals to interact," as another participant suggested.

Research Question 2: Potential Problems

As with context-embedded learning, the panel also acknowledged many potential drawbacks to using MMORPGs for social learning. Again, some were design related. For

instance, it would be challenging to include tasks that require cooperation or competition, means for tracking such collaborative play, and assurances that all necessary roles would be filled. Other concerns were related to the difficulty of managing elements such as competitive play, anonymous play, and malicious play. The panel was also concerned with overcoming the violent and male dominated social structures of existing MMORPGs. As with other themes, the panel included concerns about the lack of face-to-face interaction and the difficulty of effecting positive change in a student without complimenting the game with other educational activities. Finally, the panel expressed the concern that MMORPGs may have less flexibility to adapt to individual players than other games because changes in the game world would affect others as well. In the case of most of these concerns, though, the panel saw a need for creative solutions, which they often suggested, rather than a dead end.

Conclusion

Though the experts did come to a high level of consensus regarding the potential value of MMORPGs for social learning, this was the theme that received the lowest mean level of consensus and the least consistency in individual ratings of consensus level (See Tables 1 through 4 in chapter 4). In round 2, some concerns with the social nature of MMORPGs included the possibility of malicious behavior in the game, the focus of core game mechanics on violent behavior, the lack of appeal to both genders (or to non-gamer students), disagreements about the value of anonymity in the game, the lack of adaptability to individual students' needs, and the possibility of developing new identities in a negative way. Addressing these issues may have overcomplicated the summary that

was presented to participants in round 3. Many panel members then argued that these

issues were not significant, while one participant even felt that "everything about [the

summary] can be confirmed and refuted at the same time." This lends credence to the

suggestion that the length of the summary may have impacted the level of consensus

reported by the panel members (See Figures 2 and 3 above).

This level of disagreement aligns with inconsistencies in the literature. As was

reported in chapter 2, Prensky (2001a) and Aldrich (2004, 2005) had concerns about the

massively multiplayer nature of MMORPGs. It may be that the best scenario for

educational games is a multiplayer one, but not massively so. Further research is needed

to test this supposition (See Recommendations for Further Research below).

Dissenting Opinions and Additional Comments

There were very few true dissenting opinions reported by the expert panel.

However, some felt strongly about a few peripheral issues that should be interpreted here

as well. First, as was reported in chapter 4, one participant was adamant that educators

should not design games. His perspective is nicely summed up by the following response:

> Whenever I read "An educational MMORPG, though, could be designed"
> I cringe. I don't think we should even think of trying to design an
> educational MMORPG – I think we should use what is out there.

Others agreed with him to some degree. Another participant argued that the study should

not focus on the potential benefits of MMORPGs because "MMORPGs are already

educational and the discussion should center around how to enhance their educational

value and facilitate greater transfer of skills to the real world." As the literature, and

Steinkuehler's work in particular, suggested, existing commercial MMORPGs created

for entertainment do already have the potential to provide players with valuable

educational experiences. The researcher agrees that efforts could be focused on better

utilizing existing MMORPGs for formal educational purposes. However, if an explicitly

educational MMORPG were ever to be designed, educational experts would need to be

included in the design team. This is not to say ordinary classroom teachers should be

involved, or that ordinary instructional designers should be involved, but rather that

individuals who have first hand experience both providing students with constructivist

learning environments and also with playing MMORPGs might be valuable assets to a

game design team.

Many of the other concerns reported in chapter 4 are not unique to MMORPGs

and are already challenging to educational technologists and constructivist educators on a

broad scale. For instance, while the difficulty in defining and assessing 21st Century

skills will certainly impact any effort to implement MMORPGs in schools, it is not

unique to MMORPGs and is no reason to avoid such an implementation; the same issue

is involved in implementing many cutting edge educational technologies, from handheld

computers to Web 2.0 tools, such as blogs, wikis, and social networks. Similarly, the

concern that MMORPGs might lose their motivational appeal for students if included in a

formal curriculum is true for many potentially exciting school assignments; lyrics written

by favorite bands often inspire passion in students until they are asked to analyze them in

class.

Others were concerned about the design challenges inherent in creating an educational MMORPG, including the difficulty in designing educational quests, ensuring transfer of skills, balancing fidelity against fun, determining the extent of anonymity between players, and maintaining a compelling game experience with educational value. Though these concerns and others will present challenges to designers of future MMORPGs, they are not overwhelming. Additional efforts to design proof-of-concept games, pilot them, and study their effectiveness may be needed (See Recommendations for Further Study below).

The concerns citing the need for teacher professional development if MMORPGs are to be implemented in schools are critically important. As the section on infrastructure and logistics suggests above, the rich literature on organizational change and professional learning communities may provide valuable guidance in meeting this particular challenge.

Inquiry-Driven Learning

Though the literature review suggested that MMORPGs might be valuable for providing students with opportunities for inquiry-driven learning, this did not emerge as a theme around which the expert panel came to consensus. Specifically, their responses revealed very little focus on asking questions, discovery learning, gateway learning, or developing islands of expertise. This may have been in part because of the panelists' lack of interest or experience in these areas, but it also suggests that the ability to support inquiry-driven learning may not be a significant potential benefit of MMORPGs used for educational purposes.

However, some other elements of inquiry-driven learning did appear in participants' responses. There was some interest in active learning, problem-solving, self-regulation, individualized learning, and creativity. Participants were interested in "active learning based on experience" and suggested that "the active process of playing the game puts students in situations in which learning can take place." Others pointed out that MMORPGs "require players to construct hypotheses, solve problems, develop strategies, [and] learn the rules of the in-game world through trial and error," and they noted the value of problem-solving with respect to collaborative learning and the transfer of learning through reflection. Participants also pointed out that MMORPGs have multiple paths to success, thus giving "students the ability to find their own ways" and "the opportunity to script their own learning experience." In addition, the fact that "MMORPGs are challenging for different types of players and different levels of ability" was also mentioned as a "nod to different learning styles." Finally, some participants were interested in "increases in creativity and imagination due to the dynamic nature of the games" and "communities such as 'modding,' in which users create new content for games." This evidence suggests that MMORPGs may indeed be valuable in supporting inquiry-driven learning, despite the fact that it was not a focus for this Delphi panel.

Implications for Social Change

Similar to the lack of focus on inquiry-driven learning, there was a general lack of focus on social change among most participants' responses over the course of the Delphi study. Nevertheless, this study has some striking implications for social change, and the

participants often indirectly acknowledged the power of MMORPGs to effect positive social change.

The literature review in chapter 2 revealed that constructivist thinkers have long focused on the cultural importance and implications of educators' work (Bruner, 1966, 1986; Dewey, 1915, 1926; Vygotsky, 1997). Modern educational technologists and video game scholars, too, are concerned with how educational technologies, including video games and simulations, can effect positive social change (Frasca, 2003; Gee, 2003; Salen & Zimmerman, 2004; Shaffer, 2006b; Shaffer et al., 2003).

Just as Steinkuehler and Williams (2006) found that MMORPGs can also serve as "a window into new worlds of people and ideas" (p. 22), so too the participants in this study recognized the potential for MMORPGs in particular to help students learn about other cultures and other people. One participant suggested that MMORPGs offer "endless teachable moments [and] some of those moments can be about culture, society, norms, values, etc." Others suggested that MMORPGs are "a good place to start in promoting intercultural awareness and social perspective taking," and that a "value [of] MMORPGs is that you can interact [with] other cultures, and learn about each other," or that MMORPGs offer "opportunities for global connections when games are conducted with students from around the world." Still another expressed this perspective in the following way:

> Ultimately cultural beliefs change via exposure to new ideas and cultures. MMORPGs provide a unique way to expand one's interaction. More specifically, people's cultural belief will not change if information is only received from only the places, people and surroundings they grow up in. MMORPGs enable an environment for perspectives to be shared from

outside the context in which the student is living. This is a huge opportunity for transformational shift.

However, many of these same participants warned that this sort of learning is complex. One explains that these "are very complex skills on both intellectual and affective dimensions[, and] an MMORPG alone is unlikely to produce much traction on such transformational shifts in an individual's cultural beliefs unless complemented by a variety of other educational activities." It seems once again that the role of the teacher may be critical in realizing these potential benefits. In fact, one participant suggested that such shifts might be "less effective if mediated by teachers from within the same social context [as the students]" and another warns that "teachers rarely have enough understanding or knowledge of cultural differences" to realize the benefits of such lessons for their students. As with many other potential benefits of MMORPGs, it seems the ability of the games to help students develop multicultural literacy and global awareness would require significant support structures and would face significant challenges.

In contrast to the views expressed above, another participant felt that "it would be hard to talk about the differences between Asians and Latinos in the game world – since a very beautiful thing happens in a MMORPG: your [real life] gender doesn't matter, your [real life] cultural identity doesn't matter." In this way the nature of the games can allow students of all different races, socio-economic classes, and disabilities to interact together in a learning environment as equals.

The idea that MMORPGs can promote a sort of social equity among students was evident elsewhere in the participants' remarks. One participant suggested that MMORPGs might actually be "very cost effective for training and distance learning" including home schooling. Another pointed out that MMORPGs might be valuable for "use by students who cannot attend school due to disability or illness." Similarly, a massively multiplayer learning environment might be more accommodating of various individual schedules by providing on-demand, just-in-time, life-long learning that is not limited to school hours. As one participant put it, "this medium could transform education by providing on-demand learning and simulations to engage and instruct at a level far beyond that which can be done in a traditional classroom." In terms of equity for K-12 students it may be even more important that in MMORPGs it is common for teenagers to mentor "adults twice their age and education in how to lead" (Steinkuehler and Williams, 2006, p. 20).

Recent literature explores ways in which video games can be explicitly used for purposes other than entertainment. Michael and Chen (2006) discussed games meant to educate, train, or inform. Bogost (2007) explained that "video games are an expressive medium" (p. vii) and concluded that "video games can... disrupt and change fundamental attitudes and beliefs about the world, leading to potentially significant long-term social change" (p. ix). This study suggests that MMORPGs in particular might be useful in this way.

The constructivist revolution in education is now a century overdue, but the future of education may include something very like an MMORPG that serves as a

constructivist learning environment. Such a game environment might help students learn about other cultures and other people. It might facilitate a greater degree of equity between students and a greater degree of flexibility in formal education, and it might do so on a global scale. Furthermore, this study suggests that such a game environment might be able to motivate and engage students, while offering opportunities for context-embedded learning, social learning, and reflective learning – all while helping students to develop valuable 21st Century skills. The infrastructure and logical challenges will be numerous, but with such significant potential benefits further action by educators, game designers, and academics may be warranted.

<div align="center">Recommendations for Action</div>

Based on the findings of this study and on the above interpretations of the findings, the researcher offers several recommendations for action. In this section, seven recommendations are made for practicing K-12 educators, and six recommendations are offered for game designers. (An additional nine recommendations are made for academics in the recommendations for further research section below.) These recommendations might best be disseminated via journal articles based on this dissertation and via the researcher's blog, which would allow more in depth treatment of the issues over time and would allow two-way discussion with readers.

Recommendations for Educators

The researcher makes the following seven recommendations to educators hoping to take advantage of MMORPGs potential benefits as constructivist learning environments for their students.

Use Existing Commercial MMORPGs with Students

Because explicitly educational MMORPGs are not yet available to teachers, the researcher recommends that educators consider the use of an existing commercial MMORPG if they wish to use such games with their students. Many of the study participants found a great deal of value in existing commercial off the shelf (COTS) games. One suggested that if you are assessing soft skills such as leadership, teamwork, resource management, or business skills, "you might as well just play a COTS game." Another suggested that "commercial MMORPGs are the best way to go." In any case, others noted that "an educational MMORPG run by the school system might not be as fun as commercial software," at least in part because "you could have the problem where it's not as compelling as a commercially viable generic game (e.g. World of WARCRAFT)." Some MMORPGs, such as *Anarchy Online* for example, even offer the option of a free account. The researcher cautions, though, that educators should read the end user license agreements (EULA) of such games carefully before implementing. Many include a minimum age limit, or require that accounts are available to children only at the discretion of their parents, as is the case with *Anarchy Online.*

Also, the expert panel came to consensus around the belief that it may not be necessary for educational online role-playing games to be massively multiplayer in order

to take advantage of the benefits of being multiplayer. Smaller scale multiplayer games (or MORPGs) might be more appropriate; these games would not necessarily need to be persistent worlds. Examples include MIT's *Revolution* and Indiana University's *Arden: The World of William Shakespeare*, both of which are modifications of the commercial game *Neverwinter Nights*, which comes with a tool kit that teachers might use to create their own scenarios for students.

Use MMORPGs to Helping Students Develop 21st Century skills

The expert panel reached a very high level of consensus around the prediction that MMORPGs might be useful for helping students to develop 21st Century skills, as defined by NCREL and the Metiri Group (2003). The discussion in this chapter, which included relevant literature on video games and learning, suggests that MMORPGs may help students develop their digital age literacies, including technical literacy, information literacy, multicultural literacy, and global awareness. They may also encourage inventive thinking, including creativity, adaptability, managing complexity, risk taking, and even systems thinking. In addition, MMORPGs may help students become effective communicators by promoting interpersonal communication, interactive communication, team work, collaboration, social and civic responsibility, and even leadership. Finally, MMORPGs may also be able to help students become highly productive citizens by giving them practice with real world tools in an authentic (if fictional) context.

Several additional recommendations for educators can be derived from the consensus reached by the expert panel. First, these are very complex skills, and an MMORPG in isolation is unlikely to develop them deeply unless complimented by a

variety of other educational activities. Educators guiding students from game scenarios into real world scenarios might also explicitly facilitate transfer of skills. Without careful alignment and monitoring students could transfer learning that has a negative effect on their real world success. Educators might want to engage students in discussions about the ethical implications and consequences of using their skills to cheat the game system.

Support MMORPG Play with Dedicated, Structured, and Frequent Debriefing

Literature related to video games and learning suggests that video games may be a natural technology for encouraging reflective learning. The results of this study suggest that MMORPGs in particular might offer an opportunity for students to reflect on their learning and problem-solving strategies. The expert panel came to a very high degree of consensus around the belief that with the guidance of an educator and with dedicated, structured, and frequent debriefing time, MMORPGs might also offer an opportunity for students to reflect on their learning and problem-solving strategies. Educators might help students to realize the correlation between their in-game strategies and real world scenarios they might encounter. Something not unlike an after-action-review might be used for this purpose.

Use MMORPGs to Motivate and Engage Students

Modern video games are deeply motivating and engaging to many of the same students who struggle to pay attention in school – despite the fact that games continuously and consistently challenge students, often to the brink of frustration. MMORPGs in particular often require players to perform repetitive tasks that seem suspiciously like work, and yet these games are among the most compellingly immersive

experiences available. Now, the results of this study suggest that MMORPGs may be engaging and motivating for many students in an educational context. This may be true for some students because MMORPGs, like other forms of problem based or project based learning, require learning by doing that is active, challenging, and authentic. However, the engaging elements of an existing game might lead to a loss of focus on educational goals. Alternatively, a focus on educational goals might reduce the motivational power of a game. Striking this balance in a classroom setting using an existing MMORPG will likely require the active participation and intervention of the teacher as facilitator and coach.

Additional recommendations can be derived from concerns around which the expert panel came to consensus. For instance, educators should be aware that while elements of competition may be motivating to some students and opportunities for self-directed creativity and exploration might appeal to others, no game will be appealing to all students. Also, if educational MMORPGs are selected in such a way that they are too hard for students, they will not be fun – and thus will not be engaging or motivating. Finally, the game should be chosen to rely as much as possible on intrinsic motivation rather than relying too heavily on extrinsic motivation.

Beware Infrastructure Needs and Logistical Challenges

The expert panel came to a high degree of consensus around the prediction that implementing MMORPGs in existing schools would include many challenges related to infrastructure and logistics, including cultural resistance to the idea of using MMORPGs in schools. These concerns are consistent with existing literature related to school change

and professional learning communities, which can offer guidance for educators hoping to facilitate the sort of organizational change necessary to implement the use of MMORPGs in K-12 education. The literature can also offer guidance for educators hoping to overcome organizational resistance, to include family and the community, and to effect positive social change. (More specific recommendations are discussed in the interpretation of the infrastructure and logistics results above.) Most importantly, consideration must be given to the time necessary to implement such a change, and to implement the game itself.

Use MMORPGs as a Context for Student Learning.

Video game scholars have argued that video and computer games can help provide such a context for learning, and recent studies suggested that MMORPGs might offer a medium for context-embedded learning. The results of this study suggest that MMORPGs are indeed a genre of video game well suited to providing students with opportunities to learn by doing, achieve flow states, explore microworlds, transfer skills to the real world, learn in situated and distributed ways, and develop new identities. The expert panel came to a high degree of consensus around the prediction that MMORPGs might be valuable in providing a context for student learning that can be more concrete, immersive, and open-ended than textbooks, and can be used to represent other places, historical periods, and environments (or systems) that would be impossible to recreate in a classroom.

Additional recommendations can be derived from the consensus reached by the expert panel. For instance, educators should understand that the fidelity of game models

does not necessitate a "real world" setting. Just as in text-based stories, a fantasy world might be used to teach a real lesson. For instance, students can learn the basics of entrepreneurship in a science fiction setting. Such fantasy settings might help students to learn skills that might be too specific or too uninteresting to many students in a real world scenario. Students can also take on new roles and safely explore new identities in an MMORPG game world, including academic or professional identities that might serve them well in the future. Students could even play a role in modifying the game environment in an MMORPG. Some games allow players a great deal of influence over the game environment. Others allow modding of game environments and scenarios.

Use MMORPGs for Social Learning.

A constructivist learning environment does not leave a student in isolation, but rather facilitates social learning. This constructivist philosophy is now evident in many modern volumes on video games and learning. Furthermore, the results of this study suggest that MMORPGs are not only an inherently social entertainment medium, but that they might also be an effective medium for social learning in a formal K-12 educational context. The expert panel came to a high degree of consensus around the belief that MMORPGs can facilitate social negotiation of meaning, collaborative learning, and distance learning in an environment that meets the social learning needs of each student while constantly challenging and scaffolding each student with his or her ZPD.

As the expert panel's consensus suggests, teachers might also establish out-of-game incentives for cooperating and competing in the game. Even when negative social interactions occur as a result of cooperative or competitive play, these episodes can be

used as opportunities to provide students with strategies to cope with such interactions. Teachers and students might also benefit from working together out-of-game to establish the social rules of the game and the consequences of infractions. In addition, students can socialize outside the games about the games, or even build a learning network around the game.

MMORPGs may also be used in such a way that they allow players to see things from another's perspective. In this way the games might be used to address controversial social issues, to teach about other cultures, or to effect positive social change. However, it is unlikely that a transformational shift in a students' cultural beliefs will occur unless complemented by a variety of other educational activities. Students are also likely to "see through" anything they perceive as manipulation in such an effort to change their beliefs or values.

Recommendations for Game Designers

The researcher makes the following six recommendations to video game designers hoping to create explicitly educational MMORPGs for use in schools.

Design MMORPGs Develop Students' 21st Century skills

The expert panel came to a very high degree of consensus regarding the potential for MMORPGs to help students develop 21st Century skills, including a variety of digital age literacies, inventive thinking skills, effective communication skills, and productivity skills with relevant real-world tools. Video game developers hoping to create explicitly educational MMORPGs for use in schools might focus on this potential benefit of the games, especially because it addresses a critical need in schools, which traditionally do a

poor job of teaching these important skills. The panel believed that the challenges and systems in the game can be designed to authentically parallel real-world scenarios, even if the setting is fictional. Games will also need to be designed to include tasks that authentically mimic the real-world situations in which students will be expected to demonstrate success – without being unnecessarily high fidelity to the point of boredom or diminishing returns. In addition, an educational MMORPG will have to balance providing an environment safe for student risk taking with in-game consequences that are significant enough to make the risk of failure real and disappointing. Developers might also manage the risk of cheating the game system by designing a game in which it is expected that students will exploit or "mod" the game system in order to accomplish a task. In this way students will learn the underlying systems and assumptions well, too.

Build Reflection Into MMORPGs

The expert panel came to a very high degree of consensus around the belief that with the guidance of an educator and with dedicated, structured, and frequent debriefing time, MMORPGs might also offer an opportunity for students to reflect on their learning and problem-solving strategies. Though face-to-face debriefing may reduce the scalability of an educational MMORPG, developers can mitigate these concerns by designing games to scaffold reflection and to automate it to some extent. Developers might include something not unlike an after-action-review as part of an educational MMORPG. Other existing reflection techniques might be borrower from other fields as well. New tools for capturing in-game experiences and representing them for later reflection may also need to be developed. Developers can create online communities and

other elements of the metagame with a focus on supporting reflection on game play. The importance of including opportunities for reflection cannot be overstated; many panel members felt that MMORPGs would lose their educational value if reflection were not explicitly a part of the students' experience.

Design Motivating and Engaging MMORPGs

The expert panel came to a high degree of consensus around the belief that MMORPG may be engaging and motivating for many students. Developers are already skilled at creating motivating and engaging games, but for educational purposes they might also focus on including the motivational elements of problem-based or project-based learning, and on requiring learning by doing that is active, challenging, and authentic. In order to avoid students having to endure the drudgery of repetitive simplistic tasks for the sake of "grinding" for experience and advancement in the game, educational game designers might also design or use a more authentic system that corresponds more directly to the acquisition of real-world skills. Because of their motivational power, designers might include both competition and opportunities for self-directed creativity and exploration. However, if a game models socially destructive behavior (such as violent or sexist behaviors), this might have a negative impact on learning. Also, the content of the game, including the theme and specific experiences or encounters, will need to be as compelling as the medium in order to effectively engage and motivate students.

The quest system common in many MMORPGs could be put to educational use, requiring students to conduct research, perform experiments, and apply academic skills to

solve in-game problems. Ideally, such quests would provide an authentic and contextualized opportunity for skill use that would facilitate transfer into real-world scenarios. A scoring process that is non-trivial and corresponds to skill-acquisitions might be used to motivate students to undertake such learning quests. The ability to provide immediate and meaningful feedback will also be critical to the success of such a system. An educational MMORPG could also be designed to provide multiple paths to success, in order to accommodate various learning styles. Whatever the scoring and motivation systems used in the game, the game should be designed to rely as much as possible on intrinsic motivation rather than relying too heavily on extrinsic motivation. Also, if educational MMORPGs are created in such a way that they are too hard for students, they will not be fun – and thus will not be engaging or motivating.

Ideally, if the game is well designed it will help students accomplish educational goals without sacrificing the motivational engagement of the game. This balance could be addressed during the usual iterations of alpha and beta testing. Even if the game is slightly "less fun" than a commercial game, it would most likely still be considerably "more fun" than a traditional classroom assignment.

Beware the Infrastructure Needs and Logistical Challenges

The expert panel came to a high degree of consensus around the prediction that implementing MMORPGs in existing schools will include many challenges related to infrastructure and logistics. Game designers should be sensitive to these challenges and make efforts to design games that will easily overcome them. For instance, educational MMORPGs should not require the latest hardware or high bandwidth network

connections, both because schools are often forced to use outdated hardware and because of the need to be available from home to as many students as possible, not just the socio-economically advantaged.

Funding an educational MMORPG would be expensive to start and difficult to sustain. Even if an existing engine is used, it would be expensive to develop the game and attract players and teachers to the idea. However, the costs of development could be distributed across a great many schools. In addition, existing game engines, digital objects, and environments could be imported from the entertainment industry. Gaming engines (and graphics) that are a generation behind the cutting edge would still be effective for creating an engaging educational game. Low cost easy to learn tools would be ideal. A well-designed game concept could also attract the necessary developers, players, and educators.

The amount of time needed to implement such a game may be the greatest cost, including the time for students to learn the game and to spend time on the less educational fun elements of the game. Single player training modes or the ability to solo might help alleviate some of these concerns. Similarly, coordinating large numbers of students together in the game world might prove problematic, so educational MMORPGs might allow self-organized groups of students similar to existing "guilds" in existing games.

Cultural resistance to video games in schools might also prove a challenge. For a MMORPG to take root in the current environment of high-stakes testing, the game may need to be accepted in terms of what schools now value. Moreover, games would need to

be based on nonviolent, appropriate, and nontrivial subject matter and content – and would need to include reasonable measures to ensure student safety. Naturally, student learning would need to be measurable and demonstrable as well.

A great deal of organizational change will also be necessary if games are to be accepted and supported in existing educational organizations. There would be a significant need for teacher professional development in order to ensure that teachers would have the necessary understanding to effectively implement the games and guide students with their reflection and transfer of skills. Game companies could generate additional revenue by providing this training, provided qualified educational technologists are consulted or charged with implementing this process. Establishing pilot programs that follow models set by similar technologies already in use would also be critical to successful implementation.

Design MMORPGs as an Authentic Context for Student Learning.

The expert panel came to a high degree of consensus around the belief that MMORPGs might be valuable in providing a context for student learning because game worlds can be more concrete, immersive, and open-ended than textbooks. A game might be particularly valuable if it were designed such that students could take on new roles and safely explore new identities in an MMORPG game world, including academic or professional identities that might serve them well in the future. An educational MMORPG might even allow students a great deal of influence over the game environment, including the ability to mod the environment and create their own scenarios. Replayability of scenarios is one of the most valuable elements of an

educational game or simulation, so educational MMORPGs might be designed to allow replayability to a greater degree than most commercial MMORPGs. (On the other hand, this would need to be balanced with the need for real in-game consequences in order to help students develop the risk taking skills discussed above.)

The context provided by MMORPGs may allow more effective transfer of skills from the learning environment to the real-world. However, successful transfer of skills may be dependent on the fidelity of the models used in the game. While removal of some real-world complexity is necessary in any game or simulation, commercial MMORPGs tend to distort or exaggerate aspects of the real-world for the sake of entertainment rather than education. The models used in educational MMORPGs will need to be designed primarily to help students meet learning goals – while still maintaining high levels of motivation and engagement. In order for transfer to be effective the academic content presented within the game would need to be accurate, though not necessarily in the same way as text books; for instance a historical simulation might accurately model systems content though players' choices might generate different specific events than actually occurred in history. Similarly, the fidelity of game models does not necessitate a real-world setting. MMORPGs might be most valuable if modeled on real-world professional training, such as internships. The reward system in most MMORPGs might lend itself to this sort of design, as success in these games often requires hard work and considerable time to develop the necessary resources or money. However, a fantasy or stylized setting may be better suited to teaching some skills than a realistic simulation or even real-life.

In any case, a simulation or game might not ever be able to replace the experience of working with an actual practitioner in a real-world internship. Now, though, MMORPGs might also extend into the physical environment through new interfaces such as are now common in games like *Dance Dance Revolution* or any game that runs on the Nintendo Wii system.

Design MMORPGs that Facilitate Social Learning

The expert panel also came to a high degree of consensus around the belief that MMORPGs can promote collaboration and facilitate social negotiation of meaning. They also believed that explicitly educational MMORPGs will need to include tasks that require cooperation or competition, and a means for tracking such collaborative play; otherwise, some students may not participate in and benefit from collaborative learning.

The panel was concerned about aggressive competitiveness, bullying, embarrassment, and other victimizing behavior. They felt that a well-designed MMORPG might help address these issues and have a positive effect on potentially disruptive students by providing them a new social environment in which to take on more positive roles. Such a game might include features such as anonymous play and opportunities to collaboratively establish the rules of the game and the consequences of infractions.

Video games, including MMORPGs, can constantly challenge a player within his or her ZPD by constantly adapting to the player's skill level. Though MMORPGs may have less flexibility to adapt to individual players because changes in the game world may affect others as well, the social structure of an MMORPG can be designed to help provide the scaffolding necessary for individual students to succeed and grow. For

instance as some players develop skill in the game they can work in groups with other newer players. However, the social learning needs of each student are different; educational MMORPGs should provide an alternative means for engaging a student less adept at interpersonal communication, and should help such students develop new social skills in a safe environment.

If students are free to choose the roles they play, teachers may find that not all roles are filled. In addition, some students may choose to play roles that might operate counter to educational goals. In an educational MMORPG it should be possible to play in a nonviolent way and still progress and succeed in the game, as it is in some commercial games. Also, an educational MMORPG should allow players to choose male or female avatars and to undertake quests and other activities that are likely to appeal to female players, just as many commercial games do. Like most MMORPGs, educational MMORPGs can be designed to support players interested in achieving, exploring, and socializing – and the games can discourage disruptive behavior by design. In a well-designed open-ended game it would not be necessary for all roles to be filled for each student to find success.

MMORPGs may even be designed in such a way that they allow players to see things from another's perspective. In this way the games might be used to address controversial social issues, to teach about other cultures, or to effect positive social change. Educational MMORPGs can follow in the tradition of single player games for change such as *Food Force*, *PeaceMaker*, and *A Force More Powerful*, which teach nonviolent solutions to social problems.

Recommendations for Further Research

Based on the findings of this study and on the above interpretations of the findings, the researcher has assembled several recommendations for further research. In this section, nine recommendations are made for academics interested in contributing to the literature related to this dissertation. These recommendations might best be disseminated via journal articles based on this dissertation and via the researcher's blog, which would allow more in depth treatment of the issues over time and would allow two-way discussion with readers.

Research Teaching Methods and Assessment Metrics for 21st Century skills

The expert panel came to a very high degree of consensus regarding the potential for MMORPGs to help students develop 21st Century skills, including a variety of digital age literacies, inventive thinking skills, effective communication skills, and productivity skills with relevant real-world tools. However, as the panel recognized, these are very complex skills. Traditional schools generally do a poor job teaching such skills, at least in part because they are difficult skills to measure and thus schools are seldom held accountable for them. It would be valuable for academics to research new teaching methods and assessment metrics for 21st Century skills. In particular, the panel recognized a need to be able to assess whether or not MMORPGs are successful in helping students to develop 21st Century skills that transfer to real-world situations. New methods and metrics that are found to be effective in light of additional research could then be implemented by game designers and practicing educators for use with MMORPGs.

Research Different Reflection Strategies for MMORPGs

The expert panel came to a very high degree of consensus around the belief that with the guidance of an educator and with dedicated, structured, and frequent debriefing time, MMORPGs might also offer an opportunity for students to reflect on their learning and problem-solving strategies. However, they recognized that clear procedures for reflecting on skills such as the 21st Century skills mentioned above are not well established in traditional education. Many existing techniques might be borrowed from other fields, and new tools for capturing in-game experiences and representing them for later reflection may need to be developed as well. Establishing the effectiveness of such techniques and tools would require additional research.

The panel also saw that due to the potentially global nature of an MMORPG, the games might also provide an opportunity for students and teachers to reflect on cultural differences of others playing the game. This too would require additional research, if educators and game designers are to best understand how to facilitate such cross-cultural reflection.

Research New Forms of Game-Based Motivation

The expert panel came to a high degree of consensus around the belief that MMORPG may be engaging and motivating for many students. While elements of competition may be motivating to some students and opportunities for self-directed creativity and exploration might appeal to others, no game will be appealing to all students. Therefore, research into additional forms of game-based motivation that might

appeal to a wider variety of students, including females, and encompass a wider variety of human experience would be particularly valuable to game designers and educators.

The possibility of players becoming addicted to the game or having "an unhealthy relationship with the game" was another common concern. However, if there were clear learning outcomes that defined stopping points (or an end) to the game, this risk might be mitigated. The realization of such solutions also requires additional research. It may also be that players' personalities and other environmental factors play a greater role in causing addition than any particular game. Additional research into game additions would help designers and educators avoid such things where MMORPGs are used in formal education.

Research the Organizational Change Necessary to Implement MMORPGs in Schools

The expert panel came to a high degree of consensus around the prediction that implementing MMORPGs in existing schools will include many challenges related to infrastructure and logistics. Their concerns in this area were so numerous as to warrant a good deal of additional research.

Some studies might focus on the sorts of hardware and network resources that are available to students for MMORPG play both in and out of schools. Because MMORPGs generally require thousands of players to feel inhabited and to provide a persistent sense of community, research into the appropriate scale for an educational MMORPG would also be valuable. For instance, it may not be necessary that educational online role-playing games be massively multiplayer in order to take advantage of the benefits of being multiplayer.

Because the panel anticipated that implementation of an MMORPG would require a significant investment of time, any research that might shed light onto the amount of time necessary for students to learn an MMORPG, for games to successfully fit into a school schedule, and for large numbers of students to coordinate in the game world may also prove useful.

Similarly, the panel anticipated that cultural resistance to video games in schools might also prove a challenge. Even if the games are accepted, there will be a need to establish appropriate norms and ethics for the educational use of MMORPGs. Such things also warrant additional study.

Finally, it is anticipated that a great deal of organizational change, including significant levels of professional development, will also be necessary if games are to be accepted and supported in existing educational organizations. Research and pilot programs that follow models set by similar technologies already in use would be critical to successful implementation.

Research Ways MMORPGs Might Provide a Context for Student Learning.

The expert panel came to a high degree of consensus around the belief that MMORPGs might be valuable in providing a context for student learning because game worlds can be more concrete, immersive, and open-ended than textbooks. If students are to take on new roles and explore new identities in an MMORPG game world, including academic or professional identities that might serve them well in the future, then more research will be required to ascertain how best to convert existing apprenticeship and mentoring practices into an MMORPG. Research would also be needed to understand

how best to facilitate transfer of learning from a game context to a real-world scenario. Such research might focus on the use of fantasy or stylized settings that might be better suited to teaching some skills than a realistic simulation or even real-life. Finally, because the computer mediated context of an MMORPG might be missing valuable elements of a face-to-face learning environment, additional research could focus on how the virtual environment might best supplement (or be supplemented by) face-to-face interaction in a classroom.

Research Ways MMORPGs Might Best Support Social Learning

The expert panel also came to a high degree of consensus around the belief that MMORPGs can promote social learning. The panel felt that students who play such games might develop communication skills, including negotiation skills, and valuable new social roles. Such things need to be explored and verified by additional research, and the best methods of supporting such social learning need to be identified as well so that they can be incorporated into future educational games. More research may be necessary to identify addition ways MMORPGs might be designed and played nonviolently, and to identify additional ways for players to interact that might appeal to more players, including females. MMORPGs may have less flexibility to adapt to individual players because changes in the game world may effect others as well; additional research will be required to determine how a massively multiplayer game might provide the social structure and scaffolding that individual students will need to grow.

The panel was concerned about aggressive competitiveness, bullying, embarrassment, and other victimizing behavior. Further study is required to understand

how MMORPGs might help address these issues and have a positive effect on potentially disruptive students by providing them a new social environment in which to take on more positive roles. Research into features such as anonymous play and opportunities to collaboratively establish the rules of the game might be valuable in this respect.

Research the Potential of MMORPGs to Support Inquiry-Driven Learning.

Though it did not emerge as a theme around which the expert panel came to consensus, the potential of MMORPGs to support inquiry-driven learning did appear in participants' responses to other themes. Specifically, there was some interest in active learning, problem-solving, self-regulation, individualized learning, and creativity. More research into the potential of using MMORPGs to support these activities is needed. In addition, research into the potential of MMORPGs to support other elements of inquiry-based learning would be valuable. Based on the literature review in chapter 2, these other elements might include asking questions, discovery learning, gateway learning, and developing islands of expertise.

Research the Potential of MMORPGs to Effect Positive Social Change

Though social change did not emerge as a theme around which the expert panel came to consensus, the participants in this study recognized the potential for MMORPGs to effect positive social change in certain ways. The results of this study suggest that MMORPGs might help students learn about other cultures and other people. They might also facilitate a greater degree of equity between students and a greater degree of flexibility in formal education, and they might be able to do so on a global scale. More research is required to explore how MMORPGs might in fact do these things, and to

understand how MMORPGs might be able to help effect positive social change by providing students with immersive and moving learning experiences. More research is also required to explore how MMORPGs might best be used for procedural rhetoric in the way described by Bogost (2007).

Address the Limitations of this Study

Chapter 1 identified a number of limitations and delimitations of this study. Each of these is an opportunity for further research to compliment the results of this study. For instance, due to the small panel size and the particular individuals involved in this study, the results may be limited in their generalizability. Additional research might include larger expert panels and experts with different individual backgrounds. Such results might confirm, compliment, or contradict the results of this study.

Specifically, more research is needed to support the above recommendations to educators. This panel consisted of only 3 K-12 educators, 4 university faculty, and 1 author of a book about games and learning. More research is also needed to support the game design recommendations above. This panel included only 4 game designers. Of course, the dissenting opinions and other comments generated by this panel should also be explored in greater detail. Additional studies might also focus on the use of MMORPGs in contexts other than formal K-12 education, and might explore the use of MMORPGs to support more traditional teaching methods, rather than as constructivist learning environments. Such additional studies might be broader in scope than the limited scope of this study. A well funded Delphi could include more participants, more rounds, and fewer limitations in scope so that greater detail or greater consensus may be gained.

In addition, the delimitations placed on the study by the researcher suggest topics for further study. This present study did not set out to explore issues related to the design of games, including issues related to inclusive design. Additional research into the design issues would be invaluable to potential designers. Similarly, though the panel acknowledged the difficulties likely to be faced during implementation, the organizational change necessary to implement such games remained outside the boundaries of the literature review, as did the role of the teacher in supporting such games; both are topics that require further study. Also, though the expert panel found it important that MMORPGs may help students develop additional 21st Century skills, the preceding literature review did not address this possibility. As mentioned above, inquiry into better teaching and assessment methods for 21st Century skills would be valuable. Finally, the well-documented educational benefits of face-to-face role-playing were not treated as a part of this study. Additional research is required to help educators and developers understand how to take advantage of the benefits of face-to-face classroom role-playing and table-top role playing games in a Massively Multiplayer Online Role-Playing Game.

Most importantly, this was a Delphi study meant to provide useful predictions about the future, but predictions, of course, should be treated only as predictions, not as guarantees of any particular results. Additional research can focus on the study of existing phenomena, such as pilot programs and proof-of-concept games. Rather than gathering expert opinion about potential benefits and concerns, these studies could include real teachers, real students, and real MMORPGs. The games can be either

commercial off the shelf games, or beta versions of explicitly educational games. With ample resources of time, money, and talent, an educational MMORPG might even be developed for use in such a study.

<div align="center">Reflection on the Researcher's Experience</div>

This section of the chapter includes a reflection on the researcher's experience with the research process. This includes the possible effects of the researcher on the study. It also includes a discussion of the researchers potential biases, preconceived ideas, and values. Finally, it concludes with a reflection on his changes in thinking as a result of the study.

Biases, Preconceived Ideas, and Values

Early in his educational career, the researcher came to identify himself explicitly as a constructivist educator, at least in part because it was constructivist pedagogies that seemed to work best for his own learning. For the past seven years he has identified himself professionally as an educational technologist, and he believes that thoughtful applications of technology cannot only benefit existing students but may also be able to revolutionize the current educational system. These fundamental beliefs have undoubtedly colored his interpretations of the literature and participant responses. In addition, the researcher began the formal study with the suspicion that video games might be a valuable medium for learning. Despite some disagreement in the literature about the value of MMORPGs as educational games, he also suspected they might have great value from a constructivist perspective, particularly on account of their social properties.

Effects of the Researcher on the Study

The researcher was personally responsible for all aspects of implementing the Delphi process. He recruited all participants, composed all questionnaires (including summaries of previous responses), analyzed all data, and interpreted all findings. Because of this, the researcher may have had an effect on the participants and on other elements of the research. The composition of the email inviting experts to participate may have effected who volunteered to participate. Similarly, the way the researcher handled reminding the participants of deadlines may have effected potential attrition. More importantly, the researcher's composition of survey prompts and interpretation of participant responses in each round of the study may have been influenced by his biases. Finally, of course, the researcher's interpretations and judgment came into play again as he composed the final report of the findings, interpretations, and recommendations. For this reason, readers are urged to consider the section above carefully as they judge the implications of this study.

Changes in Thinking as a Result of the Study

Despite his biases the researcher still underwent significant changes in thinking as a result of this study. For instance, the social learning theme resulted in the lowest level of consensus and the most inconsistency in participant responses, so the researcher's biases were not necessarily supported by the participant responses. Similarly, the researcher's suspicion that MMORPGs might provide students with opportunities for inquiry-driven learning did not appear in the expert responses during data collection. The researcher set out to conduct a study focused exclusively on the elements of a

constructivist learning environment, while excluding considerations such as logistics, organizational change and game design, but the participants' responses made it clear that these peripheral issues are inseparably wrapped up in any educational use of MMORPGs.

The fact that 21st Century skills and reflection emerged as the top two themes around which the panel came to consensus was surprising to the researcher. He had considered the development of 21st Century skills during MMORPG play to be a fringe benefit, and he considered structured reflection time to be a way to enhance what students learned from MMORPGs rather than a necessary element for their learning. However, in retrospect these results are not surprising. The ability to help students develop 21st Century skills is a critical need in schools, a need that constructivist pedagogies and MMORPGs may be well suited to fill. Similarly, many schools do a poor job encouraging and supporting student reflection, yet such reflection is a critical element of constructivist philosophies. It should come as no surprise then that a study exploring the use of MMORPGs as constructivist learning environments would place a emphasis on the inclusion of intentional reflection.

It was also surprising to the researcher that context-embedded learning and social learning emerged as the two themes in which the readers might have the least confidence. As was suggested in the interpretation of the findings above, this may have merely been due to the length of these summaries and the number of issues involved; more participants may have found minor points that they disagreed with. Also, context-embedded learning and social learning are particularly abstract concepts, and they do not

have the same sort of clear outcomes that meet critical needs as 21st Century skills, reflection, and even motivation and engagement of students do.

Though the iterative nature of the Delphi method generated illuminating results, the researcher also experienced some frustrations with the Delphi process. As with any study involving a questionnaire, recruiting participants and protecting against attrition were challenges. Because it was a Delphi study that required a panel of experts, the pool from which the researcher could recruit was considerably smaller than it might otherwise have been. Because the Delphi is an iterative process, the researcher had to maintain the participation of a small number of people of several iterations of the questionnaire, with each iteration threatening additional attrition. As with other qualitative studies, data analysis was particularly time consuming. However, the researcher feels he learned a great deal about the Delphi process, the procedures of qualitative research (including the use of coding software such as TAMS Analyzer), and the value of including supplemental quantitative data.

Concluding Statement

Shaffer et al. (2003) wrote that "video games have the potential to change the landscape of education as we know it" (p. 111). They urged that games be designed with "sound theories of learning and socially conscious educational practices" (p. 111). However, they also noted that the theories of learning embedded in video games as a medium run counter to the presiding theories of learning in schools. Squire and Gee (2003) explained that games may be viewed as suspect in an era when the value of instruction is measured by standardized tests (p. 30).

This study is significant because it produced predictions about the use of a technology that may have the potential to improve (and perhaps revolutionize) education for 21st Century students and educators. An MMORPG might help students develop difficult-to-teach 21st Century skills, particularly if frequent and structured reflection time is provided for students. In addition, MMORPGs may be motivating and engaging for students while providing a context for learning and a framework for social learning. Also, as the serious games movement has demonstrated, these games might have the ability to inspire players to effect positive social change.

The future of education may be something very like an educational massively multiplayer online role-playing game. A century of artificially linear and context-free book learning may be replaced by a system in which students learn by doing. Traditional academic content might be learned by visiting a virtual world in which the content is situated and relevant. For instance, students of history might play a role in a simulation of the American Revolution; a role that might just as likely be focused on drafting the constitution as it might be related to the war. Twenty-first century skills might be easier to teach because students are exercising them while working together in a game, and assessment will be authentic; either students will be able to apply their knowledge and skills successfully in the game, or not. Students might, for example, work together to launch a business in a simulated (or fictional) world.

Experiences like this might be available to students with an unprecedented degree of equity. Students in North America, Europe, Asia, and anywhere in less developed countries where an Internet connection is available might be able to take advantage of the

same game worlds and educational experiences. Students might work together (for rigorous academic purposes) across boarders and cultural barriers. Everyone might be considered equal behind their avatars.

For this to happen in K-12 schools, though, a paradigm shift of unprecedented magnitude might be required. This shift in thinking would need to occur in three major ways. First, schools would need to embrace the tenets of constructivist pedagogy. Schools would have to come to value such things as 21st Century skills, reflection, engagement and motivation, context-embedded learning, and social learning. The wisdom of using a technology that can provide these things is not clear if these things are not valued. Hand-in-hand with this change, schools would need to accept and adopt new roles for educators, who might serve as facilitators, coaches, and debriefing experts to support student game play and reflection on game play.

Second, schools would need to overcome broader cultural resistance to using video games in schools. Educational MMORPGs will need to be seen as learning worlds, not as a waste of time, and certainly not as violent or sexist in anyway. Educators, administrators, parents, and society at large would need to believe in the concept of hard fun, rather than believing as many do that fun and learning are mutually exclusive or diametrically opposed. Obviously, game developers will have an important role to play in this change, as will educational technologists who will be called upon to educate their colleagues, superiors, and communities about the value of the games.

The third change, though, may be the most difficult. Schools will need to accept a significant transfer of power. As with two-way web tools such as blogs, wikis, and social

networks, MMORPGs allow students to interact with each other and create content without necessarily being moderated by teachers or other adult authority figures. Surely educational MMORPGs will need to include measures to address inappropriate behavior, but schools will also need to accept that students can say what they want to who they want when they want, that students will have relationships that extend beyond the school walls (and school hours), and that student solutions to in-game problems will be emergent, creative, and unlike what their educators may have predicted, expected, or hoped.

If such a paradigm shift is a desired destination, the road will likely be a long and difficult one. The results of this study suggest that significant infrastructure and logistical challenges may lay ahead for any implementation of MMORPGs in schools. Infrastructure challenges may include student access to computers, hardware requirements, and bandwidth requirements. Logistical issues may include great costs, in terms of finances, time, and human resources. Even more significant may be the kinds of organizational change necessary for successful implementation, particularly given the likelihood of resistance not only on account of MMORPGs being seen as video games, but also on account of the tendency of educators and educational institutions to resist innovations in educational technology.

Pioneering early adopters, developers, and researchers are needed to overcome these challenges and work towards the necessary paradigmatic shifts. This work may require individuals with who are comfortable subverting the existing system in order to demonstrate the benefits that MMORPGs might provide in an academic context. The

researcher thus calls for pioneers to innovate and be subversive in their efforts to act on the recommendations of this study and to further explore the potential benefits and drawbacks of using MMORPGs in schools.

REFERENCES

Aldrich, C. (2004). *Simulations and the future of learning*. San Francisco: Pfeiffer.

Aldrich, C. (2005). *Learn by doing: A comprehensive guide to simulations, computer games, and pedagogy in e-learning and other educational experiences*. San Francisco: Pfeiffer.

Baker, J., Lovell, K., & Harris, N. (2006). How expert are the experts? An exploration of the concept of 'expert' within Delphi panel techniques. *Nurse researcher, 14* (1), 59-70.

Bartle, R. (1996). *Hearts, clubs, diamonds, spades: Players who suit MUDs*. Retrieved April 16 2006 from http://www.mud.co.uk/richard/hcds.htm

Beck, J. C. & Wade M. (2004). *Got game: how the gamer generation is reshaping business forever*. Boston: Harvard Business School Press.

Bogost, I. (2007). *Persuasive games: The expressive power of video games*. Cambridge, MA: The MIT Press.

Bourgeois, J., Pugmire, L., Stevenson, K. Swanson, N., Swanson, B. (n.d.). The Delphi method: a qualitative means to a better future. Retrieved July 7, 2007 from www.freequality.org/sites/www_freequality_org/Documents/knowledge/Delphimethod.pdf

Bowles, N. (1999). The Delphi technique. *Nursing standard, 13*(45), 32-36. Retrieved July 7, 2007 from http://www.nursing-standard.co.uk/archives/ns/vol13-45/v13w45p3236.pdf

Bruner, J. S. (1966). *Toward a theory of instruction*. Cambridge, MA: Belknap Press.

Bruner, J. S. (1971). *The relevance of education*. New York: W. W. Norton & Company, Inc.

Bruner, J. (1986). *Actual minds, possible worlds*. Cambridge, MA: Harvard University Press.

Bruner, J. (1990). *Acts of meaning*. Cambridge, MA: Harvard University Press.

Bruner, J. (1996). *The culture of education*. Cambridge, MA: Harvard University Press.

Caperton, I. (2005) For Seymour Papert "hard fun" is the essence of good games AND good education. *Telemedium: the journal of media literacy, 52*(1-2), 16-19.

Carstens, A., & Beck, J. (2005). Get ready for the gamer generation. *TechTrends, 49*(3), 22-25.

Creswell, J. W. (2003). *Research design: qualitative, quantitative, and mixed method approaches.* (2nd ed.) Thousand Oaks, CA: Sage Publications.

Csikszentmihalyi, M. (1997). *Finding flow: the psychology of engagement with everyday life* (1st ed.). New York: Basic Books. Retrieved April 24, 2007, from Questia database: http://www.questia.com/PM.qst?a=o&d=43132772

Dede, C. (2005). Planning for neomillenial learning styles: implications for investments in technology and faculty. *Educating the Net Generation.* Educause. Retrieved December 17, 2006 from http://www.educause.edu/ir/library/pdf/pub7101.pdf

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

Dewey, J. (1915). *The school and society*. (2nd Ed.) Chicago: University of Chicago Press.

Dewey, J. (1916). *Democracy and education*. New York: Simon & Shuster.

Dewey, J. (1938). *Experience and education*. New York: Simon & Shuster.

Dixon-Krauss, L. (1996). *Vygotsky in the classroom: media literacy instruction and assessment*. White Plains, NY: Longman Publishers.

Duffy, T. M., & Jonassen, D. H. (Eds.) (1992). *Constructivism and the technology of instruction: a conversation.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Frasca, G. (2003). Simulation versus narrative: introduction to ludology. In Wolf, M. J. P., & Perron, B. (Eds.). *The video game theory reader*. New York: Routledge.

Freeman, D. (2004). *Creating emotion in games* Berkley, CA: New Riders.

Games for Change. (2006). *Games for change.* Retrieved June 22, 2007 from http://www.gamesforchange.org

Games for Health. (2006). Retrieved June 22, 2007 from http://www.gamesforhealth.org

Gardner, H. (1999). *Intelligence reframed: multiple intelligences for the 21st Century*. New York: Basic Books. Retrieved March 25, 2007, from Questia database: http://www.questia.com/PM.qst?a=o&d=91465967

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

Gee, J. P. (2004) *Situated language and learning: a critique of traditional schooling*. New York: Routledge.

Gee, J. P. (2005a). Learning by design: games as learning machines. *The Journal of Media Literacy, 52*(1-2).

Gee, J. P. (2005b). What would a state of the art instructional video game look like? *Innovate, 1*(6). Retrieved December 17, 2006 from http://www.innovateonline.info/index.php?view=article&id=80

Gee, J. P. (2005c). *Why video games are good for your soul: pleasure and learning*. Altona, Victoria, Australia: Common Ground Publishing.

Glesne, C. (1999). *Becoming qualitative researchers: an introduction*. New York: Longman.

Grodal, T. (2003). Stories for eye, ear, and muscles: video games, media, and embodied experiences. In Wolf, M. J. P., & Perron, B. (Eds.). *The video game theory reader*. New York: Routledge.

Hartman, A. (1981). Reaching consensus using the Delphi technique. *Educational Leadership*. 38(6), 495-497.

Holland, W., Jenkins, H., Squire, S. (2003). Theory by design. In Wolf, M. J. P., & Perron, B. (Eds.). (2003). *The video game theory reader*. New York: Routledge.

Iverson, K. M. (2005). *E-learning games: interactive learning strategies for digital delivery*. Upper Saddle River, NJ: Pearson, Prentice Hall.

Janio, J. P. (2007). *Perceptions from K-12 teachers in five countries about the future of instructional technology*. Doctoral dissertation, Walden University.

Jenkins, H. (2005). *Technology and Education: Games*. Webcast. Costa Mesa, CA: Orange County Department of Education. Retrieved December 17, 2006 from http://vc.ocde.us/archive/film/techgames.mov

Jenkins, H., Klopfer, E., Squire, K., & Tan, P. (2003). Entering the education arcade. *ACM Computers in Entertainment,* 1(1), article 08.

Jenkins, H., & Wright, W. (2005) "Buy these problems because they're fun to solve!" *Telemedium: The journal of media literacy*, *52*(1-2), 16-19.

Johnson, S. (2005). *Everything bad is good for you.* New York: Riverhead Books.

Jonassen, D. H. (1992). *Evaluating constructivistic learning.* In Duffy, T. M., & Jonassen, D. H. (Eds.) *Constructivism and the technology of instruction: a conversation.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Jonassen, D. H. (2000). *Computers as mindtools for schools: engaging critical thinking*. (2nd ed.) Upper Saddle River, NJ: Merrill.

Jonassen, D. H., Howland, J., Moore, J., & Marra, R. M. (2003). *Learning to solve problems with technology: A constructivist perspective.* Upper Saddle River, NJ: Merril Prentice Hall.

Jonassen. D. H., Peck, K. L., & Wilson, B. G. (1999) *Learning with technology: a constructivist perspective.* Upper Saddle River, NJ: Merrill.

Joppe, M. (n.d.) The Delphi method. *The research process*. Ryerson University, Toronto, ON, Canada. Retrieved July, 23, 2004 from www.ryerson.ca/~mjoppe/ResearchProcess/841TheDelphiMethod.htm

Klopfer, E., & Yoon, S. (2005). Deveoping games and simulations for today and tomorrow's tech savvy youth. *TechTrends, 49*(3), 33-41.

Koster, R. (2005). *A theory of fun for game design.* Scottsdale, AZ: Paraglyph Press, Inc.

Lahti, M. (2003). As we become machines: Corporealized pleasures in video games. In Wolf, M. J. P., & Perron, B. (Eds.). *The video game theory reader*. New York: Routledge.

Leedy, P. D., & Ormrod, J. E. (2005). Practical research: planning and design. (8th ed.) Upper Saddle River, NJ: Pearson.

Linstone, H. A., & Turoff, M. (Eds.) (1975). *The Delphi method: techniques and applications.* (Electronic version). Retrieved December 17, 2006 from http://www.is.njit.edu/pubs/delphibook/delphibook.pdf

Littleton, F. (2005) Game boys and game girls in higher education. Conference poster presented at the Games+Learning+Society (GLS) Conference, June 23-24, 2005.

Ludwig, B. (1997). Predicting the future: have you considered using the Delphi methodology? *Journal of Extension*, 35(5). Retrieved July 11, 2007 from http://www.joe.org/joe/1997october/tt2.html

McDivitt, D. (2005). *Technology and education: Games.* Webcast. Costa Mesa, CA: Orange County Department of Education. Retrieved December 17, 2006 from http://vc.ocde.us/archive/film/techgames.mov

McMahan, A. (2003). Abstraction in the video game. In Wolf, M. J. P., & Perron, B. (Eds.). *The video game theory reader*. New York: Routledge.

Merriam, S. B. (1998). *Qualitative research and case study applications in education*. San Francisco: Jossey-Bass Publishers.

MG Taylor Corporation. (1983). Delphis. *The manual*. p. 208. Boulder, CO: Taylor Management Centers. Retrieved July 7, 2007 from http://www.mgtaylor.com/mgtaylor/jotm/winter97/delphis.htm

Michael, D., & Chen, S. (2006). *Serious games: games that educate, train, and inform*. Boston: Thompson Course Technology PTR.

Mooney, C. G. (2000). *An introduction to Dewey, Montessori, Erikson, Piaget, & Vygotsky*. St. Paul, MN: Redleaf Press.

North Central Regional Educaiton Laboratory (NCREL) & The Metiri Group. (2003). *enGauge: 21st Century skills for 21st Century Learners*. Naperville, Il: North Central Regional Educational Laboratory.

Okoli, C. & Pawlowski, S. D. (2004). The Delphi method as a research tool. *Information and Management, 42*, 15-29. Retrieved December 23, 2006 from the Google cache html version of http://www.image.unipd.it/cossu/VALUTAZIONE%20DI%20IMPATTO%20AMBIENTALE/Working%20Grup/Tema%2001_Metodo%20Delphi/Okoli,%202003.pdf

Papert, S. (n.d.). Hard fun. Retrieved April 16, 2006 from http://www.papert.org/articles/HardFun.html

Papert, S. (1980). *Mindstorms: children, computers, and powerful ideas*. New York: Basic Books.

Papert, S. (1993). *The children's machine: rethinking school in the age of the computer*. New York: Persues Books, L.L.C.

Papert, S. (1996). *The connected family.* Atlanta, Georgia: Longstreet Press.

Piaget, J. (1929). *The child's conception of the world.* (J. Tomlinson & A. Tomlinson, Trans.) Savage, MD: Littlefield Adams Quality Paperbacks. (Original work published 1929.)

Piaget, J. (1950). *The origins of intelligence in children*. (Trans.) Guilford, CT: International Universities Press. (Republished, 1992.)

Piaget, J. (1952). *The Origins of Intelligence in Children* (Cook, M., Trans.). New York: International Universities Press.

Pillay, H. (2005). An investigation of cognitive processes engaged by recreational computer game players: implications for skills of the future. *Journal of research on technology in education, 34*(3), 336-450.

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

Prensky, M. (2001b). Digital natives, digital immigrants. *On the horizon, 9*(5). NCB University Press. Retrieved December 17, 2006 from http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf

Prensky, M. (2003). Escape from planet Jar-Gon: Or, what video games have to teach academics about teaching and writing. *On The Horizon, 11* (3). Retrieved April 7, 2008 from www.marcprensky.com/writing/Prensky%20-%20Review%20of%20James%20Paul%20Gee%20Book.pdf

Prensky, M. (2004a). A lesson for parents: how kids learn to cooperate in video games. Retrieved December 17, 2006 from http://www.marcprensky.com/writing/Prensky-How_Kids_Learn_to_Cooperate_in_Video games.pdf

Prensky, M. (2004b). Beyond the lemonade stand: economics and business lessons for a 10-year-old from a computer game. Retrieved December 17, 2006 from http://www.marcprensky.com/ writing/Prensky-Beyond_The_Lemonade_Stand.pdf

Prensky, M. (2005a). "Engage me or enrage me": what today's learners demand. Retrieved December 17, 2006 from http://www.marcprensky.com/writing/Prensky-Engage_Me_or_Enrage_Me.pdf

Prensky, M. (2005b). In educational games, complexity matters: mini-games are trivial – but "complex" games are not: an important way for teachers, parents, and others to look at educational computer and video games. *Educational Technology, 45*(4). Retrieved December 17, 2006 from http://www.marcprensky.com/writing/Prensky-Complexity_Matters.pdf

Prensky, M. (2006). *Don't Bother Me Mom – I'm Learning*. St. Paul, MN: Paragon House.

Quinn, C. N. (2005). *Engaging learning: designing e-learning simulation games.* San Francisco: Pfeiffer.

Rieber, R. W. & Robinson, D. K. (Eds.) (2004). The essential Vygotsky. New York: Kluwer Academic / Plenum Publishers.

Rowe, G. & Wright, G. (1999) The Delphi technique as a forecasting tool: issues and analysis. *International journal of forecasting, 15*, 353-375. Retrieved July 7, 2007 from http://www-marketing.wharton.upenn.edu/forecast/paperpdf/delphi%20technique%20Rowe%20Wright.pdf

Salen, K. & Zimmerman, E. (2004). *Rules of play: Game design fundamentals.* Cambridge, MA: The MIT Press.

Serious Games Initiative (2007). *Serious Games Initiative.* Retrieved June 22, 2007 from http://www.seriousgames.org

Shaffer, D. W. (2004). When computer-supported collaboration means computer-supported competition: Professional mediation as a model for collaborative learning. *Journal of interactive learning research, 15*(2), 101-115.

Shaffer, D. W. (2005). Multisubculturalism: Computers and the end of progressive education. Under review by *Teachers college record*.

Shaffer, D. W. (2006a). Epistemic frames for epistemic games. *Computers and Education*. 46(3), 223-234.

Shaffer, D.W. (2006b). *How computer games help children learn*. New York, NY: Palgrave MacMillan.

Shaffer, D. W., & Gee, J. P. (2005). Before every child is left behind: How epistemic games can solve the coming crisis in education. Under review by *Educational researcher*.

Shaffer, D. W., Squire, K. R., Halverson, R., & Gee, J. P. (2005). Video games and the future of learning. *Phi delta kappan, 87*(2), 105-111.

Skulmoski, G. J., Hartman, F. T., Krahn, J. (2007). The Delphi method for graduate research. *Journal of information technology education, 6*.

Slator, B. M., Beckwith, R. T., Brandt, L., Chaput, H., Clark, J. T., Daniels, L. M. et al. (2006). *Electric worlds in the classroom: teaching and learning with role-based computer games.* New York: Teachers College Press.

Squire, K. (2002). Cultural framing of computer/video games. *Game studies, 2*(1). Retrieved May 24, 2006, from http://www.gamestudies.org/0102/squire/

Squire, K. (2003). Video games in education. *International journal of intelligent simulations and gaming*, *2*(1). Retrieved May 24, 2006 from http://website.education.wisc.edu/kdsquire/manuscripts/IJIS.doc

Squire, K. (2005). Changing the game: what happens when video games enter the classroom? *Innovate: journal of online education, 1*(6). Retrieved December 17, 2006 from http://www.innovateonline.info/index.php?view=article&id=82

Squire, K., & Jenkins, H. (2004). Harnessing the power of games in education. *Insight, 3*(5), 7-33.

Squire, K. D. & Steinkuehler, C. A. (2006). *Generating 'CyberCulture': The case of Star Wars Galaxies*. In Gibbs, D. & Krause, K-L. (Eds). *Cyberlines 2.0: Languages and cultures of the Internet (2nd ed.)*. Albert Park, Australia: James Nicholas Publishers.

Steinkuehler, C. A. (2004a). A Discourse analysis of MMOG talk. In J. H. Smith & M. Sicart (Eds.), *Proceedings of the Other Players Conference*. Copenhagen: IT University of Copenhagen.

Steinkuehler, C. A. (2004b). Learning in massively multiplayer online games. In Y. B. Kafai, W. A. Sandoval, N. Enyedy, A. S. Nixon, & F. Herrera (Eds.), *Proceedings of the Sixth International Conference of the Learning Sciences* (p. 521–528). Mahwah, NJ: Erlbaum.

Steinkuehler, C. A. (2005a) *Cognition and learning in massively multiplayer online role playing games: a critical approach.* Doctoral Dissertation, University of Wisconsin, Madison.

Steinkuehler, C. A. (2005b). The new third place: Massively multiplayer online gaming

in American youth culture. *Tidskrift Journal of Research in Teacher Education*, 3, 17-32.

Steinkuehler, C. A. (2006a). Massively multiplayer online videogaming as participation in a Discourse. *Mind, Culture, & Activity*, *13*(1), 38–52.

Steinkuehler, C. A. (2006b). Why game (culture) studies now? *Games and Culture, 1*(1), 1-6.

Steinkuehler, C. A. (2008). Cognition and literacy in massively multiplayer online games. In Coiro, J., Knobel, M., Lankshear, C., & Leu, D. J. (Eds.), *Handbook of Research on New Literacies*. Mahwah NJ: Erlbaum.

Steinkuehler, C. A. & Williams, D. (2006). Where everybody knows your (screen) name: Online games as "third places." *Journal of Computer-Mediated Communication, 11*(4), article 1.

Trochim, W. M. K. (2001). *The research methods knowledge database.* (2nd ed.) Cincinnati, OH: Atomic Dog Publishing.

Vygotsky, L. S. (1978). *Mind in society: the development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Vygotsky, L. (1986) *Thought and language*. Cambridge, Mass: The MIT Press.

Vygotsky, L.S. (1997). *Educational psychology*. Boca Raton, Florida: St. Lucie Press.

Williams, P. L., & Webb, C. (1994). The delphi technique: a methodological discussion. *Journal of advanced nursing, 19*, 180-186.

Williamson, B., & Facer, K, (2004). More than 'just a game': the implications for schools of children's computer games communities. *Education, Communication, & Information, 4*(2/3), 255-270.

Winograd, D. (2005). Chris Dede on emerging technologies that enable distributed-learning communities. *TechTrends, 49*(1), 39-40.

Wong, C. (2003). *How will the e-explosion affect how we do research?* A documented briefing prepared for the RAND corporation. Retrieved July 7, 2007 from www.rand.org/pubs/documented_briefings/DB399/DB399.pdf

Yee. N. (2006). *The Daedalus project: the psychology of mmorpgs.* Retrieved December 17, 2006 from http://www.nickyee.com/daedalus/

APPENDIX A: ROUND 1 QUESTIONNAIRE

MMORPGs as Constructivist Learning Environments: Round 1 Questionnaire

This first round of the Delphi study consists of only two broad open-ended questions. Participants' answers will inform the composition of the second and third round questionnaires. Please read both questions before proceeding to answer either one. Then provide a comprehensive (yet succinct) answer to each question based on your expert knowledge, experience, and opinion. Please explain your reasoning, and cite supporting resources if necessary. This questionnaire is meant to take only 30 minutes or less to complete, but may take up to an hour.

Note: The researcher recommends that you compose your answers in a word processing or text editing application and then cut and paste your answers into the online survey only when you are done writing and are ready to click submit. This is in order to avoid the loss of any work online.

1. What are the potential benefits of using MMORPGs as constructivist learning environments in formal K-12 education?

2. What are the potential problems related to using MMORPGs as constructivist learning environments in formal K-12 education?
3. Your Name (For the researcher's logistical use only – Your responses will be anonymous to others in the study, and your anonymous participation in this study is protected):

APPENDIX B: ROUND 2 QUESTIONNAIRE

MMORPGs as Constructivist Learning Environments: Round 2 Questionnaire

Page 1. Directions

This second round of the Delphi study consists of five focused but open-ended questions. First round answers have been analyzed and organized by theme in order to generate these second round questions. Participants' answers to these questions will inform the composition of the third round questionnaire and final consensus check.

Each question in this round is preceded by a brief summary of first round responses. Please read each summary and then answer the following question. Answer the questions based on your own experience and your reaction to the summary. Citation of sources is not necessary.

This questionnaire is meant to take only 30 minutes or less to complete, but may take up to an hour. Therefore, each question is meant to take no more than 5 to 10 minutes. If you are drawn to spend more (or less) time on any particular question(s), please feel free to do so.

Note: The researcher recommends that you compose your answers in a word processing application and then cut and paste your answers into the online survey only when you are done writing and are ready to click submit. This is in order to avoid the loss of any work online.

Page 2. Overview: MMORPGs As Constructivist Learning Environments

Summary of Round 1 Responses: MMORPGs have the potential to facilitate constructive learning that is active, creative, and deep. Players learn by doing. The open ended nature of the games could allow learning to be student-lead and differentiated to meet players' needs, and it could incorporate many elements of project-based learning, including problem solving. However, such games would face the same challenges to sustainability as other constructivist learning environments in formal k-12 education, not the least of which would be the incompatibility between current educational goals and constructivist learning philosophy.

Page 3. Motivation and Engagement (Question 1 of 5)

Summary of Round 1 Responses: MMORPGs would likely be engaging and motivating for many students. They embody Papert's concept of Hard Fun; MMORPGs are fun because they are hard, not in spite of being hard. However, the possibility of players becoming "addicted" to the game is a concern. Also, the engaging elements of the game might lead to a loss of focus on educational goals. Alternatively, a focus on educational goals might reduce the motivational power of a game. In addition, video games are not appealing to all students, and not even all gamers are attracted to the genre of MMORPGs.

1. Question: How might MMORPGs be used specifically to motivate and engage students, and what problems might be associated with using MMORPGs for this purpose?

Page 4. Context Embedded Learing (Question 2 of 5)

Summary of Round 1 Responses: MMORPGs might be valuable in providing context for student learning, particularly if modeled on real-world professional training. Game worlds can be more concrete than texts and can be used to represent other places and historical periods, including environments that would be impossible to recreate in a classroom. Moreover, the game world can reach beyond the classroom due to the network nature of MMORPGs. Students can then take on new roles and explore new identities in the game world, which might also reduce negative stereotyping and allow leaders to emerge that might not in a traditional classroom. Students could even play a role in modifying the game environment. However, such a computer mediated context might be missing valuable elements of a face-to-face learning environment.

2. Question: How might MMORPGs be used specifically to provide a context for student learning, and what problems might be associated with using MMORPGs for this purpose?

Page 5. Social Learning (Question 3 of 5)

Summary of Round 1 Responses: MMORPGs often promote collaboration over individualism and can facilitate social negotiation of meaning. Cooperative problem-solving and teamwork are often necessary to achieve goals within the game. Competition can also lead to collaborative learning. As players do in existing commercial MMORPGs, students might develop communication skills and new social roles regardless of the content of the game. Some students who might not participate in a classroom situation might even be more likely to play a role. MMORPGs can also serve to bring distant learners (including others around the globe) together in a meaningful way. In addition, students can socialize outside the games about the games (potentially providing new social connections), or even build a learning network around the game. Video games, including MMORPGs, can constantly challenge a player within his or her ZPD by constantly adapting to the player's skill level, and the social structure of an MMORPG can help provide the scaffolding necessary for students to grow. However, the computer mediated social environment does not provide the same level of interactivity as face-to-face communication and might re-enforce solitude and anit-social behavior, or accentuate problems such as bullying, creating new channels for certain individuals to be ostracized.

3. Question: How might MMORPGs be used specifically to support social learning (including facilitated collaboration, cooperation, and competition), and what problems might be associated with using MMORPGs for this purpose?

Page 6. Twenty-first century skills (Question 4 of 5)

Summary of Round 1 Responses: MMORPGs might be useful for helping students to develop 21st Century skills such as critical thinking, creativity, comfort with computer use, fluency in multiple media, economic literacy, and global awareness. Success in an MMORPG requires strategic thinking, planning, decision making, judgement, and the ability to react to changing conditions, all while multitasking effectively. These games might also provide an arena for developing skills of leadership (and followership), interpersonal communications and management. Additionally, the learning communities that players form around MMORPGs (in which they share codes and strategies) parallel the activities of 21st century professionals in knowledge-based workplaces. Perhaps most importantly, MMORPGs encourage risk taking by making failure safe and often fun. However, a potential concern is the inclination of many MMORPG players to "game the system" or "cheat" in an effort to succeed in achieving in-game goals. This may reduce the effectiveness of the role-playing experience, may detract from (or eliminate) educational goals, and may encourage students to "cheat" the educational system outside of the game as well.

4. How might MMORPGs be used specifically to help students develop 21st Century skills, and what problems might be associated with using MMORPGs for this purpose?

Page 7. Additional Themes and Other Responses (Question 5 of 5)

Note: On this page, you will respond to only one of the following themes. Quickly skim the summarized results to see which seems the most important to you.

Reflection: With the guidance of an educator and with dedicated, structured, and frequent debriefing time, MMORPGs might also offer an opportunity for students to reflect on their learning and problem-solving strategies. Due to the potentially global nature of an MMORPG, this might also be an opportunity to reflect on cultural differences of the students playing. Naturally, if reflection is not explicitly planned for, this opportunity might be lost in "mindless" pursuit of in-game goals.

Social Change: Games can reinforce certain world views and provide opportunities to reinforce a value system and qualities for success and continuous improvement.

Infrastructure and Logistics: MMORPGs may require fewer hardware resources compared to many other video game genres, but implementing MMORPGs in existing schools would include many challenges related to infrastructure and logistics. With current student to computer ratios, students might experience limited access to the game at school. Many computers in schools might not meet the hardware needs of modern MMORPGs. The bandwidth available at the school might also be limited. Technical problems with the software, hardware, and network as well as the logistical and cognitive overhead necessary to play the games might outweigh the positive learning experience. (Outside of the school, many socio-economically disadvantaged students might also have limited access to the equipment necessary to play an MMORPG.) In addition, MMORPGs require thousands of players to feel inhabited and provide a persistent sense of community; it may be difficult to achieve such a population in an educational game, and allow students to play commercial games in schools raises concerns about appropriate content and student safety.

Resistance: Cultural resistance to video games in schools might also prove a challenge. The primary barriers might not be technical, but rather psychological, political, and cultural – including sometimes unconscious beliefs, assumptions, and values. Many educators and parents may not accept the potential educational value of video games, including MMORPGs. Even if the games are accepted, there will be a need to establish appropriate norms and ethics for the educational use of MMORPGs. For a MMORPG to take root in the current environment of high-stakes testing, the game may need to be accepted in terms of what schools now value. Moreover, games would need to be based on nonviolent, appropriate, and nontrivial subject matter and content – and would need to include reasonable measures to ensure student safety. Unfortunately, this might reduce the engaging and motivating elements of the games, and as Prensky says, "suck the fun out."

Cost: Funding an educational MMORPG would be expensive to start and difficult to sustain. Even if an existing engine is used, it would be expensive to develop the game and attract players and teachers to the idea.

Time: The amount of time needed to implement such a game may be the greatest cost, including the time for students to learn the game and to spend time on the less educational fun elements of the game. MMORPG game play also does not fit neatly into traditional school schedules.

Other: Other potential benefits of MMORPGs as constructivist learning environments may include the ability to easily collect rich assessment data, to be a cost-effective means of distance education, to allow students to develop design skills, to improve student reading fluency, and to better serve special education populations. Other potential drawbacks or concerns related to using MMORPGs as constructivist learning environments include the difficulty of assessing student game play and the possibility for cognitive overload in students learning and playing the game.

5. Question: Which of the items summarized above is most important, either as a potential benefit or a potential concern, and why?

Page 8. Conclusion

Thank you for completing Round 2 of this Delphi Study. Approximately 1 week of analysis will follow the conclusion of this round. Round 3 will then follow. Then the final consensus check will complete the study. Thank you again for your participation.

6. Your Name (for logistical purposes only – your anonymity will be protected):

APPENDIX C: ROUND 3 QUESTIONNAIRE

MMORPGs as Constructivist Learning Environments: Round 3 Questionnaire

Page 1. Directions

This third round of the Delphi study consists of six focused but open-ended questions. Round 1 & 2 answers have been analyzed and organized by theme in order to generate these Round 3 questions. Participants' answers to these questions will inform the composition of the final consensus check.

Each question in this round is preceded by a brief summary of Round 1 & 2 responses. Please read each summary and then answer the following question. Answer the questions based on your own experience and your reaction to the summary. Citation of sources is not necessary.

This questionnaire is meant to take only 30 minutes or less to complete, but may take up to an hour. Therefor, each question is meant to take no more than 5 to 10 minutes. If you are drawn to spend more (or less) time on any particular question(s), please feel free to do so.

Note: The researcher recommends that you compose your answers in a word processing application and then cut and paste your answers into the online survey only when you are done writing and are ready to click submit. This is in order to avoid the loss of any work online.

Page 2. Motivation and Engagement (Question 1 of 6)

DIRECTIONS:
        1. Read the following summary of Round 1 and 2 responses.
        2. Determine what claim you disagree with most strongly, if any.
        3. In the space provided, briefly explain why you disagree with the claim you've selected.

SUMMARY:

MMORPGs may be engaging and motivating for many students. This may be true for some students because MMORPGs, like other forms of problem based or project based learning, require learning by doing that is active, challenging, and authentic. MMORPGs can, however, also motivate players to endure the drudgery of repetitive simplistic tasks for the sake of "grinding" for experience and advancement in the game. If this is to occur in an MMORPG used for educational purposes, the experience of "grinding" must also be educational in its own right.

The elements of competition and peer pressure common in MMORPGs might also be motivating for some students, as might the social nature of the games. MMORPGs could even be used to teach sociology concepts, including social interaction, morals, and values. However, if the game models socially destructive behavior (such as violent or sexist behaviors) this might have a negative impact on learning. Also, some students may not enjoy competition. And, pressure from social circles to conform to cliques, participate in bullying, or ostracize certain students might be transfered into (or generated by) the game.

Opportunities for self-directed creativity and exploration might appeal to other students. The ability to take on a new role or identity within the game might also engage and motivate some students. In addition, the nature of MMORPGs could provide students accustomed to on-demand entertainment with an on-demand learning medium. However, the content of the game, including the theme and specific experiences or encounters, will need to be as compelling as the medium in order to effectively engage and motivate students.

In particular, the quest system common in many MMORPGs could be put to educational use, requiring students to conduct research, perform experiments, and apply academic skills to solve in-game problems. Using a scoring process that is nontrivial and corresponds to skill-acquisitions might be used to motivate students to undertake learning quests. The ability to provide immediate and meaningful feedback will also be critical to the success of such a system.

MMORPGs embody Papert's concept of Hard Fun; MMORPGs are fun because they are hard, not inspite of being hard. However, if educational MMORPGs are selected or

created in such a way that they are too hard for students, they will not be fun – and thus will not be engaging or motivating.

The possibility of players becoming "addicted" to the game or having "an unhealthy relationship with the game" is another common concern. However, if there were clear set learning outcomes that defined stopping points (or an end) to the game, this risk could be mitigated.

Also, the engaging elements of the game might lead to a loss of focus on educational goals. Alternatively, a focus on educational goals might reduce the motivational power of a game. In addition, video games are not appealing to all students, and may require skills (or time) that not all students have. Even among the students that are "gamers" not all are attracted to the same genre of games or to MMORPGs in particular.

1. What claim in the above summary do you disagree with most strongly and why?

Page 3. Context Embedded Learing (Question 2 of 6)

DIRECTIONS:
      1. Read the following summary of Round 1 and 2 responses.
      2. Determine what claim you disagree with most strongly, if any.
      3. In the space provided, briefly explain why you disagree with the claim you've selected.

SUMMARY:

MMORPGs might be valuable in providing a safe context for active student learning. Game worlds can be more concrete, immersive, and open-ended than textbooks, and can be used to represent other places, historical periods, and environments (or systems) that would be impossible to recreate in a classroom, including models for chemistry or other sciences. Moreover, the game world can reach beyond the classroom due to the networked nature of MMORPGs.

Students can then take on new roles and safely explore new identities in the game world, including academic or professional identities that might serve them well in the future. This ability to experiment with new identities might also reduce negative stereotyping and allow leaders to emerge who might not in a traditional classroom.

Students could even play a role in modifying the game environment in an MMORPG. Some games allow players a great deal of influence over the game environment. Others allow "modding" of game environments and scenarios.

Replayability of scenarios is one of the most valuable elements of an educational game or simulation. MMORPGs can also allow replayability, though this is not necessarily an element of such games and may need to be explicitly selected or designed for educational purposes.

The context provided by MMORPGs may allow more effective transfer of skills from the learning environment to the real-world. However, successful transfer of skills may be dependent on the fidelity of the models used in the game, and commercial MMORPGs tend to distort or exaggerate aspects of the real-world for the sake of entertainment . Also, the academic content presented within the game would need to be accurate. It may be difficult to assess if students have learned the content and even more difficult to asses of they have learned soft skills such as leadership. It is also possible that students' learning would not transfer well from the relatively safe environment of the game to the riskier environment of real-world consequences. Ultimately, transfer may need to be supported through reflection, an aspect that existing MMORPGs do not stress and which may need to be guided by a teacher. Game worlds might also include an safe area explicitly meant for reflection.

MMORGPs might be most valuable if modeled on real-world professional training, such as internships. The reward system in most MMORPGs might lend itself to this sort of design, as success in these games often requires hard work and considerable time to develop the necessary resources or money. Unfortunately, the MMORPG interface might require students to acquire new skills before being even minimally successful in the virtual context.

As with any form of eLearning, the computer mediated context of an MMORPG might be missing valuable elements of a face-to-face learning environment. However, activities in the virtual environment can supplement (or be supplemented by) face-to-face interaction in a classroom. MMORPGs might also extend into the physical environment through new interfaces such as are now common in games like Dance Dance Revolution or the Nintendo Wii.

2. What claim in the above summary do you disagree with most strongly and why?

Page 4. Social Learning (Question 3 of 6)

DIRECTIONS:
      Directions remain the same on this page.

SUMMARY:

MMORPGs often promote collaboration over individualism and can facilitate social negotiation of meaning. Students who play such games might develop communication skills, including negotiation skills, and valuable new social roles. Cooperative problem-solving and teamwork are often necessary to achieve goals within the game. In-game competition can also lead to collaborative learning. Educational MMORPGs will need to include tasks that require cooperation or competition, and a means for tracking such collaborative play; otherwise, some students may not participate in and benefit from collaborative learning. Teachers might also establish out-of-game incentives for cooperating and competing in the game.

Unfortunately, MMORPGs that include competitive elements, particularly PvP elements, may foster aggressive competitiveness and may cause emotional distress for those who lose or do not win. If some students are ostracized for their lack of skill or success in the game this can lead to bullying, embarrassment, or other victimizing behavior. However, even when negative social interactions occur as a result of cooperative or competitive play, these episodes can be used as opportunities to provide students with strategies to cope with such interactions. Also, the anonymity of players in MMORPGs may contribute to this sort of behavior. Alternatively, anonymity might mitigate some of the effects of this behavior in the real-world, so educators planning to use such a game would need to be thoughtful in their decision to allow anonymity or not. Teachers and students might also benefit from working together to establish the social rules of the game and the consequences of infractions.

The social learning needs of each student are different; MMORPGs might provide an alternative means for engaging a student less adept at interpersonal communication, and might help such students develop new social skills in a safe environment. However, the violent and male dominated social structures of many commercial MMORPGs may be inappropriate for use in an educational setting. Also, if students are free to choose the roles they play, teachers may find that not all roles are filled. In addition, some students may choose to play roles that might operate counter to educational goals.

MMORPGs can also serve to bring distant learners together in a meaningful way. In addition, students can socialize outside the games about the games, or even build a learning network around the game. However, there is a risk of including a potentially malicious person in the game or in the metagame social circles.

MMORPGs may also be used or designed in such a way that they allow players to see things from another's perspective. In this way the games might be used to address controversial social issues, to teach about other cultures, or to effect positive social change.

Video games, including MMORPGs, can constantly challenge a player within his or her ZPD by constantly adapting to the player's skill level. However, MMORPGs may have less flexibility to adapt to individual players because changes in the game world may effect others as well. The social structure of an MMORPG can also help provide the scaffolding necessary for individual students to succeed and grow. For instance as some players develop skill in the game they can work in groups with other newer players.

The computer mediated social environment does not provide the same level of interactivity as face-to-face communication and might re-enforce solitude and antisocial behavior, or accentuate problems such as bullying, creating new channels for certain individuals to be ostracized. Also, a player may come to identify too strongly with their avatar, which represents only a small portion of the player's personality, a fact that may need to be communicated to and reinforced for students.

3. What claim in the above summary do you disagree with most strongly and why?

Page 5. Twenty-first century skills (Question 4 of 6)

DIRECTIONS:
        1. Read the following summary of Round 1 and 2 responses.
        2. Determine what claim you disagree with most strongly, if any.
        3. In the space provided, briefly explain why you disagree with the claim you've selected.

SUMMARY:

MMORPGs might be useful for helping students to develop 21st Century skills such as critical thinking, creativity, comfort with computer use, fluency in multiple media, economic literacy, and global awareness. Success in an MMORPG requires strategic thinking, planning, decision making, judgement, and the ability to react to changing conditions, all while multitasking effectively. Players must balance their resource, prioritize their actions, manage multiple objectives, and understand in-game systems, including the game economy. Even information literacy skills are important as players seek to find, evaluate, and use information (both in-game and from other outside sources). MMORPGs as a genre may be particularly beneficial in for educational purposes because they focus on working within systems and processes rather than on achieving a single win-state. The challenges and systems in the game can be selected or designed to authentically parallel real-world scenarios.

These games might also provide an arena for developing skills of leadership (and followership), interpersonal communications and management. Additionally, the learning communities that players form around MMORPGs (in which they share codes and strategies) parallel the activities of 21st century professionals in knowledge-based workplaces. Perhaps most importantly, MMORPGs might encourage risk taking by making failure safe and often fun.

However, a potential concern is the inclination of many MMORPG players to "game the system" or "cheat" in an effort to succeed in achieving in-game goals. This may reduce the effectiveness of the role-playing experience, may detract from (or eliminate) educational goals, and may encourage students to "cheat" the educational system outside of the game as well. Many existing MMORPGs will cancel a player's account if they are caught cheating. Educators might want to engage students in discussions about the ethical implications and consequences of cheating the system. Another way to manage the risk of such "cheating" is to build it into the game by expecting students to exploit or "mod" the game system. (In this way they will learn the underlying systems and assumptions well.) In some respects the ability to exploit a system is another valuable life skill.

It may also be difficult to assess whether or not MMORPGs are successful in helping students to develop such 21st Century skills and transfer them to real-world situations. Transfer might be explicitly facilitated by educators guiding students from game

scenarios into real-world scenarios. Games will also need to be chosen or designed to include tasks that authentically mimic the real-world tasks and situations in which students will be expected to demonstrate success. Without careful alignment and monitoring students could transfer learning that has a negative effect on their real-world success.

NOTE: Many of the skills mentioned in this section were important skills for success in the 20th century and in some cases throughout human history. However, modern schools are notoriously poor at teaching and assessing such skills, and recent changes in students, technology, and world markets suggests that such skills will be even more important in this new century. For these reasons, and because the breadth of these skills is difficult to name, the researcher continues to use the term "21st Century skills." To view more in-depth definitions and frameworks describing "21st Century skills" please see the following two websites:

> www.21stcenturyskills.org
> www.ncrel.org/engauge/skills/skills.htm

4. What claim in the above summary do you disagree with most strongly and why?

Page 6. Reflection (Question 5 of 6)

DIRECTIONS:
        1. Read the following summary of Round 1 and 2 responses.
        2. Determine what claim you disagree with most strongly, if any.
        3. In the space provided, briefly explain why you disagree with the claim you've selected.

SUMMARY:

With the guidance of an educator and with dedicated, structured, and frequent debriefing time, MMORPGs might also offer an opportunity for students to reflect on their learning and problem-solving strategies. Educators might help students to realize the correlation between their in-game strategies and real-world scenarios they might encounter. Something not unlike an after-action-review might be used for this purpose, but clear procedures for reflecting on skills such as the 21st Century skills mentioned in the previous session are not well established – and new tools for capturing in-game experiences and representing them for later reflection may need to be developed as well.

Due to the potentially global nature of an MMORPG, they might also provide an opportunity for students and teachers to reflect on cultural differences of others playing the game.

Without such explicit reflection activities the educational value of playing an MMORPG might largely be lost. However, debriefing may reduce the scalability, increase the cost of implementation, and limit the independent use of an MMORPG for educational purposes, especially if conducted in a face-to-face format.

5. What claim in the above summary do you disagree with most strongly and why?

Page 7. Infrastructure and Logistics (Question 6 of 6)

DIRECTIONS:
       1. Read the following summary of Round 1 and 2 responses.
       2. Determine what claim you disagree with most strongly, if any.
       3. In the space provided, briefly explain why you disagree with the claim you've selected.

SUMMARY:

MMORPGs may require fewer hardware resources compared to many other video game genres, but implementing MMORPGs in existing schools would include many challenges related to infrastructure and logistics. With current student to computer ratios, students might experience limited access to the game at school. Many computers in schools might not meet the hardware needs of modern MMORPGs. The bandwidth available at the school might also be limited. Technical problems with the software, hardware, and network as well as the logistical and cognitive overhead necessary to play the games might outweigh the positive learning experience. (Outside of the school, many socio-economically disadvantaged students might also have limited access to the equipment necessary to play an MMORPG.) In addition, MMORPGs require thousands of players to feel inhabited and provide a persistent sense of community; it may be difficult to achieve such a population in an educational game, and allow students to play commercial games in schools raises concerns about appropriate content and student safety. Filtering games for age appropriate content may also be a concern.

Funding an educational MMORPG would be expensive to start and difficult to sustain. Even if an existing engine is used, it would be expensive to develop the game and attract players and teachers to the idea.

The amount of time needed to implement such a game may be the greatest cost, including the time for students to learn the game and to spend time on the less educational fun elements of the game. MMORPG game play also does not fit neatly into traditional school schedules. In a truly massive multiplayer game, coordination of players with different school schedules (potentially even across different time zones) would also be a challenge.

Cultural resistance to video games in schools might also prove a challenge. The primary barriers might not be technical, but rather psychological, political, and cultural – including sometimes unconscious beliefs, assumptions, and values. Many educators and parents may not accept the potential educational value of video games, including MMORPGs. Even if the games are accepted, there will be a need to establish appropriate norms and ethics for the educational use of MMORPGs. For a MMORPG to take root in the current environment of high-stakes testing, the game may need to be accepted in terms of what schools now value. Moreover, games would need to be based on

nonviolent, appropriate, and nontrivial subject matter and content – and would need to include reasonable measures to ensure student safety. Naturally, student learning would ned to be measurable and demonstrable as well. Unfortunately, this might reduce the engaging and motivating elements of the games, and as Prensky says, "suck the fun out."

A great deal of organizational change will also be necessary if games are to be accepted and supported in existing educational organizations. There would be a significant need for teacher professional development in order to ensure that teachers would have the necessary understanding to effectively implement the games and guide students with their reflection and transfer of skills. Establishing pilot programs that follow models set by similar technologies already in use would be critical to successful implementation.

6. What claim in the above summary do you disagree with most strongly and why?

Page 8. Conclusion

Thank you for completing Round 3 of this Delphi Study. Approximately 1 week of analysis will follow the conclusion of this round. Then the final consensus check will complete your participation in the study. Thank you again for your participation.

7. Your Name (for logistical purposes only – your anonymity will be protected):

APPENDIX D: FINAL CONSENSUS CHECK QUESTIONNAIRE

MMORPGs as Constructivist Learning Environments: Final Consensus Check

Page 1. Overview

Thank you for completing Rounds 1, 2, and 3 of this study. Your participation and commitment are greatly appreciated.

This is the last stage of the study, the final consensus check. You will be asked to read a series of summaries and to indicate your level of consensus with the summaries on a scale of 1 to 5. Participants' responses from Rounds 1, 2, and 3 have been analyzed and organized by theme in order to generate these summaries.

In addition to indicating your level of consensus you will be invited to leave any additional comments related to each summary. Your ratings and your comments will be considered in the presentation of findings from this study.

This questionnaire is meant to take only 30 minutes or less to complete, but may take up to an hour. Therefor, each question is meant to take no more than 5 to 10 minutes. If you are drawn to spend more (or less) time on any particular question(s), please feel free to do so.

Note: The researcher recommends that you compose any additional comments in a word processing application and then cut and paste your answers into the online survey only when you are done writing and are ready to click submit. This is in order to avoid the loss of any work online.

Page 2. Motivation and Engagement (Question 1 of 6)

DIRECTIONS:

1. Read this summary of participant responses: Motivation and Engagement (These words hyperlinked to a PDF of the summary. This summary appears in its entirety on the following page.)

2. Rate your level of consensus with the summary on a scale of 1-5 (defined below).

3. Feel free to leave any additional comments related to the topic of this summary, particularly if there is anything in the summary with which you disagree.

CONSENSUS DEFINED:

For the purposes of this study, consensus is defined as the state in which the results are at least acceptable to every member of the Delphi panel, if not exactly as they would have wished.

LEVELS OF CONSENSUS DEFINED:

5. Complete Consensus – I am in agreement with everything stated in this summary. The results are acceptable to me, if not exactly as I would have wished.

4. High Level of Consensus – I agree with most of what is stated in this summary, and I disagree in only minor or insignificant ways. The results are acceptable to me.

3. Moderate Level of Consensus – I agree with much of what is stated in this summary, but I also disagree in some ways. The results are acceptable to me.

2. Low Level of Consensus – I agree with some of what is stated in this summary, but I also disagree in some major or significant ways. However, the results are still acceptable to me.

1. No consensus – I disagree with most or all of what is stated in this summary. The results are not acceptable to me.

Question 1. What is your level of consensus with the summary provided above?
　　　　5. Complete Consensus
　　　　4. High Level of Consensus

3. Moderate Level of Consensus
2. Low Level of Consensus
1. No Consensus
Additional Comments:

SUMMARY:

MMORPGs may be engaging and motivating for many students. This may be true for some students because MMORPGs, like other forms of problem based or project based learning, require learning by doing that is active, challenging, and authentic.

MMORPGs might, however, also motivate players to endure the drudgery of repetitive simplistic tasks for the sake of "grinding" for experience and advancement in the game. If this is necessary in an MMORPG used for educational purposes, the experience of "grinding" could also be made educational in its own right. However, repetitive grinding for no purpose other than advancement in the game is antithetical to good constructivist learning, and such grinding not a necessary element of MMORPGs. Other commercial MMORPGs have found different ways of motivating players. Educational game designers might design or use a more authentic system that corresponds more directly to real-world skills. Ultimately, including uninteresting tasks in an otherwise interesting world might undermine student engagement in the game.

The elements of competition and peer pressure common in MMORPGs might also be motivating for some students, as might the social nature of the games. MMORPGs could even be used to teach sociology concepts, including social interaction, morals, and values. However, if the game models socially destructive behavior (such as violent or sexist behaviors) this might have a negative impact on learning. Also, some students may not enjoy competition. And, pressure from social circles to conform to cliques, participate in bullying, or ostracize certain students might be transfered into (or generated by) the game.

Opportunities for self-directed creativity and exploration might appeal to other students and might be beneficial for learning, provided the educational goals of the game are still the students' focus. The ability to take on a new role or identity within the game might also engage and motivate some students. In addition, the nature of MMORPGs could provide students accustomed to on-demand entertainment with an on-demand learning medium. However, the content of the game, including the theme and specific experiences or encounters, will need to be as compelling as the medium in order to effectively engage and motivate students.

In particular, the quest system common in many MMORPGs could be put to educational use, requiring students to conduct research, perform experiments, and apply academic skills to solve in-game problems. Ideally, such quests would provide an authentic and contextualized opportunity for skill use that would facilitate transfer into real-world scenarios. Using a scoring process that is nontrivial and corresponds to skill-acquisitions might be used to motivate students to undertake such learning quests. The ability to provide immediate and meaningful feedback will also be critical to the success of such a system. Whatever the scoring and motivation systems used in the game, the

game should be designed or chosen to rely as much as possible on intrinsic motivation rather than relying too heavily on extrinsic motivation. Unfortunately, the design of such a system that provides educationally valuable quests that rely primarily on intrinsic motivation may be a difficult (or impossible) challenge for game designers.

MMORPGs embody Papert's concept of Hard Fun; MMORPGs are fun because they are hard, not inspite of being hard. However, if educational MMORPGs are selected or created in such a way that they are too hard for students, they will not be fun – and thus will not be engaging or motivating.

The possibility of players becoming "addicted" to the game or having "an unhealthy relationship with the game" is another common concern. However, if there were clear set learning outcomes that defined stopping points (or an end) to the game, this risk could be mitigated. Also, it may be that players' personalities and other environmental factors play a greater role in causing addition than any particular game. Furthermore, it is unlikely that students would develop an addiction to a learning game – and educators might not consider it a bad thing if they did.

The engaging elements of the game might lead to a loss of focus on educational goals. Alternatively, a focus on educational goals might reduce the motivational power of a game. Ideally, if the game is well designed it will help students accomplish educational goals without sacrificing the motivational engagement of the game. This balance could be addressed during the usual iterations of alpha and beta testing. Even if the game is slightly "less fun" than a commercial game, it would most likely still be considerably "more fun" than a traditional classroom assignment.

Video games are not appealing to all students, and may require skills (or time) that not all students have. An educational MMORPG, though, could be designed to provide multiple paths to success, with some requiring less technical "skill" with the game. Even among the students that are "gamers" not all are attracted to the same genre of games or to MMORPGs in particular.

Page 3. Context Embedded Learning (Question 2 of 6)

DIRECTIONS:

1. Read this summary of participant responses: Context-embedded Learning (These words hyperlinked to a PDF of the summary. This summary appears in its entirety in on the following page.)

2. Rate your level of consensus with the summary on a scale of 1-5 (defined below).

3. Feel free to leave any additional comments related to the topic of this summary, particularly if there is anything in the summary with which you disagree.

CONSENSUS DEFINED:

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2. Low Level of Consensus – I agree with some of what is stated in this summary, but I also disagree in some major or significant ways. However, the results are still acceptable to me.

1. No consensus – I disagree with most or all of what is stated in this summary. The results are not acceptable to me.

Question 2. What is your level of consensus with the summary provided above?
  5. Complete Consensus
  4. High Level of Consensus
  3. Moderate Level of Consensus
  2. Low Level of Consensus
  1. No Consensus
  Additional Comments:

SUMMARY:

MMORPGs might be valuable in providing a safe context for active student learning. Game worlds can be more concrete, immersive, and open-ended than textbooks, and can be used to represent other places, historical periods, and environments (or systems) that would be impossible to recreate in a classroom, including models for chemistry or other sciences. Moreover, the game world can reach beyond the classroom due to the networked nature of MMORPGs. Even so, traditional textbooks and classrooms are likely to serve a complementary roll in supporting students' game-based educational experiences. Games and simulations may even be best used in conjunction with more traditional educational techniques.

Students can take on new roles and safely explore new identities in an MMORPG game world, including academic or professional identities that might serve them well in the future. This ability to experiment with new identities might also reduce negative stereotyping and allow leaders to emerge who might not in a traditional classroom.

Students could even play a role in modifying the game environment in an MMORPG. Some games allow players a great deal of influence over the game environment. Others allow "modding" of game environments and scenarios.

Replayability of scenarios is one of the most valuable elements of an educational game or simulation. MMORPGs can also allow replayability, though this is not necessarily an element of such games and may need to be explicitly selected or designed for educational purposes.

The context provided by MMORPGs may allow more effective transfer of skills from the learning environment to the real-world. However, successful transfer of skills may be dependent on the fidelity of the models used in the game. While removal of some real-world complexity is necessary in any game or simulation, commercial MMORPGs tend to distort or exaggerate aspects of the real-world for the sake of entertainment rather than education. The models used in educational MMORPGs will need to be selected or designed primarily to help students meet learning goals – while still maintaining high levels of motivation and engagement.

Also, in order for transfer to be effective the academic content presented within the game would need to be accurate, though not necessarily in the same way as text books; for instance a historical simulation might accurately model systems content though players' choices might generate different specific events than actually occurred in history. In this way games and texts might be used in a complementary fashion – games to teach systems content and soft skills such as leadership or decision making, and texts to teach real-world specifics.

Similarly, the fidelity of game models does not necessitate a real-world setting. Just as in text-based stories, a fantasy world might be used to teach a real lesson. For instance, students can learn the basics of entrepreneurship in a science fiction setting. Such fantasy settings might help students to learn skills that might be too specific or too uninteresting to many students in a real-world scenario.

It may be difficult to assess if students have learned the content and even more difficult to asses of they have learned soft skills such as leadership. It is also possible that

students' learning would not transfer well from the relatively safe environment of the game to the riskier environment of real-world consequences. Ultimately, transfer may need to be supported through reflection, an aspect that existing MMORPGs do not stress and which may need to be guided by a teacher. Game worlds might also include an safe area explicitly meant for reflection.

MMORGPs might be most valuable if modeled on real-world professional training, such as internships. The reward system in most MMORPGs might lend itself to this sort of design, as success in these games often requires hard work and considerable time to develop the necessary resources or money. Unfortunately, the MMORPG interface might require students to acquire new skills before being even minimally successful in the virtual context.

However, a well designed game could scaffold the development of such skills. Also, a fantasy or stylized setting may be better suited to teaching some skills than a realistic simulation or even real-life. In any case, students who play such a game before beginning a real-world internship would likely be better prepared than those who don't play the game. Regardless, a simulation or game might not ever be able to replace the experience of working with an actual practitioner in a real-world internship.

As with any form of eLearning, the computer mediated context of an MMORPG might be missing valuable elements of a face-to-face learning environment. However, activities in the virtual environment can supplement (or be supplemented by) face-to-face interaction in a classroom. MMORPGs might also extend into the physical environment through new interfaces such as are now common in games like Dance Dance Revolution or the Nintendo Wii.

Page 4. Social Learning (Question 3 of 6)

DIRECTIONS:

1. Read this summary of participant responses: Social Learning (These words hyperlinked to a PDF of the summary. This summary appears in its entirety on the following page.)

2. Rate your level of consensus with the summary on a scale of 1-5 (defined below).

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Question 2. What is your level of consensus with the summary provided above?
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        1. No Consensus
        Additional Comments:

SUMMARY:

MMORPGs often promote collaboration over individualism and can facilitate social negotiation of meaning. Students who play such games might develop communication skills, including negotiation skills, and valuable new social roles. Cooperative problem-solving and teamwork are often necessary to achieve goals within the game. In-game competition can also lead to collaborative learning. Educational MMORPGs will need to include tasks that require cooperation or competition, and a means for tracking such collaborative play; otherwise, some students may not participate in and benefit from collaborative learning. Teachers might also establish out-of-game incentives for cooperating and competing in the game.

Unfortunately, MMORPGs that include competitive elements, particularly PvP elements, may foster aggressive competitiveness and may cause emotional distress for those who lose or do not win. If some students are ostracized for their lack of skill or success in the game this can lead to bullying, embarrassment, or other victimizing behavior. However, even when negative social interactions occur as a result of cooperative or competitive play, these episodes can be used as opportunities to provide students with strategies to cope with such interactions. Also, the anonymity of players in MMORPGs may contribute to this sort of behavior. Alternatively, anonymity might mitigate some of the effects of this behavior in the real-world, so educators planning to use such a game would need to be thoughtful in their decision to allow anonymity or not. Teachers and students might also benefit from working together to establish the social rules of the game and the consequences of infractions. A well-designed MMORPG might also help to address these issues and have a positive effect on potentially disruptive students by providing them a new social environment in which to take on new more positive roles.

The social learning needs of each student are different; MMORPGs might provide an alternative means for engaging a student less adept at interpersonal communication, and might help such students develop new social skills in a safe environment. However, the violent and male dominated social structures of many commercial MMORPGs may be inappropriate for use in an educational setting. Also, if students are free to choose the roles they play, teachers may find that not all roles are filled. In addition, some students may choose to play roles that might operate counter to educational goals. On the other hand, it is possible to play most existing commercial MMORPG in a nonviolent way and still progress and succeed in the game. Also, MMORPGs usually allow players to choose male or female avatars and to undertake quests and other activities that are likely to appeal to female players. In a well-designed open-eneded game it would not be necessary for all roles to be filled for each student to find success. Most MMORPGs are already designed to support players interested in achieving, exploring, and socializing – and most games discouraging disruptive behavior by design. Educational MMORPGs can be selected or designed to follow this model and to avoid violent or gender-biased game play.

MMORPGs can also serve to bring distant learners together in a meaningful way, although this may require additional technical skill on the part of the players. In addition, students can socialize outside the games about the games, or even build a learning network around the game. However, there is a risk of including a potentially malicious person in the game or in the metagame social circles; most distance learning takes place in a "walled garden" such as a password protected content management system.

MMORPGs may also be used or designed in such a way that they allow players to see things from another's perspective. In this way the games might be used to address controversial social issues, to teach about other cultures, or to effect positive social change. However, it is unlikely that a transformational shift in a students' cultural beliefs will occur unless complemented by a variety of other educational activities. Also, students are likely to "see through" anything they perceive as manipulation in such an effort to change their beliefs or values.

Video games, including MMORPGs, can constantly challenge a player within his or her ZPD by constantly adapting to the player's skill level. However, MMORPGs may have less flexibility to adapt to individual players because changes in the game world may effect others as well. The social structure of an MMORPG can also help provide the scaffolding necessary for individual students to succeed and grow. For instance as some players develop skill in the game they can work in groups with other newer players.

The computer mediated social environment does not provide the same level of interactivity as face-to-face communication and might re-enforce solitude and antisocial behavior, or accentuate problems such as bullying, creating new channels for certain individuals to be ostracized. Admittedly, traditional classrooms and other school activities such as sports might are at least as likely to create this scenario. However, students who are more reserved or shy might blossom in a game-world. especially through the use of an avatar. The game environment might also allow for a "psychosocial moratorium" that encourages growth and development, particularly in adolescents. Additionally, communication within a game or virtual reality can create relationships that transcend what may be achieved by the player in a real-life situation.

Also, a player may come to identify too strongly with their avatar, which represents only a small portion of the player's personality, a fact that may need to be communicated to and reinforced for students.

Page 5. Twenty-first century skills (Question 4 of 6)

DIRECTIONS:

1. Read this summary of participant responses: 21st Century skills (These words hyperlinked to a PDF of the summary. This summary appears in its entirety on the following page.)

2. Rate your level of consensus with the summary on a scale of 1-5 (defined below).

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Question 2. What is your level of consensus with the summary provided above?
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      4. High Level of Consensus
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      2. Low Level of Consensus
      1. No Consensus
      Additional Comments:

SUMMARY:

MMORPGs might be useful for helping students to develop 21st Century skills such as critical thinking, creativity, comfort with computer use, fluency in multiple media, economic literacy, and global awareness. Success in an MMORPG requires strategic thinking, planning, decision making, judgement, and the ability to react to changing conditions, all while multitasking effectively. Players must balance their resource, prioritize their actions, manage multiple objectives, and understand in-game systems, including the game economy. Even information literacy skills are important as players seek to find, evaluate, and use information (both in-game and from other outside sources). MMORPGs as a genre may be particularly beneficial in for educational purposes because they focus on working within systems and processes rather than on achieving a single win-state. The challenges and systems in the game can be selected or designed to authentically parallel real-world scenarios. Also, these are very complex skills, and an MMORPG in isolation is unlikely to develop them deeply unless complimented by a variety of other educational activities.

MMORPGs might also provide an arena for developing skills of leadership (and followership), interpersonal communications and management. Additionally, the learning communities that players form around MMORPGs (in which they share codes and strategies) parallel the activities of 21st century professionals in knowledge-based workplaces.

MMORPGs might also encourage risk taking by making failure safe and often fun. However, if failure is too easy (or fun) within a game, it might lead players to become more risk-adverse in real life or else to have an unrealistic view of risk, failure, and consequences in real life. An educational MMORPG would have to balance providing an environment safe for student risk taking with in-game consequences that are significant enough to make the risk of failure real and disappointing. In game consequences might even be irrevsible. Though this might conflict with the replayability of a game, then the game could also be used to help students learn how to deal with failure, a key to real-world risk taking.

A potential concern is the inclination of many MMORPG players to "game the system" or "cheat" in an effort to succeed in achieving in-game goals. This may reduce the effectiveness of the role-playing experience, may detract from (or eliminate) educational goals, and may encourage students to "cheat" the educational system outside of the game as well. Many existing MMORPGs will cancel a player's account if they are caught cheating. Educators might want to engage students in discussions about the ethical implications and consequences of cheating the system. Another way to manage the risk of such "cheating" is to build it into the game by expecting students to exploit or "mod" the game system to accomplish a task. (In this way they will learn the underlying systems and assumptions well.) In some respects the ability to exploit a system is another valuable life skill and perhaps should be part of the process of playing an educational game. In this respect, the potential of gaming or cheating the system is a minor if not insignificant concern.

It may also be difficult to assess whether or not MMORPGs are successful in helping students to develop such 21st Century skills and transfer them to real-world situations. (However, this difficulty in assessment does not mean that learning and transfer are not occurring.) Transfer might be explicitly facilitated by educators guiding students from game scenarios into real-world scenarios. Games will also need to be chosen or designed to include tasks that authentically mimic the real-world tasks and situations in which students will be expected to demonstrate success – without being unnecessarily high fidelity to the point of boredom. The elements of fantasy and play are important to the success of role-playing games. Regardless, without careful alignment and monitoring students could transfer learning that has a negative effect on their real-world success.

NOTE:

Many of the skills mentioned in this section were important skills for success in the 20th century and in some cases throughout human history. However, modern schools are notoriously poor at teaching and assessing such skills, and recent changes in students, technology, and world markets suggests that such skills will be even more important in this new century. For these reasons, and because the breadth of these skills is difficult to name, the researcher continues to use the term "21st Century skills." To view more in-depth definitions and frameworks describing "21st Century skills" please see the following two websites:

www.21stcenturyskills.org
www.ncrel.org/engauge/skills/skills.htm

Page 6. Reflection (Question 5 of 6)

DIRECTIONS:

1. Read this summary of participant responses: Reflection. (This word hyperlinked to a PDF of the summary. This summary appears in its entirety on the following page.)

2. Rate your level of consensus with the summary on a scale of 1-5 (defined below).

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Question 2. What is your level of consensus with the summary provided above?
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     2. Low Level of Consensus
     1. No Consensus
     Additional Comments:

SUMMARY:

With the guidance of an educator and with dedicated, structured, and frequent debriefing time, MMORPGs might also offer an opportunity for students to reflect on their learning and problem-solving strategies. Educators might help students to realize the correlation between their in-game strategies and real-world scenarios they might encounter. Something not unlike an after-action-review might be used for this purpose, but clear procedures for reflecting on skills such as the 21st Century skills mentioned in the previous session are not well established in traditional education. Many existing techniques might be borrowed from other fields. New tools for capturing in-game experiences and representing them for later reflection may need to be developed as well.

Due to the potentially global nature of an MMORPG, they might also provide an opportunity for students and teachers to reflect on cultural differences of others playing the game. However, it might be difficult to reflect on real-world cultural differences in an online game when many of those differences would not be apparent in the game-world and the players avatars. It may also be difficult for many teachers to facilitate reflections on cultural differences, particularly without exposure to different cultures themselves. Perhaps the most important lesson to be learned about culture is that people are more alike than different, and this can be learned in an online game environment as students engage in play with others from around the world and their cultural differences do not deter them from enjoying – and succeeding within – the game together.

Debriefing may reduce the scalability, increase the cost of implementation, increase the time required, and limit the independent use of an MMORPG for educational purposes, especially if conducted in a face-to-face format. However, such potential drawbacks do not outweigh the benefits of having students reflect on their game play. Without such explicit reflection activities the educational value of playing an MMORPG might largely be lost. To mitigate these concerns, though, games can be designed to scaffold reflection and to automate it to some extent. Even independent use of an MMORPG might include a report back to a teacher or peers.

Page 7. Infrastructure and Logistics (Question 6 of 6)

DIRECTIONS:

1. Read this summary of participant responses: Logistics. (This word hyperlinked to a PDF of the summary. This summary appears in its entirety on the following page.)

2. Rate your level of consensus with the summary on a scale of 1-5 (defined below).

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Question 2. What is your level of consensus with the summary provided above?
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    1. No Consensus
    Additional Comments:

SUMMARY:

MMORPGs may require fewer hardware resources compared to many other video game genres, but implementing MMORPGs in existing schools would include many challenges related to infrastructure and logistics. With current student to computer ratios, students might experience limited access to the game at school. Many computers in schools might not meet the hardware needs of modern MMORPGs. The bandwidth available at the school might also be limited. Technical problems with the software, hardware, and network as well as the logistical and cognitive overhead necessary to play the games might outweigh the positive learning experience. (Outside of the school, many socio-economically disadvantaged students might also have limited access to the equipment necessary to play an MMORPG.) Filtering games for age appropriate content may also be a concern.

In addition, MMORPGs require thousands of players to feel inhabited and provide a persistent sense of community; it may be difficult to achieve such a population in an educational game, and allow students to play commercial games in schools raises concerns about appropriate content and student safety. However, it is possible to populate a game world with richly interactive nonplayer characters (NPCs) controlled by the computer. Also, it may not be necessary for educational online role-playing games to be massively multiplayer in order to take advantage of the benefits of being multiplayer. Smaller scale multiplayer games (or MORPGs) might be more appropriate; these games would not necessarily need to be persistent worlds.

Funding an educational MMORPG would be expensive to start and difficult to sustain. Even if an existing engine is used, it would be expensive to develop the game and attract players and teachers to the idea. However, the costs of development could be distributed across many many schools and the potential benefits might justify the expense. In addition, existing game engines, digital objects, and environments could be imported from the entertainment industry. Gaming engines (and graphics) that are a generation behind the cutting edge would still be effective for creating an engaging educational game. Low cost easy to learn tools would be ideal. A well designed game concept could also attract the necessary developers, players, and educators.

The amount of time needed to implement such a game may be the greatest cost, including the time for students to learn the game and to spend time on the less educational fun elements of the game. MMORPG game play also does not fit neatly into traditional school schedules. In a truly massive multiplayer game, coordination of players with different school schedules (potentially even across different time zones) would also be a challenge. Single player training modes or the ability to solo might help alleviate some of these concerns. Also, coordinating large numbers of students together in the game world might be in conflict with the ideals of a constructivist learning environment in which students are engaged in individualize inquiry-driven learning, and so might not be a desirable use of an MMORPG anyway; self-organized groups of students similar to existing "guilds" in existing games might be more desirable.

Cultural resistance to video games in schools might also prove a challenge. The primary barriers might not be technical, but rather psychological, political, and cultural –

including sometimes unconscious beliefs, assumptions, and values. Many educators and parents may not accept the potential educational value of video games, including MMORPGs. Even if the games are accepted, there will be a need to establish appropriate norms and ethics for the educational use of MMORPGs. For a MMORPG to take root in the current environment of high-stakes testing, the game may need to be accepted in terms of what schools now value. Moreover, games would need to be based on nonviolent, appropriate, and nontrivial subject matter and content – and would need to include reasonable measures to ensure student safety. Naturally, student learning would ned to be measurable and demonstrable as well. Unfortunately, this might reduce the engaging and motivating elements of the games, and as Prensky says, "suck the fun out."

A great deal of organizational change will also be necessary if games are to be accepted and supported in existing educational organizations. There would be a significant need for teacher professional development in order to ensure that teachers would have the necessary understanding to effectively implement the games and guide students with their reflection and transfer of skills. Establishing pilot programs that follow models set by similar technologies already in use would be critical to successful implementation.

However slowly, educational institutions are moving inexorably towards the ability to overcome these hinderances.

Page 8. Conclusion

Thank you for completing this final consensus check. This concludes your participation in the study. Thank you again for your contributions in all rounds of the study. This research was made possible by your volunteer efforts.

7. Your Name (for logistical purposes only – your anonymity will be protected):

APPENDIX E: PARTICIPANT RESPONSES

ROUND 1, QUESTION 1

1.   - Uses a teaching mechanism that the student identifies from activities they enjoy in their free time. – Can place the teacher and student on an equal communication level – Teachers can relate the process of learning a new game to the process of learning a new topic / problem solving situation in the classroom – Can use the MMORPG to introduce basic ideas of economic systems and team play dynamics. – Fun lesson plans can be built around quests. Tue, 1/8/08 2:18 PM

2.   I can think of several. First there is the general area of thinking/communication skills that are separate from the actual content of the game. Playing MMORPGs have the potential to give learners practice at strategic thinking, planning, decision-making and judgment. They might also provide an arena for developing skills at leadership (and followership), interpersonal communications and management. Designing MMORPGs have the potential to develop some of the same skills along with analysis and synthesis. In terms of content, MMORPGs might be used to represent other places and historic periods. By making distant places more concrete, they might facilitate learning concepts and principles associated with an environment unlike our own place and time. Giving kids the opportunity to take a place that they're studying and recreating it in a virtual world would engage them far more deeply than merely reading about it. A third class of benefits may derive from the technology itself. As a collaborative, realtime communication channel, MMORPGs might serve as a way to bring distant learners together in a meaningful and engaging way. Debriefing the game might be a good way to begin a conversation about cultural differences between the real-world places that learners come from.   Fri, 1/4/08 12:47 PM

3.   - MMORPGs offer students the opportunity to script their own learning experience. This makes learning much more unique and personalized. – Most MMORPGs (including WoW), promote collaboration over individualism. In fact, some portions of the game are unplayable in single-player mode. – Role-playing, and learning through this process of role-playing, can be a lot more immersive than a conventional classroom learning session. This can make the learning experience a lot richer and more meaningful. This will probably work pretty well for subjects like history or economics. – The pace of learning in a conventional teacher led classroom session is driven by the requirements of the "average" student. Above average and poor learners tend to suffer under this system since for one, the pace of learning is too slow, while for the other it is too fast. With an MMORPG, students can learn at a pace that is more attuned to their learning needs since they decide the pace.   Thu, 1/3/08 9:05 AM

4.   Use by students who cannot attend school due to disability or illness Ability for students to modify environment (I would point to Harel, Children as Designers for

research, I'm sure you have that well marked already!) Ability to play with identity (again, I'm sure you are looking at Turkle for those references) Use in a long-term project Use with other participants lead by an educator so that guidance and reflection are a part of the process Attraction to students who may not be succeeding in a traditional classroom setting. I'm assuming that any teacher using MMORPGs in a classroom setting would be passionate about them. So you have the benefit of the teacher caring about the process, working hard to make it work, and relating to students as a peer-user and participant. MMORPGs have a wide array of ways to move about, succeed and advance. Having multiple ways gives students the ability to find their own way, and the share advice about how to succeed, creating a peer culture of collaboration and learning (that is, if the teacher understands and supports that) Wed, 1/2/08 7:12 PM

5.   Benefits would include a primer to the social environment as school-age kids form their social circles and engage in group efforts via the game mechanics. Also, it would introduce interactive goal achievement as kids do quests or missions. It also emphasizes reading skills. Kids can also socialize outside the games about the games themselves, providing a link to a social circle that might not have existed before.   Wed, 1/2/08 5:00 PM

6.   Students guiding their own learning in an environment that is engaging and exciting Students gaining 21st Century skills: collaboration, problem-solving, critical thinking, comfort with manipulating technology; high levels of carryover from school to life/career, unlike behaviorist pedagogies currently being used Increases in creativity and imagination due to the dynamic nature of the games – students must always be reacting to the moves/challenges of others within the game, coming up with their unique approaches and responses Opportunities for global connections when games are conducted with students from around the world.   Sat, 12/29/07 7:23 PM

7.   After investing significant time in MMORPGs during the past two years, my most important take away has been exploring leadership roles in online communities. Our "real life" identities are, for the most part, not a part of the game. It's much easier to avoid negative stereotyping, which, in my experience, has allowed strong leaders to emerge in roles that I wouldn't expect. This is a bit of a lens through which I play in MMORPG's. http://www.strategy-business.com/press/article/06309?pg=0   Thu, 12/20/07 8:39 AM

8.   The biggest benefit I see, is the ability to form groups/guilds to work together for a common goal. This collaboration is essential to students' ability to live and work in the world of 2.0 and 3.0. The ability to network and collaborate to reach a common goal cannot be stressed enough.   Wed, 12/19/07 9:50 AM

9.   1) Engages the student in a way that is hard to reproduce otherwise 2) Facilitates social interaction for students who may otherwise be introverted in person 3) Can provide

a platform for students to display their work and instill pride 4) Can introduce students to others learning the same material all over the world   Wed, 12/19/07 9:45 AM

10.   The first benefit I see is that a "game" will grab and hold the attention of a child more than other methods of teaching. A game will also allow us to teach them things even though they don't know it, they think they are just playing. And even when they know it is a lesson, a game environment is more fun, therefore they pay attention more and stay active longer. As for an MMO, that allows us to bring many, many students together at one time all learning the same thing. It allows for geographic and demographic diversity and can allow us even more access to the kids since they could continue to play/learn at home as well as at school.   Tue, 12/18/07 9:33 PM

11.   cooperation, collaboration, connecting outside of the classroom, performance versus testing, recording activity, high-interest, potential to design and model   Tue, 12/18/07 3:39 PM

12.   Emerging multi-user virtual environment (MUVE) interfaces offer students an engaging "Alice in Wonderland" experience in which their digital emissaries in a graphical virtual context actively engage in experiences with the avatars of other participants and with computerized agents. MUVEs provide rich environments in which participants interact with digital objects and tools, such as historical photographs or virtual microscopes. Moreover, this interface facilitates novel forms of communication among avatars, using media such as text chat and virtual gestures. This type of "mediated immersion" (pervasive experiences within a digitally enhanced context), intermediate in complexity between the real-world and paint-by-numbers exercises in K-12 classrooms, allows instructional designers to construct shared simulated experiences otherwise impossible in school settings. Researchers are exploring the affordances of such models for learning in K-12 education. Immersion in virtual environments and augmented realities shapes participants' learning styles, strengths, and preferences in new ways beyond what using sophisticated computers and telecommunications has generated thus far, with multiple implications for K-12 education. Dede (2005) describes learning styles enhanced by mediated immersion in distributed-learning communities based on MUVE and AR interfaces: (a) fluency in multiple media; (b) learning based on collectively seeking, sieving, and synthesizing experiences, rather than individually locating and absorbing information from some single best source; (c) active learning based on experience (real and simulated) that includes frequent opportunities for reflection; (d) expression through non-linear, associational webs of representations rather than linear "stories" (e.g., authoring a simulation and a webpage to express understanding, rather than a paper); and (e) co-design of learning experiences personalized to individual needs and preferences. If we examine students' technology use outside of school, we see these shifts in learning styles happening in their informal, voluntary educational activities. For example, while one kid sitting in front of a console game is still prevalent, collaborative, mediated gameplay is rising. X-box live and Nintendo DS devices enable participants to interact during gameplay across distance and space. Massively multi-player online games

(MMOG), such as the World of Warcraft (Blizzard Entertainment) and Everquest (Sony Online Entertainment), bring players together online where they can interact in a virtual collaborative context. Emerging communities such as "modding," in which users create new content for games (often contributing to a shared database of models), and "machinima," in which users create new content via video capturing techniques, are further shaping how kids now express themselves via collaborative digital experiences. Youth are forming networked communities around games and movies, in which they share codes and strategies and build collaborative clans working together to fulfill quests. In their learning processes, many of these distributed communities among kids parallel the activities of 21st century professionals in knowledge-based workplaces.   Sun, 12/16/07 9:31 AM

13.   We structure interaction, language, values, goals, entitlement, and self-esteem when we create lessons plans. Games are structured forms of play and can be used in a number of ways. It is not so much the tool as the way we use it (activity theory: our means to discover and innovate). Games are designed to help players develop new skills and tactics that can be layered and manipulated to evolve strategies to create the player's desired outcome (see Brock Dubbels (2004)). Games require players to construct hypotheses, solve problems, develop strategies, learn the rules of the in-game world through trial and error (similarly to real-world situations). Gamers must also be able to juggle several different tasks, evaluate risks and make quick decisions. A UK study concluded that simulation and adventure games where players create societies or build theme parks, developed children's strategic thinking and planning skills (http://www.futurelab.org.uk/resources/publications_reports_articles/literature_reviews/). Other Source: Rude-Parkins, C., K. Miller, K. Ferguson, and R. Bauer. 2005. Applying Gaming and Simulation Techniques to the Design of Online Instruction. Innovate 2 (2). http://www.innovateonline.info/index.php?view=article&id=70 (accessed January 30, 2006). Positives/Benefits: *Games can teach/train valuable cognitive and fine motor skills *Games can be used to practice teamwork/cooperation *Online games can be a positive social experience *Games can reinforce certain world views *Dynamic and interactive *Provides real-time assessment, measurement, and evaluation of student learning *Provides time series analysis of decision process *Suspends space and time limitations for learning *Very cost effective for training and distance learning (homeschooling) *Allows practice with virtual clients/mentors/collaborators *Multi-sensory learning environment *Provides opportunity to reinforce a value system and qualities for success and continuous improvement *Models environment or concept *Hypothesis testing *Learning can be extended beyond the classroom   Sun, 12/16/07 1:42 AM

14.   I believe the potential of MMORPG's is just beginning to be understood. The level of involvement that players experience while playing a game brings tremendous learning opportunities. I believe there is a correlation between the active involvement of a student and the level of learning they achieve. First, MMORPG's can provide motivational benefits. A high percentage of students enjoy playing games. Second, the

active process of playing the game puts students in situations in which learning can take place. Thus allowing connections to be made. Third, and possible the most interesting aspect of MMORPGs is that as a social studies teacher (world history) making my class attractive to hands on learners is always a challenge. I think a huge benefit of MMORPG's is the hands on approach it can bring to a course, like history, that can be difficult-to-teach hands on type kids. Some of the benefits from above come from my use of games in my classroom and the informal testing of students who have played game. Students that were actively involved in playing games scored better and with better understanding on assessments than did student who were not involved.   Fri, 12/14/07 10:34 AM

15.   The initial benefits are an engaging environment, which may make learning engaging. A long-term issue will be what are the unique educational affordances of MMORPGS. Those are likely to be similar to the learning outcomes being explored in virtual worlds, e.g. Second Life. The benefits will also be skewed as to how they're implemented. For example, if the learner can customize the character, then there can be some real affiliation between the learner and the avatar, and the learner can more easily assimilate the avatar's experiences. It also depends on what capabilities are built in, for example what the characters can do. In Second Life, players can create 3D objects collaboratively. That has some very valuable educational benefits. If we've certain types of problems to be solved in the MMORPG, we can get practice in solving those types of problems, and collaboratively. More generically, assuming typical MMORPGs like World of Warcraft, our educational affordances have to do with specifics of interpersonal relationships like communication, participation, leadership, coordination, etc. Some generic problem-solving can also be reflected upon and transferred. Another potential opportunity is for the environment to attenuate the normal social hierarchies that can develop among learners, and create a more level playing field for individuals to interact. In summary, the engagement may be at least initially positive, the social aspects are a benefit, but the specific domain attributes will depend on the roles available.   Thu, 12/13/07 9:55 AM

16.   Constructivist learning is essentially building our own mental models of understanding. Learning does not have to be didactic, linear, or rigid. Basically, as we've always known, kids are natural learners, and with guidance, can construct knowledge. 1) unmotivated, uninterested learners become insanely motivated and interested. 2) unmotivated, uninterested learners become insanely motivated and interested. 3) unmotivated, uninterested learners become insanely motivated and interested. 4) MMORPG's tend to be resource-light; working on a broad set of computers 5) MMORPG's have very high production value; encouraging engagement and motivation 6) Failure is safe and often fun 7) Many obstacles can only be overcome in a team (guild, corp, whatever); providing a directed and focused community 8) Games can elicit "flow" – a state of near-complete immersion, where a student is wholly focused and concentrated on a task 9) MMORPG's are challenging for different types of players and different levels of ability; a nod to different learning styles 10) mmorpg are continuously challenging –

mastery is tremendously difficult Finally and most importantly, 11) Game play is well refined. This is the most important point. Games are inherently educational. You can't succeed in a MMORPG unless you learn how it works, understand the patterns, symbols, and challenges. You must be able to understand the underlying dynamics of the game in order to win...this is what makes games educational. The thing about MMORPG's are they are well designed. The underlying gameplay and balance are very good. The play is constantly challenging (fitting into the zone of proximal development), and challenges change and morph (often in direct relation to players ability!).   Thu, 12/13/07 9:42 AM

ROUND 2, QUESTION 2

1.   - Alienates students that do not play MMORPGs – If a student is already gaming too much, having to think about MMORPGs during class might only make the situation worse. – Parents who might not want their children playing MMORPGs might not appreciate them being used as a learning environment in the classroom   Tue, 1/8/08 2:18 PM

2.   The challenge facing anyone designing MMORPGs for educational use is to ensure that the amount of learning that accrues is not outweighed by the logistical and cognitive overhead required to implement and play the game. Succeeding in the game and mastering the desired learning goals must be deeply linked. That's not an easy thing to pull off. Public schools are presently driven by high stakes testing on too much content and too little of the skills/knowledge to succeed in an information society. For a MMORPG to take root in this environment, it needs to carry its weight in terms of what schools now value. It has to be worth the time invested. Most commercially successful MMORPGs are wrapped around violent conflict at their core. That, of course, doesn't square with any school culture outside of madrasas. Remove the violence and you remove one of the prime motivational elements of a game. Something educationally useful has to take the place of that powerful element. Another distraction is the opportunity to spend time on things that are purely game-related and unconnected to the kinds of learning that schools value. Dressing up your avatar, for example, is one of the fun things about Second Life and other environments but (unless fashion design or historical costumes are inextricably tied to the curriculum) most school settings would see this a giant waste of time. Again, removing this element that makes non-educational games fun would deaden the game.   Fri, 1/4/08 12:47 PM

 3.   Some of the potential problems that do come to mind are: – Gamers will tend to be more successful than non-gamers, thereby skewing the education system in favor of gamers. – Teachers will have little or no control on how each student plays the game, since each student would script her own experience. As a result, it may be more difficult to ensure that students achieve certain learning objectives in a specified time-frame. – Not everyone loves gaming, and for them an MMORPG may be no more an attractive option than conventional instructor led training. – Not everyone likes RPGs, and some of

these people may be unable to completely embrace an MMORPG with enthusiasm. In my experience, gamers tend to display a fair amount of genre loyalty and this sometimes translates to a certain amount of disdain for other genres (for example, some of my friends who love fast paced action games will simply not touch an RPG). As a result, even amongst gamers, there me be some skewing in favor of MMORPGers.   Thu, 1/3/08 9:05 AM

4.   It's difficult to sustain ANY constructivist learning environment in formal K-12 education, this would be no different. School or teacher-centric goals will undermine the user centered experience. School use will assimilate the game playing aspects but try to turn them into boring drill (see Papert on the ability of "School" to assimilate, like a body assimilating a foreign invader, http://www.papert.org/articles/school_reform.html is one such article. School will insist on metrics from the game that subvert the design, rendering the game "not fun" MMORPGs have no "set path", so how will you "prove" that a student will be exposed to any content or educational objectives? If you make them follow a set path, you are killing the RPG aspect that makes them fun. School will insert content into a game that won't work. School periods are too short to get into "flow" of gameplay (the flow guy – it's sort of a cliche to cite this, but oh well. Csikszentmihalyi) Some kids don't like video games and find them boring. Therefore it's as likely to be rejected by non-gamers as any other "teaching trick" would be. Assuming that all kids like video games is not true. There are many genres, even among "gamers" there are wide variations. Gaming or cheating the system is a widespread practice in MMORPGs, the ability to game any system would have to be well understood by the teacher. You need to have a teacher who has a passion for MMORPGs, it's not going to work to write lesson plans and hand them to random teachers. MMORPGs need LOTS of people to make them feel alive. There's nothing worse than an empty space with nothing to do. It's unlikely that formal K-12 adoption will generate the numbers needed to sustain a space that "feels good". Look at the numbers – in the US there are about 100,000 schools. Even if 1% of them (a pretty good market share!) had a class going on line EVERY day, with about a ten hour spread that some class would be online when your class is (3 time zones, approx 7 active hours of school), which reduces your potential for hooking up with other classes to 100 schools across the US. If everyone gets on once a week(more likely scenario), that's a potential for only 20 schools using any one MMORPG at any one time. That's just not enough people. If you are talking about an open to the public MMORPG, see next problem... Fears of opening up school networks, allowing students to play with strangers, and inappropriate content/language. Money – funding for this would be expensive to start and hard to sustain. Even if you used an existing engine, it would be expensive to attract players and teachers to the idea. Marketing to the K-12 world is expensive since it's a fragmented, institutional market.   Wed, 1/2/08 7:12 PM

5.   MMORPGs have by their nature an addictive element. Kids have not fully developed self-control and could play for hours/days if not monitored or restricted. Also, the virtual nature of the games do not enforce the same interactivity one gets with real

friends you can physically touch and laugh or cry with. Sitting in front of a computer for hours on end re-enforces solitude.   Wed, 1/2/08 5:00 PM

6.	Access – limited in-school access and speed of connections is a major problem; schools with older computers that are not capable of meeting the memory needs of mmorpg's; limited out-of-school access – there is still a gap based on socio-economic status, this problem would need to be addressed in order for all students to have access to the mmorpg's at home. Attitudes – too much misunderstanding surrounding the effectiveness of mmorpg's to teach students to learn and to teach themselves. Our education system is still run like it was in the 19th century – teacher-centered, output-based. A shift in the basic belief systems of those in and around education must occur for the use of mmorpg's to be more than anomalies. Assessment – changes must occur in the type of assessment that we conduct in order to determine student learning with these tools; how do you assess student learning in mmorpg's using current approaches? Who will create new assessments? How long will it take for the acceptance of these alternative assessments? Justification – the use of mmorpg's must be justified to the powers-that-be; parents, teachers, administrators, politicians, government funding officials, etc. must all see that using mmorpg's can be one part of a radical change that can bring about the shift in education they are looking for. Sat, 12/29/07 7:23 PM

7.	Among the more significant issues in managing our guild's growth over time has been balancing that line between appropriate and inappropriate interactions online. Establishing and enforcing cultural norms requires constant attention given the diverse age group and cultural mix of the people participating. This is partly due to a "gaming culture", part to do with people being able to hide behind online anonymity, and partly do to the diverse culture in our guild. We do an excellent job of managing these norms, but it requires a significant investment of time on the part of extremely skilled leaders to ensure a safe sense of community. Thu, 12/20/07 8:39 AM

8.	Unless the MMORPG is a closed system eg. an island in SL, then outsiders could easily destroy the ability for students to appropriately reach their goals. Wed, 12/19/07 9:50 AM

9.	1) Can become addictive 2) If it is not managed well by the instructor it can be confusing 3) Technological problems (software, network, hardware) can eclipse the positive experience 4) If it is forced upon students as opposed to being provided as a supplementary learning channel it may cause anxiety Wed, 12/19/07 9:45 AM

10.	An MMO environment could make it harder to control access and just exactly who is involved. We could easily end up with trouble makers that could ruin the experience. If the game is to focused on being a "game" it might lose its function as a learning tool. Tue, 12/18/07 9:33 PM

11.   Ignorance, lack of tools and equipment, resources, lack of pedagogical knowledge, does not translate well to standardized assessments   Tue, 12/18/07 3:39 PM

12.   Despite the proliferation of sophisticated technology use outside of schools, typical classrooms seldom leverage any of the three interfaces described above for teaching and learning. Moreover, when employed computers and telecommunications are generally used to streamline the delivery of content, ignoring information technology's capabilities to: 1) support learning in real-world contexts, 2) connect learners to experts and communities of peers, 3) provide visualization and analysis tools for thinking with data, 4) scaffold problem solving that enables more complex reasoning than possible otherwise, and 5) enable opportunities for feedback, reflection and revision of knowledge construction. This is not due to major problems intrinsic to MUVEs, but instead to the innate conservatism of the educational system. The primary barriers to altering curricular, pedagogical, and assessment practices towards any ICT-based transformative vision are not conceptual, technical or economic, but instead psychological, political, and cultural. The largest challenges in changing schooling are people's emotions and their almost unconcious beliefs, assumptions, and values. To be achieved, a transformative vision must generate the professional commitment and political will to realize a major shift in education.   Sun, 12/16/07 9:31 AM

13.   "Although there are variations in constructivist epistemology, the common thread is that it is subject-centered, experience-based, and relativist. But its relativism needs to be distinguished from other relativisms in which the goal of science as a search for truth about the world is accepted, and it is then asserted that we cannot know of different accounts which one is actually true or better. In contrast for most constructivists, our knowledge does not tell us about the world at all, it tells us about our experiences, and how they are best organized." (see Matthews (1992) http://www.ed.uiuc.edu/EPS/PES-Yearbook/92_docs/Matthews.HTM) Necessarily, the teacher has to remind students of specific educational goals that need to be met, regardless of the students' relative found-truth , based on his/her experience (the process of knowledge, i.e. finding the solution/answer) in the semi-open-ended MMORPG. Also, Richard Bartle (1996) has classified multiplayer RPG-players into four primary psychological groups (Bartle Test, http://www.guildcafe.com/bartle.php), a potentially interesting tool to predict students/gamers tendencies once immersed in a game environment. Negatives/Problems: *Lost of educational focus while on-quest *Relative truth (value in specific educational sessions?) *Cognitive overloads (Chee Siang Ang, Panayiotis Zaphiris and Shumaila Mahmood (2007). A model of cognitive loads in massively multiplayer online role playing games. Interacting with Computers , 19 (2),pp 167-179.) *Games can reinforce certain world views *Addiction *Escapism *Isolation *Antisocial behavior *"grinding" or cheating the system to get points (in education: gaming the game by by-passing the educational goals).   Sun, 12/16/07 1:42 AM

14.   MMORPG's have the Dungeons and Dragon type crticism from the 1980's. Kids will get deeply involved, addicted, and almost believing that their Avatars are real. Possibily creating an unreal since of the world or real-world. Also, games are not appealing to all people and fantasy games like WOW may be to far out for some students. Games not being attractive to all also come from my use of games in my classroom. Some kids immediately look at the game and say things like No Way....I can't do this. Or I don't want to do this. Both attitudes create problems when trying to teach using games. Fri, 12/14/07 10:34 AM

15.   One potential problem is that the initial engagement of the MMORPG may dissipate, a bit of a Hawthorne effect, and there may be some subsequent disengagement. The problems depend a lot on what is enabled in the MMORPG. If you've a customized one, you can build very specific problems into it, but you could have the problem where it's not as compelling as a commercially viable generic game (e.g. World of Warcraft). So learners won't invest themselves as much emotionally in the game. The flip side of that is if it does have commercial polish, certain learners might have problems with getting over-engaged to a point where it interferes with their normal lives. It's also potentially uncertain whether all types of learners function equally well in these environments, and we might find it caters to certain types of learners. Previous work has characterized players as socializers, explorers, achievers, or troublemakers (to euphemize the terms a bit). Such an environment might allow these traits to subsume the educational goals. The social aspects of the environment might accentuate certain problems like bullying, creating new channels for certain individuals to be ostracized. Another design issue: if you don't have much ability to match the avatar to the learner, the learner may not fully engage. In summary, the engagement may suffer in comparison, the social affordances may have some negative consequences, and the particular outcomes depend heavily on the implementation.   Thu, 12/13/07 9:55 AM

16.   1) time – games take time to play, especially MMORPG's and often don't fit into a classic school period 2) time – games take time to play, especially MMORPG's and often don't fit into a classic school period 3) time – games take time to play, especially MMORPG's and often don't fit into a classic school period 4) Students can't win a MMORPG; there is no end-point – I suppose this could be a good thing, but it does lack a certain finality and ending 5) parental / peer opinion can be an obstacle; games are viewed as fun with little educational merit 6) measurement can be difficult. without very clear learning objectives, it is difficult to provide evidence of learning – especially in today's "standard-driven" educational culture 7) poor bandwidth – many schools don't have the internet bandwidth to play games 8) some kids aren't "computer people". although MMORPG's support multiple players and multiple play styles, there are some kids who simply aren't computer people, and won't access the game (it won't be interesting or fun).   Thu, 12/13/07 9:42 AM

ROUND 2, QUESTION 1

1.   I think the motivation derives from the competition that peer pressure can bring in a group setting. You place them in a situation where their actions can be seen by many and they will be motivated to improve and do well. This will in turn keep them engaged in the activities for longer periods of time. Downside, those that cannot spend the required time or simply dont possess the skills will be de-motivated and less engaged. Having a secondary system in place for these students would be beneficial. Thu, 1/17/08 11:20 PM

2.   One way to motivate in any game is have a clear scoring process, which is nontrivial and corresponds to skill acquisition. Rapid feedback is essential. Competition against other students where there is a clear winner can be very motivating for some students. One problem is that some students may not enjoy competition, especially if they feel that they cannot improve. Thu, 1/17/08 12:43 PM

3.   MORPGs, are often seen as vehicles to be used by 'tweens, teens, and twenties, but should not be discounted for use with younger students. Immersive technology, if properly designed, would allow students to be co-creators of their own experiences and learning, and would give them direct access to content in ways that have never been possible or seen previously. This medium could transform education by providing on-demand learning and simulations to engage and instruct at a level far beyond that which can be done in a traditional classroom. "If it is digital, they will come." The main difficulty I can see would be that mentioned above -the fear of addiction. The Psycho-social moratorium that presents through the use of MMORPGs or MUVES is a very real phenomenon that should be "taught" prior to beginning any course utilizing VR.   Wed, 1/16/08 4:56 PM

4.   The Quest system of a MMORPG would be a great tool to use in the classroom. You can have quest based assignments which can be based on anything from problem solving, research or finding specific items based on questions. Some examples I can think of is providing clues or items around the classroom. The student would have to research to find out more about the item and what it could be. Another quest would be for the student to meet someone who has shown up from a previous time. They can then ask a series of questions and research to discover what time they actually came from and who they are. Helping quests are widely used in MMORPGs and could be used here as well. You can work with another classmate and the quests could be as simple and helping keep the school clean, etc. Students can also write their own quests! You can give them an assignment to learn about a particular topic and the student can use their imagination to put together a quest about the topic. The one negative would be for those students who are either not allowed or not able to play MMOPPGs. They might be less interested in the assignment if it is wrapped around a MMORPG   Wed, 1/16/08 10:42 AM

5.   "Kids, would you like to play a computer game in school?". This alone will generate an exceptional level of motivation and engagement. Computer games are very fun, and when students hear they will be able to participate in a fun activity in school, they will become motivated and interested. I'm not sure how I can be specific, Mark – the simple act of playing a game is intrinsically motivating – there isn't anything else we have to do except use a MMORPG as an instructional tool in the classroom, and we generate exceptional enthusiasm. 1) A teacher can create an island in Second life and bring the students to the virtual world. Once there, they can discuss or model almost anything. 2) Students can join Eve-online and gain an intimate look at supply / demand economics, or the role of nation-states as it relates to growth and research 3) Students can join World of Warcraft and discuss fantasy roles, grind, game design, or any number of interesting issues. 4) if we want to define text-based games as MMORPG (a stretch, I know), then we can heap English-language arts learning on the kids. As far as potential problems: 1) Some students don't like / aren't good computer games 2) There will be some students who risk developing unhealthy relationship with the game 3) Parent and peer non-understanding of what games are and how they can be used for learning (they are just playing games). 4) If there isn't correct support (technical and pedagogical) then the "education" simply won't work – the essence of the activity will only be playing games. Wed, 1/16/08 9:54 AM

6.   1. One aspect of using MMORPGs for engagement is the opportunity to assume a different identity, through an avatar, than one has in the real-world. If this avatar has a socially constructive, intellectually reflective persona, then that identity shift may be a positive experience for the learner. If instead the new identity models social destructive behavior (e.g., Grand Theft Auto) or anti-intellectual behavior (solving every problem with a gun), then the tacit learning from the MMORPG may have a negative impact even if the active learning processes (e.g., mentoring, apprenticeship, collaboration) are good. Sat, 1/12/08 7:27 AM

7.   I'm going to assume for this question that you are talking about MMORPGs that are specifically designed for students (not commercial products) since these are very different. If MMORPGs are to motivate and engage, I think they need to be incorporated into a class for a long period of time, be tightly woven in to the normal practice of the class (not a "reward" for work done, for example) and if the use is assessed, it is done with the understanding that the process of learning gets the "A", not a content assessment. The problems would be that this game doesn't exist, and if it did, wouldn't be used by many teachers. Fri, 1/11/08 2:29 PM

8.   MMORPGs have the potential to provide students with a learning environment that captivates them, assists in the development of transferable skills, and enables real-world application. Many of the principles of project-based learning are applicable here: authentic assessment, interactive learning, cooperative and collaborative learning, etc. As students identify, define, and solve problems they are given opportunities to build real-world skills. As we know, learning is most effective when skills and concepts are

integrated into real-world contexts and situations; using MMORPGs helps create these types of learning environments. All of these principles provide a base for the development of learning activities that, when conducted within the gaming environment, parallel many of the activities that students engage in outside of school. Problems: 1. Teachers understanding the games and nuances of the game to the point of being able to teach the games, align specific objectives and outcomes, and build authentic assessments – all of these skills are required … where will teachers learn them? 2. Moving to this type of learning environment will require collaboration between all stakeholders – this is a challenge for most school communities. Coming to consensus and then providing support at all levels could be a deal breaker.   Fri, 1/11/08 7:08 AM

9.   the MMORPG must first be well-designed to engage, and then be of a subject matter that motivates. The media is not enough in itself.   Thu, 1/10/08 11:47 PM

10.   Some tailored quests or activities geared for learning, like using math to solve a puzzle or a history reference to complete an information quest. Employing these elements into a fun 3D environment where one can explore and socialize may even serve to eliminate part of the drudgery that comes with traditional learning techniques. One can also further develop the "grind" aspect to include informational learning bits incorporated into the leveling up of the student character, providing an education-based motivator for the student to improve his/her character willingly. The problems that can arise from this is loss of focus on the learning parts and going for the pure fun instead, pressure from social circles to conform to cliques and their implied group behaviors, or even loss of interest due to forced academia. There's also the parents to consider, and their reactions to students "playing video games" as part of class structure. Many will not understand and will oppose the curriculum.   Wed, 1/9/08 1:43 PM

11.   The appealing part of MMORPG's for me is in the area of Sociology. I have used The Sims with previous classes and MMORPG's do not take a big jump in terms of relevance to the class curriculum. Using MMORPG's to teach the large concepts of Sociology is an interesting idea and worth some consideration. Teaching social interaction, morals, values etc. could all be done inside the game. Kids drawn to games will be motviated and engaged in the learning process. The problems that may come with that emphasis are varied. First I can only imagine that with the filtering software the school uses that the on line game would run slow. Also graphic/sound cards are not the best and probably would create some difficulties with using the game. Second, when does the class become more about the game than about the curriculum? The motivation for gamers may be to excel in the game....not in the classroom. Third, making connections between the actions of an AVATAR and real life may not be the easiest thing to do. Gaming can increae certain skills but does it really make me think deeply? Wed, 1/9/08 11:00 AM

12.   Within the game, students can be challenged to solve puzzles, make friends, combine efforts of differently skilled avatars towards a shared goal. There are many

lessons that can be learned. If the game environment is stocked with challenges and levels that are difficult and interesting, then there is less worry of the negative affects of addiction. The student is actively involved in their own learning and will tend to play more and learn more quickly as they are engaged and having fun. The educational goals must be tightly integrated into the game play, so they cannot be decoupled and therefore playing means learning is happening. Although many students may not be attracted to the MMORPG genre, there are still valuable lessons to be learned. MMORPG at minimum can teach basic computer skills such as typing, internet usage, chat etc. Proficiency and comfort with technology is a key skill in the modern world, and MMORPG provide a more palatable mechanism to teach these versus sitting in a classroom for a lecture on computers. Again, the student will learn more by doing, and learn faster when they are enjoying. MMORPGs are just a tool, like education videos and books. Like in a classroom, what is required in an MMORPG environment to function as a beneficial educational tool is some level of discipline and accountability. If some level of user moderation is done (like teachers do in classes) and if users are known to the system so that they are responsible for their actions, then the temptation to be a disruptive element is lessoned. With moderation, the game play can operate as designed.   Tue, 1/8/08 11:54 PM

13.   I'll suggest it's not how they're used, it's how they're *designed*. Ideally, the theme of the Role they play, the actions available, and tasks to complete are aligned with the learning outcomes. You have to ensure they're not TOO hard, mind you, or they're no longer fun. Having a set outcome is one way to prevent addiction; the game is done when the learning's accomplished. You need to ensure, however, that the learning goals are meaningfully embedded in the world in a way that the learner 'gets' is meaningful, AND care about. While some might not be attracted to the MMORPG, if you do it right they'll prefer the MMORPG to other ways to learn. If you don't get it right, however, you run the risks of all the problems you indicate.   Tue, 1/8/08 6:34 PM

ROUND 2, QUESTION 2

1.   Wide open question with tons of potential. I see that a game can be made to simulate ANY situation and any context. As such we can make a scenario to teach the students whatever we want and we can easily replay the scenario multiple times along with making minor changes if we felt necessary. Drawback is that NOTHING substitutes for reality so no matter what, students will always know its a game and games dont usually have real-world consequences.   Thu, 1/17/08 11:22 PM

2.   Speaking from direct experience in chemistry, the ability to create large realistic 3D models of molecules in Second Life is a definite asset. A problem is that some skill acquisition is required for students to even do minimal work in the virtual environment. This can be a block for many students. However, as more students learn the required skills they can help others by working in groups and that is beneficial on many educational levels.   Thu, 1/17/08 12:48 PM

3.   One of the greatest benefits would be that of total immersion in a VR historical space, that students (and adults) could not ever see in RL. The problems that exist now, are only those of time, and the funding for qualified game developers and script writers (as well as the impetus)to actually create the space.   Wed, 1/16/08 4:59 PM

4.   The reward system in MMORPGs is a great real-world model. Not everything in a MMORPG is based on rewards of money or quests. Rewards are based on either, quests, time or money. Each of them will take time and will reward you differently. You can break the class up into 3 groups. One group will have to work and get their reward. Another group will have to volunteer and get their reward while the last group could be forced to do nothing and get a small reward. You could then discuss how each group felt during the process and if the reward was worth it.   Wed, 1/16/08 10:52 AM

5.   Part of this question refers to the world-setting. Games such as eve-online provide a fantasy-space setting. Games such as World of Warcraft provide a tolkien-esque setting. Students enter the game (story) and act as if they were a character in that story. The other part of this question discusses the inherent learning that happens when kids play a game. Context almost doesn't matter when kids are playing games in education – as long as the game is good, and kids are inside the lusory space of the game, they will learn – simply playing, they are learning. Your point about students taking on another role is especially important. games are quite unique in this way; they allow for a very safe, very free exploration of another identity.   Wed, 1/16/08 9:57 AM

6.   2. The issue of transfer from MMORPGs to the real-world is complex. The virtual context may be more like the real-world than the abstract and arid setting of the classroom, making transfer more likely. However, for entertainment purposes MMORPG often distort or exaggerate aspects of the real-world, leading to mislearning and misgeneralization (e.g., people trying to solve real life relationship problems by modeling potential solutions in The Sims). Also, transfer needs to be scaffolded through reflection (e.g., only some aspects of leading a WoW team to kill monsters transfer to leading a business team in the real-world), an aspect that MMORPGs do not stress.   Sat, 1/12/08 7:27 AM

7.   All the responses above are very valid. I don't think that missing face to face is an issue. The problem is that again, this just doesn't exist. Simulations that are meant to provide specific training, like an airplane simulator, recreate an environment where everything is known. If you push this button, you crash. However, the most complex situations are ones where there is no answer, so simulations can't be created. MMORPGs might give the "feel" of a historical period, but then what. If you are still trying to deliver content, there is a disconnect. Fri, 1/11/08 2:35 PM

8.   Nothing to add Fri, 1/11/08 7:14 AM

9.   If they are designed either to be tools for communication, data collection, then they can be open environs for study like second life. If they were to be designed to allow for performance assessment, that would be very significant in adaptation for education; it would also be good if an educator could design for instruction in MMORPGs as well as allow students to build and create target variables for collection and assessment.   Thu, 1/10/08 11:50 PM

10.   I really like the idea of period emulation in MMORPGs and think that this could be of immense usefulness, provided that the framework for the historical context is complete. The real-world training would be tricky, I think, because not all aspects would be their actual real equivalent. Things like business decisions, customer cases, or consequences of actions can only be limited to the game mechanics, where the real-world is unique in its dynamic responses. The best I think could be hoped for in the case of real-world training via a game world is a basic understanding of the underlying principles. Being a security guard in a city online does not prepare you for being out in the cold at night on precarious icy footing while you patrol client property in the dead of winter. The game environment is inherently "safe" where the penalty is "starting over". Real life is much more unforgiving of large mistakes.   Wed, 1/9/08 2:00 PM

11.   MM's like Second Life and WOW are certainly fun to play. Putting them in context of classroom curriculum in some areas of study would prove difficult. With my limited play time of MM's I don't see a fit with Chemistry for example. Some subject areas are just not a good fit. Therefore, the use of MM's would be difficult to implement effectively. Thus running the risk of being just a game and not a tool for learning. Wed, 1/9/08 11:03 AM

12.   MMOGs are not just leisure activities and are unlike passive mediums such as television and film. The game itself is often highly educational as players are active participants in learning and engaged in gathering, using and experimenting with knowledge to make it meaningful, organized, and readily accessible. Games provide a way of learning by doing. As your avatar participates in the story, the player gains real-life knowledge, experience and membership in communities that are playing together: • To move the on-screen character (such as with a keyboard, mouse, joystick or dance mat), the player must react to visual and audio clues. Manual and mental dexterity improve and become more agile through the coordination of hand-eye movements during play. • Many physical benefits follow from video games such as www.DanceMela.com which enable the player to exercise while playing. By stepping the dance mat to the beat of the latest Bollywood track, the avatar dances with other player avatars on screen. Similar games are being used in schools across the US to help kids become physically fit. The Nintendo WII has revolutionized game play by tracking player movements in real life that directly controls the on-screen avatar which is competing in a game of tennis, boxing, or adventures in vast fantasy world. • MMOGs require cooperation rather than autonomous action. Each player must negotiate and come to agreements with others to achieve goals. Players can gain important social skills such as communication and

negotiation that later become assets in business and social settings. • As the game progresses, the virtual world changes. Greater challenges emerge with harder obstacles to overcome. Each person must balance their resources (i.e. in-game money, food, clothes, etc.) and prioritize their actions to ensure their avatar's health, the success of their groups, and survival in the intricate virtual world. By managing multiple objectives and understanding the in-game rules and economies, players improve their decision making processes. • Each participant becomes a valued member of their online communities by providing skills needed in the group to satisfy a coordinated division of labor. Being valued for individual contribution is both enjoyable and builds personal confidence. Respect for individuality and concern for the needs of others are just a few examples of the lessons learned. • In general, playing games can help people cross the digital divide by lowering the barriers to learning the basics of computers, email and chat through playing together. MMOG game play is not about singular goals and becoming the best. Instead each avatar works towards common goals, shares experiences, gaining skills and managing resources. Unlike single player games, Multiplayer Online Games are not just about getting a high score and solving a single puzzle. Victory is loosely defined because the game is never over and the story is ever-evolving. In fact, the main game is often a small part of the entertainment and the benefits of playing reach far beyond the obvious mechanics of making your character move and interact. At the bare minimum, MMOGs require focus, patience, and experimentation in a safe virtual world, where learning and fun is coupled in play. Problems that may be associated with MMORPGs is when others chose to pollute the environment, say and do things that may be objectionable, or if the game is not designed well enough to ensure that what is being taught is accurate and appropriate. Certification of games and monitoring of use can quell some of the negative affects. Wed, 1/9/08 12:06 AM

13.   Well, one obvious solution is to have the learners meet F2F *before* they play the game. It's not obvious WHY it must be multiplayer, unless 'leadership emergence' is one of the learning goals. However, we know collaboratively solving problems can be powerful learning, but you need to ensure the task requires collaboration and cooperation, I reckon, or some might not need to, and consequently not, participate. I'd suggest again that designing the theme, goals, and available resources and actions is a critical element in making a successful learning context. And, of course, 'sweating' the details: ensuring the interface is easy, tuning the challenge, etc.   Tue, 1/8/08 6:39 PM

ROUND 2, QUESTION 3

1.   An MMO could be positioned to allow people to act in different ways or see things through the eyes of others. As such we could focus the learning to such things as how to deal with various social classes and races, or how to work together with people you wouldn't normally deal with.   Thu, 1/17/08 11:26 PM

2.   Activities in virtual environments can range from the highly collaborative to the highly competitive. That depends on the educator's expectations and objectives. Certainly, both of these modalities can lead to positive and negative social interactions and that cannot be engineered. However, the negative in the short term can lead to an opportunity to provide the student with strategies to cope with such negative activities that will be encountered in life.   Thu, 1/17/08 12:53 PM

3.   A really good program developer would build in a "reflection" area (like the home-base concept seen in World of Warcraft) or requirement for "leveling-up" that could help students remain engaged, and collaborative. If the goal is to beat the game and not other players, this should be easy to facilitate.   Wed, 1/16/08 5:02 PM

4.   It might be valuable to gather all the different types of people that play MMORPGs. You can have a group of gamers come into the classroom to meet the students. This would be a group of well chosen people and would represent a cross section of society. Also, my previous examples of classroom based quests would be a good way to introduce the MMORPG with a face to face angle. The downside would be any person you bring in from the outside to meet a student could possibly pose a risk of not being a good person. There also might be a negative effect if one of these people embarrass or call a student out in front of the class.   Wed, 1/16/08 11:27 AM

5.   This is a difficult question to answer, in that cooperation and competition are completely intrinsic to MMORPG's. I don't know what a teacher could do to further encourage cooperation or competition (other than set up and out-of-game incentive to cooperate or compete). While the games can be played solo for a brief time, inevitably, in order to progress, players must work together. This is the cool thing about MMORPG's – they are inherently "Vygotskian" in their constructivist approach. The idea of facilitated collaboration is very interesting, and seems like it would be a great way to use MMORPG's. As far as problems, see above (I'll copy them again here): 1) Some students don't like / aren't good at computer games 2) There will be some students who risk developing unhealthy relationship with the game 3) Parent and peer non-understanding of what games are and how they can be used for learning (they are just playing games). 4) If there isn't correct support (technical and pedagogical) then the "education" simply won't work – the essence of the activity will only be playing games.   Wed, 1/16/08 9:57 AM

6.   3. Research shows that blended learning experiences are more powerful than purely face-to-face or purely mediated communication. The limits of mediated communication skills that MMORPGs can build could be transcended by complementing these mediated experiences with face-to-face interactions, perhaps by a network of local

groups for enthusiasts to discuss the MMORPGs in direct interpersonal interaction.
Sat, 1/12/08 7:27 AM

7.   In a classroom, it would be up to the teacher to situate the social learning in an
academic context and to provide reflective activities so that students see that social skills
translate to other parts of their lives. The problems of antisocial behavior might happen if
a teacher loses control of the activities, or if there is secrecy involved. I think the teacher
and students together should negotiate the social rules in real life, and create their own
justice system for infractions. Secrecy and allowing power struggles to take place will
sink this. (and the power struggles could take place teacher /student or student/student.
Fri, 1/11/08 2:39 PM

8.   My greatest concern is the male-dominated world of commercial MMORPGs. In
order for the use of game worlds to be successful, some must be designed by and for the
female population. Women are generally the more social animal of the species and their
input and involvement is needed to balance out the male dominance. Problems:
Continued focus on shoot 'em ups will alienate most female students and teachers. I
would not eliminate this element, but rather include girls and women in the development
and find out what will engage them. A balance of design is needed – while I am not
drawn to games with monsters and aliens, I am also not interested in an MMORPG that
allows me to be the Project Runway judge for Barbie's latest styles. So, by providing a
social context that is not gender-bias based we can readily apply good social learning
approaches without alienating either gender. Fri, 1/11/08 7:20 AM

9.   They should be deisgned to use the opportunities and constraints in the system.
Again, the medium is not the important piece, it just adds some new twists with time,
communication, and visualization, and the potential for AI and assesment   Thu, 1/10/08
11:51 PM

10.   Supporting the socialization in MMORPGs is normally done through a "friend
network", where the player knows which of his/her friends are online at any time and can
converse with them regardless of where they're at in the game. There are also groups that
can be formed ("party")for the purpose of taking on a significant task where the members
of the group can converse with each other while talking to distant friends. There is also
some public channel where anyone can converse with anyone else in the general public at
large. This framework works across several MMORPGs, including World of Warcraft,
City of Heroes/Villans, Everquest, etc., although one cannot normally converse with
someone outside whatever game they're in unless some external chat software is used
(and some do exactly this). The competition element comes in through the use of PvP
(player vs. player), sometimes with rewards for high numbers of opponent players

defeated. Some games have restricted PvP in zones or maps, while others encourage PvP everywhere, including capital cities. The problems that areise from being able to talk to friends when online is that the child gets used to having their friends at their fingertips without having to coordinate time/place where a friend could physically visit. The child becomes accustomed to "instant access" and develops a lack of patience in other areas of his/her life. My daughter is a case for this (using just a chat feature, not an MMORPG) as she enjoys constant contact with her friends online. We restrict her access to certain times of the day, but she is of the mind that her friends are just waiting for her somewhere in cyberspace, ready to chat at a moment's notice. She is impatient when she asks her parents for something and expects instant results. Same with my cooking dinner. She waits about 5 minutes, then asks if it's ready. It seems to me that being more plugged in equals less patience. The downside of the PvP is that it may foster too much competitiveness and cause those who lose emotional distress. This can also carry over into the real-world, as the social network can be damaged when one is ostracized for being less competent at PvP (even online name-calling can break into the real-world). This can easily lead to the bully/victim problem, even affecting one who would not normally be targeted for such social negativity (such as a football player). Wed, 1/9/08 2:55 PM

11.   I think this area is the most powerful for MM's. The social learning that can take place is incredible. Even though the interaction may not be face to face does not mean it can't be effective. This study is not being done face to face yet we think it will be useful and effective. Interaction between AVATARS in the game provide endless teachable moments. Some of those moments can be about culture, society, norms, values etc. Having the student engaged in the game will provide teachers with ample opportunity to discuss activites face to face. the problems that come from some of interaction in games probably comes from students will do things inside of a game that they probably wouldn't do outside of the game. This can be both a posivite and negative by providing many discussable moments. Wed, 1/9/08 11:10 AM

12.   MMORPGs are not a replacement for face-to-face communication, but can surely help in improving the communication skills. The social, learning needs of each person are different; MMORPGs provide an alternative means for reaching a child less adepts at interpersonal communication, reach to rural areas with less access to competent educational practices, and may enable anyone to improve on the communication skills they have. Problems can occur with competition when the student player associates too closely with their character and the game. In the end, this is a virtual world and their avatar represents a small portion of the player's personality and interests; this needs to be reinforced with the player. Competitive loss is a reality of both virtual and real-worlds, and so how to deal with this and competition in a healthy way is an important lesson. Loss in an MMORPG is one more step removed from physical competition, and should

therefore be more easily to see that loss is apart of the process and game and not related to personal inadequacies.   Wed, 1/9/08 12:33 AM

13.   One of the statements you make, that MMORPGS can constantly challenge a player isn't quite true, as it can't adapt for one without affecting the others. In MMORPGS, one can search out challenges, but a player can take on too big a challenge, and be frustrated. Now, on to your question: MMORPGS can be used specifically to support social learning by building in goals that require collaboration to solve, such as the players having different characteristics. However, the massively multi-player environment could (and should) be scaffolded with ways to track decisions in tasks and allow conversations and comparisons around them. One problem is, of course, that if it's truly 'massively' multiplayer, you might have trouble getting people to play all the appropriate roles for everyone who needs to participate. Also, most massively multiplayer games seek to support at least several of the four proposed player types (socializer, achiever, explorer, troublemaker), and that's a bit of a contrast to your proposed goals, unless you wanted to actively track and show them their interpersonal style and allow/encourage them to explore other styles. This could be facilitated by allowing them to chose an 'anonymous' persona that can't be tracked back to them by other players.   Tue, 1/8/08 6:57 PM

ROUND 2, QUESTION 4

1.   Virtual environments are just tools – it is up to the educator to design assignments that practice these skills. If the educator does not pay attention to what the students are learning based on the assignments that could be a negative. Thu, 1/17/08 12:56 PM

2.   I cannot add to the above. A good way to manage the risks of "cheats" is to build them into the game eg. teach "modding" as a way to move ahead, and build in assessment that discourages the negative behaviors. Twenty-first century learners look for work-arounds and short-cuts as that is their modality and their birth-right! They have never known other ways in which to access information so give them a way to move at "twitch-speed" (Prensky)and they will build a better mouse trap.   Wed, 1/16/08 5:08 PM

3.   To be successful in a MMORPG, you need to research and develop skills to effectively not only find information, but, analyze if that information is correct and complete. Student already do this all the time in the classroom and it would be simple to draw examples and comparisons. As for cheating, many makers of MMORPGs will cancel the accounts of people they find cheating. I find this very real-world.   Wed, 1/16/08 11:49 AM

4.   You know, again, this happens so intrinsically – it's difficult. When kids play games, they are using a computer, and learning a highly complex system. They are interacting with symbols, working with people, literally, across the globe, and are

communicating using all the classic 21st century tools. When looking for a problem, they google, wiki, and read forums. There is absolutely no question playing a MMORPG builds, strengthens, and develops 21st Century skills. After all, what could be more 21st century than a MMORPG?   Wed, 1/16/08 9:58 AM

5.   4. I am skeptical of claims that MMORPGs teach the 21st Century skills the introduction to this question lists and challenge the other panelists to produce research documenting this. Also, the issues with transfer I raised in question two certainly apply here. The focus of this question is more on ethical considerations, and MMORPGs have few scaffolds for teaching that "cheating" is damaging to both the player and other participants. This will always be an issue, because the primary reasons players are involved in MMORPGs are for entertainment and for social recognition for in-game accomplishments (whether attained ethically or not), rather than on learning and on morality.   Sat, 1/12/08 7:27 AM

6.   I'm pretty suspicious of the whole "21st Century skills" in the first place, they hardly seem new. Anyway, the types of skills you've listed are enhanced by using games, simulations, and allowing students to experience real-world systems. I think that an MMORPG could be used to develop those skills, but so could a stock-picking simulation. I don't think that an MMORPG has any specific problem that would come up affecting this.   Fri, 1/11/08 2:43 PM

7.   By just moving students away from paper, pen, and text book as their only source of information for learning, we will help them develop 21st Century skills. The interactions, problem-solving, and play that occurs in the game world can be designed to parallel real-world situations. Fri, 1/11/08 7:21 AM

8.   21st Century skills are the same as 20tyh century: critical thinking, open mindedness, curiosity, creativity, and play. The games are just tools, what matters is what we do with them. If they are just used as new economies, that would be boring.   Thu, 1/10/08 11:53 PM

9.   MMORPGs certainly do help with critical thinking, problem solving and computer literacy. One must learn the layout of the keyboard in order to chat with any speed. My 2 nephews did not have any real computer experience before playing World of Warcraft. Now, they are familiar with at least some of the PC's internal components, like the video card. They can type quickly enough and are familiar with the standard WASD-mouse movement techniques. They are overall more comfortable with using a computer from playing the MMORPG. They are sometimes bombarded with "gold farmers" trying to sell in-game gold for real money. This is something World of Warcraft game publishers consider cheating and is a bannable offense (for both the gold farmer and the purchaser). A path to easy riches for only a few american dollars. It is quite easy and tempting, and many players succumb. There are usually a small number of any online community geared to thinking about ways to cheat the game to gain status or virtual gear.

Once these undesirables gain a foothold, it can be difficult to get rid of them. Meanwhile, they ply their dubious trade or scam players outright. Something like this would most definitely take away from any educational experience and may even turn people off from playing MMORPGs entirely.   Wed, 1/9/08 3:35 PM

10.   MM's do teach students 21st Century skills. Computer usage, online communities, digital creations, digital communication are all things of our current world. Like it or not kids need to learn how to manage these things inside their own lives. Their is a gray area out there when it comes to cheating. We all do things in our lives to try to make acheivement easier. The desire to get ahead is natural. Getting ahead by any means is not. Is "gaming the system" really a negative? Don't a lot of us do this in real life anyway? Wed, 1/9/08 11:19 AM

11.   My previous responses illustrate some of the more specific 21st Century skills and the intro paragraph to this question is quite correct. This can be a new arena for leadership, fellowship, management etc, such like with Simulation Games like aviation and military teach to deal with transfer of knowledge for flying and dealing with exceptional situations. So MMORPGs can be very effective in teaching. Cheating happens in the real-world and games (college students can buy research papers and test answers). It is a fact of life and as important a lesson to learn as anything else. The process of playing should be educational, and MMORPGs tend to be more focused on an elongated process than just on winning. Because the objectives are complex, often related to working with others, and extend over long periods of time, there is less incentive to cheat, especially if there are consequences within a moderated world. Many new games have communities which moderate themselves and ostracise those who don't play fairly, much like a local community. Law and rules that apply to everyone should be monitored and enforced to assist in the continued benefits and value of the learning space.   Wed, 1/9/08 12:43 AM

12.   The way in which 21st Century skills can be taught (and you have to carefully consider whose proposal of those skills you use) is to provide the sorts of tasks and tools you expect them to use, ensuring that the focus is on using the tools to accomplish tasks, not on the tools themselves. And you need problems to solve that mimic the problems they'll be facing (ala Jonassen). Tasks that require research, experimentation, solution design, evaluation, communication, and providing them tools that are analogical to real tools but focusing on the underlying representation. Magic as a metaphor is a powerful opportunity to convey the richness that the 21st century will provide (Clarke's "any truly advanced technology is indistinguishable from magic"). They might need to capture data simultaneously from several different sites to detect patterns, requiring cooperation, and then require multiple skill sets in the world to solve that no one has enough time to master all of them. One problem is in not explicitly facilitating transfer, and assuming they'll 'get' the connection. Of course, the world might be used for other than the intended goals if you don't design them compellingly enough, and of course, the 'gaming' problem you mention (though 'problem generators' might solve that). The

worst problem is perpetuating any unsavory social behavior, e.g. bullying, into this new environment. But that's a factor of the culture around the environment rather than the environment itself.   Tue, 1/8/08 7:08 PM

ROUND 2, QUESTION 5

1.   I know you want one, but on the cost issue I simply disagree with the statement. I think an MMO could easily be cost effective and people would be interested. Time is a big issue. Those that cannot spend 5 hours a day playing WoW find they are left out. Only the kids seem to have that time while those of us with jobs and our own kids are lucky to get in an hour each night. The time it takes to implement an MMO educational game isnt great nor is the potential time to learn it. If you build it right they are learning while they play. The biggest thing would be the amount of time required to play/learn in any given day and how to fit that into your schedule. This question will always arise and be further complicated by the fact that we would be looking to make available nationwide or world wide which adds the additional complication of various time zones. However, it works in MMO's now, so it should work in an educational MMO arena as well.   Thu, 1/17/08 11:33 PM

2.   Time: The amount of time needed to implement such a game may be the greatest cost, including the time for students to learn the game and to spend time on the less educational fun elements of the game. MMORPG game play also does not fit neatly into traditional school schedules. When getting started in such activities, get as much assistance as possible from those already using these technologies in their teaching. Start with something simple and tested then branch out and evolve. No need to be over-ambitious trying to reinvent the wheel and ending up with a stalled project.   Thu, 1/17/08 12:59 PM

3.   Resistance: This difficulty in many ways faces all teachers who are pursuing ed-tech at this time, as the "immigrants" are still firmly entrenched, and many won't be swayed to learn or accept new technologies that are so inherently foreign to them. The level of change required is great indeed, but I believe we are moving inexorably toward it. It is incumbent to those on "the cutting edge" exploring these possibilities that will change the face of education, (Hopefully sometime before I retire!) :-)   Wed, 1/16/08 5:21 PM

4.   I believe Reflection would be the most important. Educating students on the correlation of what they do in a game and how it compares to the real-world might be very eye opening to them. Also, when they leave the classroom, there will be a good chance they will bump into a real-world situation and realize that they had virtually done the same thing (teamplay, effective communication, leadership) years ago. Wed, 1/16/08 11:54 AM

5.   cost: no, nyet, nie, nien, no. we must stay away from "education games" Blech. They inevitably suck, and totally miss the point of "games". It's far better to use a CTOS game, for tons of good reasons – but listen, man. Teachers can't make games. That's why they (we) are teachers and not game designers.   Wed, 1/16/08 10:01 AM

6.   1. I think the most important current issue is the absence of reflection. The military has elaborate, well conceptualized after-action-review strategies to maximize learning from their battle simulations. The intellectual skills educators would want MMORPGs to foster are more complex, yet no comparable models have been developed, and most educators who advocate gaming as learning ignore the issue of reflection being key.   Sat, 1/12/08 7:27 AM

7.   I'm a little unclear about the question, what do you mean by "most important" – most important to creating a constructivist environment or most important to getting them accepted in schools? It seems like time, resistance, cost, and infrastructure reflect the problems of adoption. None of these could be seen as benefits, which makes me think I don't understand your question. All these issues could be gotten around by determined teachers. So therefore, logistics, resistance, cost, and time aren't the most important factors for a single implementation. Large-scale is a different story. Social change relates to a concern about potential game bias or design, or a benefit if you agree with the bias. I don't think that's the MOST important thing either way. So I guess I'm left with reflection as the one selection. IF you solve all the adoption issues, MMORPGs will still fail without expert teacher guidance, primarily represented by the things you've grouped as reflection. The benefit is to enhance the classroom experience, and this is the key to that. And I suppose that as a concern, if you've managed to solve all these other unsolvable problems, and the teacher fails to provide reflective activities surrounding the MMORPG, you've still failed. So, final answer, I'll pick reflection. I think for MMORPGs to provide real benefit in creating a constructivist learning environment, it's the skill of the teacher/leader to create a context that takes the MMORPG use beyond the clicking. It's also the "last mile" in the chain of concerns that block potential MMORPG use for real learning.   Fri, 1/11/08 3:01 PM

8.   I believe that Resistance is the most important issue to deal with. Without acceptance of this approach, the ideas will never come to fruition. Unfortunately, resistance to effective teaching methodology is nothing new – maybe we need to approach the resistance from a different angle. How about using a MMORPG and students to solve the problems feeding into the resistance to change? Could students and teachers come up with new theories of change as a result of a game?   Fri, 1/11/08 7:26 AM

9.   Benefit: Other: Other potential benefits of MMORPGs as constructivist learning environments may include the ability to easily collect rich assessment data, to be a cost-effective means of distance education, to allow students to develop design skills, to improve student reading fluency, and to better serve special education populations. Other

potential drawbacks or concerns related to using MMORPGs as constructivist learning environments include the difficulty of assessing student game play and the possibility for cognitive overload in students learning and playing the game.   Thu, 1/10/08 11:54 PM

10.   I think that the Infrastucture & Logistics theme is going to be the most difficult to implement. I also think that this falls somewhat under cost, as the schools must purchase the necessary computers and install networks, as well as provide bandwidth for the game to be played. Hardware and software maintenance would require its own dedicated team of experts. If the students were expected to engage in online play outside of school, not everyone has access to a computer (or the internet). Kids hate feeling left out of any kind of fun. An educational MMORPG run by the school system might not be as fun as commercial software, and will have to contain some sort of age-appropriate filter. Fifth-grade students should not be able to log into World War 2, for example. Trying to actually set up an MMORPG as a school tool would be a monumental task, even in planning.   Wed, 1/9/08 3:50 PM

11.   Resistance: In my use of COTS games in the classroom I have encountered only mild resistance. However, I would be seriously concerned the the use of MM's would find more pressure the COTS. I do think I would also find that I would have tech problems with the state of the art games that are on the market now. The violence level of games like WOW would also pose a problem. So overall selling the MM would be much more difficult than selling the COTS. Wed, 1/9/08 11:24 AM

12.   Guidance is critical, as it preserves the integrity of the game, learning environment and debriefing would be good but may not be necessary, if the game still is a beneficial teaching tool. Debriefing can help maximize the learning experience, but should not be necessary and may detract from the other benefits of providing an educational environment that is scaleable to operate, and independent enough for the student to move at their own pace. There is always resistance to new methods and tools. When I was teaching computer education in NYC public schools in 1990, teachers were against the new systems as they felt their jobs were threatened and they were not able to learn the new technology. However, there were measurable realized benefits from the education gaming that eventually won out and got the board of education to roll out technology across all schools. I suggest, chose the game right MMORPG that is not too violent and is challenging enough, and monitor it. Many publishers will help setup a secure area just for students and other limited communities. I don't think we need to have much evaluation of game play or worry about overload. Let learning happen, without measurement or other hindrances.   Wed, 1/9/08 2:07 AM

13.   I'm not sure if it's 'reflection' or 'other', but one of my concerns is having teachers able to not only to effectively incorporate this activity into the classroom, but scaffold the resulting reflection. It's the *ability* of the educator to guide. It also depends on the tools to capture the experience and represent it for the processes of discussion. It's

reliably a problem for teachers to be capable of incorporating technology into the classroom and scaffold effective reflection, and this isn't going to be any easier!   Tue, 1/8/08 7:13 PM

ROUND 3, QUESTION 1

1.   I believe the last statement, "Also, the engaging elements of the game might lead to a loss of focus on educational goals" to be untrue as the learning outcomes would/should be embedded within the gane structure ergo, if the game is written with the appropriate learning outcomes, and by an experienced game developer, there will be no loss of educational goals or student motivation. In a discussion assignment with my middle school class this week, when asked "What should schools do to make you engage and be more self-directed in your own learning?" the answer was the same from every single student group, "Make learning a game." When queried about the type of game, the response was "any kind". The discussion continued with students expressing that even a "drill and kill" tupe game would be preferable to the current methods of pedigogical delivery.   Sat, 2/2/08 3:14 PM

2.   Also, the engaging elements of the game might lead to a loss of focus on educational goals. Alternatively, a focus on educational goals might reduce the motivational power of a game. In addition, video games are not appealing to all students, and may require skills (or time) that not all students have. Even among the students that are "gamers" not all are attracted to the same genre of games or to MMORPGs in particular. Although I understand the arguments, as a game designer and an educator I feel that proper effort put into the design of the game would negate that concern. Also in game development we go through iterations of testing, alpha, beta, etc and we could, and should, find and correct any such issues that arise. I believe I mentioned before, that an MMO meant for education could easily have multiple paths and ways of doing things. This enables those with "Skills" to do one thing while those without do something else, yet both achieve the same goal.   Fri, 2/1/08 9:19 PM

3.   I chose this statement: "MMORPGs can, however, also motivate players to endure the drudgery of repetitive simplistic tasks for the sake of "grinding" for experience and advancement in the game. If this is to occur in an MMORPG used for educational purposes, the experience of "grinding" must also be educational in its own right." to disagree with. I have a big problem with the whole "grind" aspect of MMORPGs. Just because it's the accepted norm for the genre doesn't mean it's good. This also plays a part of the addictive nature of MMORPGs: gotta get that next skill level or that better sword or finish this FedEx quest series just to do another. Maybe in putting together a game focused on education and real-world experience will encourage developers to think outside the conventional MMO box and design something more elegant and intuitive while preserving fun, if not enhancing it. The grind keeps you in the game while you pursue your virtual social networks. At times, the grind overshadows the social aspect as you strive to "achieve" in the game.   Fri, 2/1/08 7:57 PM

4.   The statement about grinding being educational may be true. However, I believe the grinding type learning that is referred to is what teachers try to avoid in the classroom. Alleviating the mundane and breaking routine is important to keep the classroom fresh. If the game were being used in a manner where the grind become a possible outcome of daily lesson plans then the game is not being used effectively or the the game itself is not effective.   Fri, 2/1/08 6:45 AM

5.   That the "quest system" could be put to educational use. That design is not only "nontrivial", it might be impossible. I just don't see it happening. There are often so many paths to success in MMORPGs that it's highly unlikely that this could be aligned to even the most progressive curriculum.   Thu, 1/31/08 9:49 PM

6.   While I basically agree with all of the statements, the one I come closest to having issues with was, "The possibility of players becoming "addicted" to the game or having "an unhealthy relationship with the game" is another common concern. However, if there were clear set learning outcomes that defined stopping points (or an end) to the game, this risk could be mitigated." I think there are personality and environmental precursors to addictions of any type and this would also apply to computer use and MMORPGs. Just because students are given the means and time to play the games, even for educational reasons, they will not necessarily develop an addiction.   Wed, 1/30/08 1:31 PM

7.   I agree with everything here, but choosing the most difficult topic, I would say that the quest system is the hardest to implement in a way that translates to specific educational goals. The skills gained by characters in a game are not necessarily mapped to real life skills, and if they are, then this could detract from the fun. For example, solving an equation in a game to teach math skills might be tedious. However, some problem could be formed in different ways to reach the same end. For example, I see before me a bunch of squares with different probabilities of a negative action occurring. To cross the map, I need to take the least dangerous route to better my chances of staying alive. In this way, a student may learn the complexities of probability theory without having to solve an obvious math problem. To learn history, one may have to come up with a battle-plan like a famous general, etc. The education aspects need to be interactive and apart of the narrative so they don't appear as another rote lesson. If woven well into the game play and story, many lessons can be learned without detracting from the fun. This is the challenge from a game design perspective and in creating a game with "Educational Value." Mon, 1/28/08 4:20 AM

8.   I wished you asked what we AGREE with – there are so many good points here. I suppose if I have to disagree with a claim, it would be the idea of self-directed creativity and exploration. The point is correct, however I think it is on quicksand – that is, without an educational objective (or learning goal, or "big question") hanging over a kids head, there will be a tendency to simply not think about what is happening in the game world, and the educational experience will devolve into just playing (which is education –

it's just games in education can be so much more than "just playing"). Again, my quibble with this point is minimal – I think we need be very careful about structuring the learning activity.   Sun, 1/27/08 6:49 AM

9.   I don't disagree strongly with anything in the above summary. The statement that I think needs additional clarification is: "Opportunities for self-directed creativity and exploration might appeal to other students. The ability to take on a new role or identity within the game might also engage and motivate some students. In addition, the nature of MMORPGs could provide students accustomed to on-demand entertainment with an on-demand learning medium. However, the content of the game, including the theme and specific experiences or encounters, will need to be as compelling as the medium in order to effectively engage and motivate students." I would add material here on extrinsic vs. intrinsic motivation. A major flaw in many educational games is that they "sugar-coat" educational material by using extrinsic motivation (e.g., do these subtraction drills and you get 2 minutes on a fun game) rather than tackling the more difficult design task of making the educational content intrinsically interesting (for example, through embedding it in a context where its use is valuable). When considering aspects of a game that build engagement (such as creativity, exploration, identity…), in each case designers should strive to maximize the intrinsic engagement of these activities.   Sat, 1/26/08 1:39 PM

10.   The statement I most disagree with is this: "MMORPGs can, however, also motivate players to endure the drudgery of repetitive simplistic tasks for the sake of 'grinding' for experience and advancement in the game. " I don't think 'grinding' should be included as part of the experience requirements. There are ways to provide rewards for correct responses, and to provide practice, that the learner can determine how much 'grinding' is needed, and can perform in the game if thematically coherent but also made available outside the game. I want to suggest that putting uninteresting tasks in an otherwise interesting world can undermine the engagement and consequently the effectiveness.   Sat, 1/26/08 1:37 PM

11.   I would disagree most with the addiction statement. Having an effective educational game being truly addictive is probably an unlikely scenario and a problem that many educators would probably rather deal with than the opposite of just getting their game used.   Sat, 1/26/08 9:06 AM

12.   Also, the engaging elements of the game might lead to a loss of focus on educational goals. Alternatively, a focus on educational goals might reduce the motivational power of a game. In addition, video games are not appealing to all students, and may require skills (or time) that not all students have. Even among the students that are "gamers" not all are attracted to the same genre of games or to MMORPGs in particular. Because: Good design is just good design. It is not an either/or situation.
Fri, 1/25/08 9:29 PM

ROUND 3, QUESTION 2

1.   The statement that a "MMORPG interface might require students to acquire new skills before being even minimally successful..." does not make sense to me at all! If the game creator is designing the game for a specific culliculum standard, and therfore the grade level for which it was written, negates the notion; the requisite skills are almost second nature to these students. However, if education changes (as it surely must) to better reflect the learning styles of todays digital students, then the aquisition of skills as well as curricular standards could well be accessed by students in a manner befitting their learning differences,eg. non-linear and non-scaffolded. The availibility of materials (new games) when students feel they are ready to tackle the skills (even if they are mistaken) could itself be a great part of the process.   Sat, 2/2/08 3:26 PM

2.   I dont really disagree with any of those assertions.   Fri, 2/1/08 9:20 PM

3.   I can't really disagree with anything here, only to cite something that supports this part. There was a news story recently about a young man who saved real lives by using skills he learned by playing a combat medic in America's Army, an MMO that the military uses to train soldiers in a virtual environment. I find this to be incredible and justification for this study that real skills can be learned virtually and applied with success in reality. This does not, however, support the content of the commercial MMORPGs that focus solely on entertainment.   Fri, 2/1/08 8:02 PM

4.   I disagree with the claims that these are riskier environments and that they are most valuable is modelled on the real-world, professional training. First, I believe gaming gives people an alternate way of meeting each other, communicating and exploring new sides of themselves. Many gamers often create multiple avatars and act in different ways thus allowing them to explore different sides of their personality. Some people make their game characters destructive and have other characters that bond and assist groups of people. Many male gamers chose female characters. Their reasoning is that in the game, as a female, people's behaviour towards them offers advantages (such as many players give female characters gifts). Whatever the reason, players are able to explore different sides of their personality and how others react to them. Thus games can be a very effective way of teaching communication skills and a variety of soft skills. Immersion into a fantasy world is a natural way of learning. It is exactly like reading a child a story that teaches them something as apposed to reading a history or science book. Playing a game should not necessarily be modelled after the real-world to teach, on the contrary, escaping the real-world to explore and learn on your own lessons that can be applied elsewhere may have better results.   Fri, 2/1/08 10:56 AM

5.   Academic content would absolutely need to be accurate. However, in the game Making History students start at an accurate point in history and then they Make their own History by the decision they make. The teacher then needs to be able to redirect and reteach students as to the real events of history. MMORPG's, with their unlimited players

and variables would make it difficult, but not impossible to achieve the standard of accuracy that schools are expected to follow. Fri, 2/1/08 6:49 AM

6.   These are all hard to disagree with, since most of the statements contain caveats. But to pick one, it would be that the MMORPGs might be most valuable if modeled on real-world professional training. What professions would be modeled? These jobs are too specific to be very useful or interesting to most students. Plus, simulations can only be created when every possible interaction is known. Hopefully, though, we are teaching students how to find answers to questions that aren't pre-determined.   Thu, 1/31/08 10:01 PM

7.   I disagree with "MMORGPs might be most valuable if modeled on real-world professional training, such as internships. The reward system in most MMORPGs might lend itself to this sort of design, as success in these games often requires hard work and considerable time to develop the necessary resources or money. Unfortunately, the MMORPG interface might require students to acquire new skills before being even minimally successful in the virtual context." It would seem that students who are exposed to MMORGPs before going to internships and professional trainings would have a leg up on those who had not. They would have had opportunities to work through authentic scenarios, possibly similar to real-life experiences in the internship setting. Wed, 1/30/08 1:33 PM

8.   Mark, I'm sorry, but I simply can't find anything I really disagree with here – all of it is classic games-in-education stuff. I've carefully ready all the points here, and all of them strike me as correct and valid points.   Sun, 1/27/08 6:51 AM

9.   I most disagree with this: "However, successful transfer of skills may be dependent on the fidelity of the models used in the game, and commercial MMORPGs tend to distort or exaggerate aspects of the real-world for the sake of entertainment." In fact, all simulations remove *some* of the complexity in the world. Commercial games may alter the real-world for entertainment, but effective MMORPG design should also consider altering the world in specific ways to achieve the synergistic effects of education and engagement. Say, if a particular relationship is really important when it occurs, but it doesn't occur that often, it might happen more frequently than a realistic pattern of occurrences. The point being that fidelity is not the most pressing design issue, but rather the learning outcome is, and the world may be altered to facilitate that. To a lesser extent, I'll also disagree with the comment that internships is the best model for MMORPGS, since actual practitioner might in many cases be a better role model.   Sat, 1/26/08 1:43 PM

10.   I don't disagree strongly with anything in the above summary. The statement that I think needs additional clarification is: "MMORPGs might be valuable in providing a safe context for active student learning. Game worlds can be more concrete, immersive, and open-ended than textbooks, and can be used to represent other places, historical

periods, and environments (or systems) that would be impossible to recreate in a classroom, including models for chemistry or other sciences. Moreover, the game world can reach beyond the classroom due to the networked nature of MMORPGs." I think setting up MMORPGs as a "better" alternative than textbooks misses the point that the two are potentially complementary. Games are a great medium for experience and engagement, but to be educational they often require building players' knowledge and skills through supplementary – and likely more traditional – learning activities outside the game that provide content and processes useful in the MMORPG.   Sat, 1/26/08 1:39 PM

11.   I tend to agree with all of these statements but if I were to disagree it would be in an interpretation of the first comment where it says that MMORPGs can be more open-ended than textbooks. In many ways virtual worlds are more limiting than text. Their best use is in conjunction with traditional learning modes such as reading and F2F interaction. Sat, 1/26/08 9:16 AM

12.   MMORGPs might be most valuable if modeled on real-world professional training, such as internships. The reward system in most MMORPGs might lend itself to this sort of design, as success in these games often requires hard work and considerable time to develop the necessary resources or money. Unfortunately, the MMORPG interface might require students to acquire new skills before being even minimally successful in the virtual context. Because: The real-world may not be an optimal media choice. Perhaps role-play would. The power of VR is that you can do things you might not in RW.   Fri, 1/25/08 9:31 PM

ROUND 3, QUESTION 3

1.   "The computer mediated social environment does not provide the same level of interactivity" I have heard this claim, and know that although it may be a factor, the game environment allows for a "psychosocial moratorium" (E.Erickson) that is so necessary for growth and development in adolescents. Additionally, communication within a game or VR platform can create relationships that transcend what may be achieved by the same player in a real life situation.   Sat, 2/2/08 3:35 PM

2.   The computer mediated social environment does not provide the same level of interactivity as face-to-face communication and might re-enforce solitude and antisocial behavior, or accentuate problems such as bullying, creating new channels for certain individuals to be ostracized. Also, a player may come to identify too strongly with their avatar, which represents only a small portion of the player's personality, a fact that may need to be communicated to and reinforced for students. Everything about this can be confirmed and refuted at the same time. Whereas face-to-face interaction is extremely valuable, the computer interaction can also be valuable plus the computer will allow those that are shy much more opportunities than it does for the already outgoing. Being associated with an avatar or a screen name is not much different than a nickname and certain types of clothing that we might see today. For example the "jocks" are usually

wearing the same similar clothes everyday, as are the preppies, the punks, etc. That is their everyday real life avatar.   Fri, 2/1/08 9:35 PM

3.   I should point out here that students who choose to "go against the grain" and play roles counter to educational goals have personal/behavioral issues that begin outside the classroom. Properly done, the MMORPG might help in addressing these issues and have a positive effect on the disruptive student, which may also translate into improving the student's own social environment and how he/she relates to it. A tall order, I'm sure, but it is at least theoretically possible.   Fri, 2/1/08 8:09 PM

4.   I don't see the major threat of games creating new channels for individuals to be ostracized. Again, anonymity is the norm, so in real life they would not be ostracized for their behaviour, most likely, and they could always create a new avatar and re-enter the environment.   Fri, 2/1/08 11:07 AM

5.   Bullying, peer pressure and ostracism are all issues that students deal with. However, the essence of an MMORPG is the AVATAR is the active "being" in the game. If students can become someone or something else inside of the game then the competitive shortcomings should not have a large impact on the real student. The digital AVATAR would be the one struggling with the competitive issues. Fri, 2/1/08 6:53 AM

6.   I don't think it would be a problem that a player would identify too strongly with their avatar. I just don't see the time that schools would devote to this would be enough to have that happen.   Thu, 1/31/08 10:14 PM

7.   The social learning needs of each student are different; MMORPGs might provide an alternative means for engaging a student less adept at interpersonal communication, and might help such students develop new social skills in a safe environment. However, the violent and male dominated social structures of many commercial MMORPGs may be inappropriate for use in an educational setting. Also, if students are free to choose the roles they play, teachers may find that not all roles are filled. In addition, some students may choose to play roles that might operate counter to educational goals. I agree with the first sentence but not the rest. One of the most compelling things about MMORPGs is that every action and role has a cause and effect. Yes, there is violence, it is not the only component of the game and people have hit the top level without killing a single item in the game. While it is a male dominated game, you can choose a male or female character and there are many quests and activities that sometimes seem more geared for a female player. Also, every race and character type can solo and progress in the game and many different types can group effectively and groups struggling to complete things can only learn more about team dynamics, etc. Wed, 1/30/08 5:51 PM

8.   none   Wed, 1/30/08 1:34 PM

9.   MMORPGs can also serve to bring distant learners together in a meaningful way. Yes, this is correct, however, technical skill and technical ability come into play. Most

distance learning programs are about visiting a learning management system (moodle, blackboard, webct) and participating in a threaded discussion or real-tim chat. The typical distance learning environment is a walled-garden. When people are using a MMORPG in the context of distance learning, technical ability, and the ability to navigate through slightly more complex technical problems must be considered. Again, the nice thing about MMORPG is they are generally well-built, AAA titles, and they have devoted resources to helping players get started; however, my point remains, technical issues might screw up MMORPG's. By the way, I think the idea of using MMORPG's in distance learning environments is excellent.   Sun, 1/27/08 6:58 AM

10.   "However, the violent and male dominated social structures of many commercial MMORPGs may be inappropriate for use in an educational setting." My understanding is that most MMORPGs are designed to support three of the four quadrants of behavior: achieving, exploring, and socializing, and that the 'disrupting' is discouraged through design. I think it's important to design educational MMORPGs like this as well, and avoid directly utilizing any design that is focused on violence and gender-bias. This is really the same claim as "Unfortunately, MMORPGs that include competitive elements, particularly PvP elements, may foster aggressive competitiveness and may cause emotional distress for those who lose or do not win.", so I similarly disagree with it. Sat, 1/26/08 1:48 PM

11.   I don't disagree strongly with anything in the above summary. The statement that I think needs additional clarification is: "MMORPGs may also be used or designed in such a way that they allow players to see things from another's perspective. In this way the games might be used to address controversial social issues, to teach about other cultures, or to effect positive social change." This is a good place to start in promoting intercultural awareness and social perspective taking, but these are very complex skills on both intellectual and affective dimensions. A MMORPG alone is unlikely to produce much traction on such transformational shifts in an individual's cultural beliefs unless complemented by a variety of other educational activities.   Sat, 1/26/08 1:39 PM

12.   I disagree most with using virtual worlds to "address controversial issues or effect social change". I think students will see through anything they perceive as manipulation. Sat, 1/26/08 9:41 AM

13.   The computer mediated social environment does not provide the same level of interactivity as face-to-face communication and might re-enforce solitude and antisocial behavior, or accentuate problems such as bullying, creating new channels for certain individuals to be ostracized. Also, a player may come to identify too strongly with their avatar, which represents only a small portion of the player's personality, a fact that may need to be communicated to and reinforced for students. Because: Books and Sports can be just as likely to create this scenario.   Fri, 1/25/08 9:33 PM

ROUND 3, QUESTION 4

1.   The notion of "cheats or chaeating" Is one that is a construct of earlier centuries and engrained in society, therefore abhorent to most educators and adults with no gaming experience. However, the "cheats" that are used within a game system, are really nothing more than a type of coping skill gained through an understanding of the 21st Century skills we have so much dificulty teaching in traditional schools. Game modding would be a highly beneficial addition to the game requirement increasing student skill and content aquisition.   Sat, 2/2/08 3:41 PM

2.   I dont disagree with any of these.   Fri, 2/1/08 9:35 PM

3.   I'll have to select this statement: "Perhaps most importantly, MMORPGs might encourage risk taking by making failure safe and often fun." for discussion. I think that making failure safe undermines the reality of the skill-building and making difficult choices. If the students can make whatever mistakes they choose without in-game consequences, they tend to take the same scenarios in the real-world at a skew. When the student cannot feel the pain of fatal error it is expected in a game environment that he/she gets another chance, or as many chances as needed to finally get it right. This is where I tend to take a harder stance than most in that game consequences for poor choices will adversely affect the character to the point where starting over is inevitable. Current game mechanics make this a difficult proposition at best, as this is not the standard model. Commercial games want you to keep paying that monthly access bill and will do much to make in-game consequences more bearable to the point of mere inconvenience (including character death). Players do not develop the proper cognitive processes for dealing with failure. They fail in the real-world and expect to be given unlimited chances to redo it. When they get refused another chance, they cry about how unfair life is.   Fri, 2/1/08 8:28 PM

4.   It may be true that it is difficult to assess whether or not MMORPGs are successful in helping students to develop such 21st Century skills and transfer them to real-world situations. However, just because we are not good at assessing this or measuring a direct link, does not mean it is not happening. In China, before gaming became a huge hit, the call-center market was declining because there were not enough resources with basic computer skills. Gaming changed this, it provided many people with basic 21st Century skills on technology, social networking, communication and much leading edge knowledge. These skills were often learned as a side effect of the game play. It is hard to draw a direct link but there is a lot of supporting evidence of the 21st century benefits.   Fri, 2/1/08 11:15 AM

5.   Gameing the system. This is a tough topic. I will avoid the word cheat. We all game the system. You are gathering information digitally over the interenet. Doctoral students 20 years ago didn't have that opportunity. Are you gaming the system? I used software to generate chapter tests for my students, it saves time and is a practical skill I have continued to use. Gaming the system...aren't these just kids who have learned to be

more efficient with their energy? Isn't that a good thing? Didn't they find a real solution to a real problem? Inside of a game....is it really cheating. Who didn't figure out how to get unlimited free men on Mario World? Those are skills...look for the hidden..find a way to get it done.   Fri, 2/1/08 6:57 AM

6.   I don't think cheating or gaming the system would be a problem. I also don't think that it would encourage kids to think they can cheat the educational system. If teachers are guiding the experience, gaming the system should be just part of the process.   Thu, 1/31/08 10:24 PM

7.   none   Wed, 1/30/08 1:35 PM

8.   I disagree with the cheating issue; I don't see this as anything more than a footnote of a problem – I think it's trivial and essentially inconsequential. I guess an analogy between cheating on a paper and cheating in a game could hold. I do strongly agree with the idea that playing games builds 21st Century skills.   Sun, 1/27/08 7:09 AM

9.   The claim "However, a potential concern is the inclination of many MMORPG players to 'game the system' or 'cheat' in an effort to succeed in achieving in-game goals. This may reduce the effectiveness of the role-playing experience, may detract from (or eliminate) educational goals, and may encourage students to 'cheat' the educational system outside of the game as well." is the one I have the most problem with. Again, the study seems to assume using an existing MMORPG instead of designing one with the necessary affordances. If you design it right, if they *can* cheat to accomplish a task, they've still accomplished the task! Using the textbook used to be foolishly thought to be cheating, yet in the 'real-world' we laud people who use the appropriate resources (textbooks, Google, what have you) to solve the task. Our model of what performance is has to change. Note also that we could build in more 21st Century skills into MMORPGs, like data collection, modelling, designing, etc!   Sat, 1/26/08 1:54 PM

10.   I don't disagree strongly with anything in the above summary. The statement that I think needs additional clarification is: "MMORPGs might be useful for helping students to develop 21st Century skills such as critical thinking, creativity, comfort with computer use, fluency in multiple media, economic literacy, and global awareness. Success in an MMORPG requires strategic thinking, planning, decision making, judgement, and the ability to react to changing conditions, all while multitasking effectively. Players must balance their resource, prioritize their actions, manage multiple objectives, and understand in-game systems, including the game economy. Even information literacy skills are important as players seek to find, evaluate, and use information (both in-game and from other outside sources). MMORPGs as a genre may be particularly beneficial in for educational purposes because they focus on working within systems and processes rather than on achieving a single win-state. The challenges and systems in the game can be selected or designed to authentically parallel real-world scenarios." These are very complex skills, and a MMORPG in isolation is unlikely to develop them deeply unless complemented by a variety of other educational activities.   Sat, 1/26/08 1:40 PM

11.   "MMORPGs might encourage risk taking by making failure safe and often fun". This is not necessarily a good thing. Real life is full of irreversible negative consequences from inappropriate risk taking.   Sat, 1/26/08 9:53 AM

12.   It may also be difficult to assess whether or not MMORPGs are successful in helping students to develop such 21st Century skills and transfer them to real-world situations. Transfer might be explicitly facilitated by educators guiding students from game scenarios into real-world scenarios. Games will also need to be chosen or designed to include tasks that authentically mimic the real-world tasks and situations in which students will be expected to demonstrate success. Without careful alignment and monitoring students could be transfer learning that has a negative effect on their real-world success. Because: Sure, all of those things are important, but what we are modeling should allow for some variability; high fidelity simulations may be quite boring. Should the player character need to brush her teeth? The promise of games is the fantasy, imaginative, and possible worlds of play. When we remove play, we are just grinding. Fri, 1/25/08 9:37 PM

ROUND 3, QUESTION 5

1.   Debriefing should in no way reduce the scalability, etc. as there should be no assumption that a MMORPG would necessarily be on a global scale. It would be quite possible for a the game to be played at varying levels of global collaboration based on the schools' and students' needs. Debriefing should be part of the appropriate game deveopment and not viewed as a seperate activity or function, as the authenticity of the game play may then be suspect to students.   Sat, 2/2/08 3:46 PM

2.   I dont disagree again. Fri, 2/1/08 9:35 PM

3.   I think that this AAR will be a necessary function in the MMORPG learning process regardless of cost. To simply let students play with no time to examine any aspect of the game or its results will be detrimental to the entire project. This is what will set the game apart from its commercial cousins, the ability to have a constructive AAR as a group with discussions and feedback on experiences and lessons learned. No current online game has this. Independent use would be like homework where you make a report to present the next day or at the end of each week, collectively if possible and open for discussion and comparison. If the project were to be implemented, this aspect would be a "must have."   Fri, 2/1/08 8:38 PM

4.   I agree with most everything here, but if I have to chose the most disagreeable then " Due to the potentially global nature of an MMORPG, they might also provide an opportunity for students and teachers to reflect on cultural differences of others playing the game." Teachers rarely have enough understanding or knowledge of cultural differences. It is a greater concern to have these as lessons to be taught or preconceptions

reinforced by teachers. I prefer to let teachers moderate lessons that are more objective in nature and certainly worry about people attributing behaviour to cultural differences. The deeper lessons of culture is that we are much more alike then different, and the differences are often levelled to some degree within game environments due to the rules and abilities of characters. Clans are often formed amongst cultural groups, but this is more of a matter of comfort and often language/communication. I believe a large value to MMORPG is that you can interact for other cultures, and learn about each other, but lets not attribute the competitive nature of games and their outcomes with the differences in culture.   Fri, 2/1/08 11:25 AM

5.   There is not much here I disagree with. Just concerend with what the perception of frequent debriefing time is. My largest concern for MM's in the classroom is the time factor and the frequent debriefing would add to the amount of time need to be effective. Fri, 2/1/08 6:59 AM

6.   I think that "clear procedures for reflecting on skills" are very well established, there is quite a bit of literature and research about this (not in a game context, of course). Not that it actually happens much, but they do exist. Thu, 1/31/08 10:30 PM

7.   none   Wed, 1/30/08 1:35 PM

8.   Reflecting on cultural differences. It would be reflecting on cultural differences inside the game and not outside the game. For example, we could talk about the cultural differences between the elves and the dwarves (and how is that like the difference between Asians and Latinos). However, I think it would be hard to talk about the differences between Asians and Latinos in the game world – since a very beautiful thing happens in a MMORPG: your IRL doesn't matter your IRL gender doesn't matter your IRL cultural identity doesn't matter all the identities you have in "meatspace" sort of go away when you are playing a MMORPG – it's kind of cool, actually.   Sun, 1/27/08 7:13 AM

9.   I most disagree with "However, debriefing may reduce the scalability, increase the cost of implementation, and limit the independent use of an MMORPG for educational purposes, especially if conducted in a face-to-face format." The statement seems to imply this is bad, but the tradeoff of not reducing scalability, increasing cost, and limited breadth of use is instead to undermine educational effectiveness, which is anathema to the whole purpose. Yes, it's naive to assume folks are good at scaffolding this reflection, but we have two hooks: scaffolding self-reflection, and automating it to some extent. And I'll similarly challenge the claim that there aren't "clear procedures for reflecting on skills". Sorry, but I don't think that's as hard to fathom as you imply. Sat, 1/26/08 1:59 PM

10.   I disagree with the overall tone of the statement: "Without such explicit reflection activities the educational value of playing an MMORPG might largely be lost. However,

debriefing may reduce the scalability, increase the cost of implementation, and limit the independent use of an MMORPG for educational purposes, especially if conducted in a face-to-face format." I believe that debriefing is very important in its effects on learning. The list of caveats implies that somehow these may well outweigh the value of post-game reflection and feedback – I disagree with that assessment   Sat, 1/26/08 1:40 PM

11.   Due to the potentially global nature of an MMORPG, they might also provide an opportunity for students and teachers to reflect on cultural differences of others playing the game. – Online worlds then to have their own codes of conduct, different from the users real-world experience.   Sat, 1/26/08 9:56 AM

12.   Due to the potentially global nature of an MMORPG, they might also provide an opportunity for students and teachers to reflect on cultural differences of others playing the game. How do we know the cultural difference of someone playing behind an avatar? I like to play out my fantasy, explore, and try on new personas.   Fri, 1/25/08 9:38 PM

ROUND 3, QUESTION 6

1.   I agree with all of the above, but would add that we are moving inexorably towards the ability to overcome these hinderances, if at a snails pace!   Sat, 2/2/08 3:49 PM

2.   Funding an educational MMORPG would be expensive to start and difficult to sustain. Even if an existing engine is used, it would be expensive to develop the game and attract players and teachers to the idea. I disagree that it would be difficult to start and sustain an educational MMO. Whereas it might deemed expensive at $3 to 5 million I know that there would be plenty of support to fund such an endeavour which would then be shared across many, many schools. The benefits would justify the expense. As for developing, all you need is somebody with the experience and vision to create the game and there are plenty of people out there that qualify. Attracting players is easy enough if you design the MMO properly from the beginning.   Fri, 2/1/08 9:39 PM

3.   I'll pick on this statement: "MMORPGs require thousands of players to feel inhabited and provide a persistent sense of community." With current engine AI it is possible to have the game world populated with computer-controlled characters (NPCs) and not feel so empty. In the regard of using the game as a scenario-based learning tool, as in reliving a significant time or event in history, the feel of thousands of players would be unneeded and largely irrelevant as the NPCs provide the focus and vehicle through which education is derived.   Fri, 2/1/08 8:47 PM

4.   Basically I agree with the statements except "games would need to be based on nonviolent, appropriate, and nontrivial subject matter and content" Why? The reality is much entertainment is violent, we can not get away from it without banning TV from children, which won't happen. Violence is engaging, and within the virtual, relatively

harmless (unlike to some degree playing American football or rugby). I am not sure the MMO must be nonviolent, in game violence may be an excellent tool to teach many things (including the value of nonviolence) and can add to the addictiveness of a learning environments, and therefore increase the benefits. The same sentiment applies to nontrivial matter. I am not sure how nontrivial would be defined, but trivial things may also be the perfect hook to keep the engagement levels up so other lessons are learned. Many games use animated effects to make the play seem trivial, but the player is learning to pattern match, or plan ahead a few moves to maximize their score. So trivial may very well be really beneficial.   Fri, 2/1/08 11:37 AM

5.   The time factor is obviously addressed here. But one thing I have found through using Making History and The Sims is that the resistance to video games was larger in my head than it was in real life. Over 3 years of using COTS games in my classroom I have not heard from one parent concerned that we are playing games in the classroom. MM's may have a little different view in society but I think that if a game was planned for effective education use that complaints would be few and far between. Fri, 2/1/08 7:01 AM

6.   This is hard because it sounds like something I would write! To pick one thing, I think it's even too mild in saying that there "would be a significant need for teacher PD.." I'm positive that no amount of teacher PD would ever be enough to get teachers to actually do this if they didn't already have an inclination to use games in this way in the first place.   Thu, 1/31/08 10:40 PM

7.   none   Wed, 1/30/08 1:37 PM

8.   --> EDUCATORS SHOULD NOT TRY TO MAKE GAMES <-- We basically suck at it, and the people who make games are really good at it. Our jobs, as educators, is to look at existing games and use them to fit in our learning objectives into, right? let the people who are good at making games, make games. We already know a "well-designed" game is intrinsically educational. so all it takes is a teacher who knows the game world to play it and use it with their students.   Sun, 1/27/08 7:17 AM

9.   I'll most disagree with "Unfortunately, this might reduce the engaging and motivating elements of the games, and as Prensky says, 'suck the fun out.'" That'd be if you didn't get the design right, but I believe it's possible to design an environment that's interesting and rewarding, though there may need to be in-game mentorship as well. I'll secondarily challenge "In addition, MMORPGs require thousands of players to feel inhabited and provide a persistent sense of community;". I don't know that; do you? Of course, the project is defined as being about MMORPGs, while I think there may be benefit in just MORPGs (not *massively* multiplayer, just multiplayer).   Sat, 1/26/08 2:03 PM

10.	I disagree with the overall tone of the statement: "Funding an educational MMORPG would be expensive to start and difficult to sustain. Even if an existing engine is used, it would be expensive to develop the game and attract players and teachers to the idea." The success of the "Global Kids" initiative and their game about Haiti shows the potential worldwide interest in educational games that are well developed and engaging. In developing an educational MMORPG, many digital objects and contexts could be imported from the entertainment industry, and one-generation-behind gaming shells for authoring are relatively inexpensive, yet powerful enough for educational MMORPGs. I think the statement as written is too negative about the front-end investments required. Sat, 1/26/08 1:45 PM

11.	Funding an educational MMORPG would be expensive to start and difficult to sustain. – This impression is one of the biggest obstacles for educators to start experimenting with virtual worlds. There are plenty of low cost/ short learning curve options, although it does require finding other educators with the necessary experience. Sat, 1/26/08 9:58 AM

12.	The amount of time needed to implement such a game may be the greatest cost, including the time for students to learn the game and to spend time on the less educational fun elements of the game. MMORPG game play also does not fit neatly into traditional school schedules. In a truly massive multiplayer game, coordination of players with different school schedules (potentially even across different time zones) would also be a challenge. Because: 1. Most MMORPGs have single player mode before players can move into teams and social settings. 2. schools need to revisit traditional instruction and make adjustments to learning a new skill set with computers. 3. Why bother coordintaing. The value of this is moving away from an industrial/assembly line model of education. Fri, 1/25/08 9:42 PM

FINAL CONSENSUS CHECK, QUESTION 1

1.	Basically I agree, but the discussion of repetitive actions, competition and content of the game really comes back to good design of game-play. Repetitive action in and of itself is not bad, this is exactly how we learn many things, and much of which was not intended in the design of this action. Particularly for Education Gaming, the ability to take on different roles should be leveraged well. Anonymity with fellow players allows the player to explore new ideas and actions without real-world social reprisals. By having each of the student's roles registered with the school (confidentially so other students are not aware unless they reveal their identities) to provide some level of accountability of action and a safer environment to learn and play. I agree that MMORPGs embody Hard Fun but also want to be clear, that MMORPGs are educational as they are. They can teach basic computer skills, practice with communication, teaming, typing, email, etc. This discussion should is more about expanding the educational advantages, rather than whether or not MMORPGs can teach.	Fri, 2/8/08 10:35 PM

2.   my only quibble would be that it would be possible to create an experience that would be highly transferable to the real-world.   Mon, 2/4/08 9:36 AM

3.   I agree with this. However, whenever I read "An educational MMORPG, though, could be designed" I cringe. I don't think we should even think of trying to design an educational MMORPG – I think we should use what is out there.   Mon, 2/4/08 6:25 AM

4.   Too negative about how hard it is to develop intrinsic motivation   Mon, 2/4/08 4:07 AM

FINAL CONSENSUS CHECK, QUESTION 2

1.   My main comment is on "MMORGPs might be most valuable if modelled on real-world professional training, such as internships." This is someone debatable because all the professional training models have been set up with a standardize learning process and tools that are known and in place for many years. MMORPGs offer the ability to have flexibility in the learning process. If you look at the way technical people learn skills, they rarely read the manuals provided with new products. On the contrary, they install and play with the application, and after much trial and error, later in the learning process, they refer to manuals or other information sources (often asking people on the net). Learning in MMORPG can happen in a seemingly random, inefficient order and also provide lessons that are difficult to model with texts and classes (such as social interaction), as therefore are often removed from professional training. In some ways MMORPGs can provide a more holistic way of learning because the lessons are intertwined with the softer skills. The point being, new learning models need to be explored. Real-world professional training models are designed to streamline the process, and lower costs of delivering that service and thus they have to make compromises in the overall education experience for the purpose of transferring very specific knowledge in a very controlled realm. i.e. few people that learned MS Word in a class, learned much about how to use it or about writing. Those that learned to write and had to use MS Word as a tool to complete the tasks, often know the tools much more fully.   Fri, 2/8/08 11:00 PM

2.   I'm a little worried about the notion that the context has to be relatively real, whereas in many cases we remove complexity or alter probabilities for instructional purposes.   Tue, 2/5/08 6:50 PM

3.   MMORPGS will not provide more transfer. That is the role of reflection and application to new situations. MMORPGS are only as good as the design. The context may provide the necessary prior knowledge to someone who has not seen a picture of a moonbow, but for those with imagination and experience, this visual representation may reduce the pleasure of learning dependening on how inspiring the art work is and the quality of the player's imagination. Also, why are we so preoccupied with safety? Also,

wouldn't it be better to take kids to Paris, rather than sending them to a sim of Paris? Kids are soon bored of MMORPGS if the builds are not consistently upgraded, or they are given the ability to build and create new content--but restriction in the name of safety tends to over rule this creativity.   Mon, 2/4/08 10:02 PM

4.   "the removal of real-world complexity" and replacing it with entertainment in commercial games in not just something that can be replaced with educational aspects. that's a mistake most educational games make. these games are fun because the game play is tuned for fun and engagement, reality is not in the equation. you can't take that out. if the top design goal of the game isn't to create a fun game, it won't be a fun game. content is a problem, there's no way to assess it in a game like this, and yet, if all you assess is "soft" skills, you might as well just play a COTS game and see who wins. It's as likely that leadership skills or "business" skills could be assessed through any team-based game or resource management game. Mon, 2/4/08 9:45 AM

FINAL CONSENSUS CHECK, QUESTION 3

1.   My main point is that MMORPGs are educational and this discussion is around enhancing the educational value so more skills and knowledge can be transferred. The entire gameplay, to different degrees depending on the game, teach, sometime just basic computation skills, sometime more advanced social and networking skills, and in some game, things like analytics, problem solving, history, science and languages. In my mind, we need some line that says this MMORPG is being used specifically for education and this line is around Anonymity. MMORPGs will teach no matter what, but when explicitly used for education, the entire environment must be safe and protect all the players. The balance of ensuring anonymous exploration without real-world social reprisals, could be to let students to anonymous to each other and take on as many characters as they like, but have each student's character known to the school or teacher in confidence. This allows the school to mitigate risk malicious people disrupting the experience for all. The statement, "However, it is unlikely that a transformational shift in a students' cultural beliefs will occur unless complemented by a variety of other educational activities." Please explain what environment does this well and why MMORPGs are any less valuable in transforming cultural beliefs? Ultimately cultural beliefs change via exposure to new ideas and cultures. MMORPGs provide a unique way to expand one's interaction. More specifically, people's cultural belief will not change if information is only received from only the places, people and surroundings they grow up in. MMORPGs enable an environment for perspectives to be shared from outside the context in which the student is living. This is a huge opportunity for transformational shift, that can arguably be less effective if mediated by people/teachers from within the same social context. Students are like to see through the contradiction of a teacher saying things from their own cultural perspective, when their own interaction with other cultures tells them differently. I am less concerned about the potential problem of "a player may come to identify too strongly with their avatar." I think this can be more easily addressed then some of the other psychosocial issues.   Fri, 2/8/08 11:48 PM

2.   Having spent considerable time in SL and WoW, I find this to be the opposite of the below statement. The virtual or MMORPG environment may actually make people feel as though the are more closely connected to other players, which in turn can lead to misunderstanding especially where chat is used in place of voice. "The computer mediated social environment does not provide the same level of interactivity as face-to-face communication and might re-enforce solitude and antisocial behavior, or accentuate problems such as bullying, creating new channels for certain individuals to be ostracized."   Fri, 2/8/08 3:09 PM

3.   Come to identify to closely with their avatar? Who has been taking this survey? Mon, 2/4/08 10:03 PM

4.   While I agree with the intent behind this statement, I think in the real-world the problem would be capturing this in any way that was embedded into the game. Capturing and assessing social learning is really tricky, and I think it would be too easy to game the game, if the players knew that they were being graded on teamwork or other social aspects. Making the game scoring system transparent to the player means that it's easier to work around and fool, hiding it makes the game confusing and feels like trickery. Are you doing a psychological profile or teaching history, would be the question. My only answer would be that this cannot be embedded in the game and would have to be something the teacher does outside the game as part of the reflection. You have to trust the teacher as a professional to determine these things, not the game.   Mon, 2/4/08 9:51 AM

5.   "aggressive competitiveness and may cause emotional distress for those who lose or do not win." I disagree with this point, as one of the unique things about games is that kids do not suffer from high-levels of distress when they fail. In fact, failure is often shrugged off or encourages the player to keep trying, and learn from their mistakes. Mon, 2/4/08 6:29 AM

FINAL CONSENSUS CHECK, QUESTION 4

1.   "However, if failure is too easy (or fun) within a game, it might lead players to become more risk-adverse in real life or else to have an unrealistic view of risk, failure, and consequences in real life." Let's make sure that the student understands that this is a game. I am not sure why they would become risk-adverse, hopefully the opposite affect will happen, where taking risks is encouraged and people learn that calculated risks are a way to excel in life and that failure is a part of the process. i.e. the old entrepreneurial adage, "Every success was preceded by 100 failures." We should encourage people to try and fail, learn and progress. MMORPG can be a good testing bed for this. I don't think we should protect kids from failure, it is an intrinsic and beneficial part of the self-actualization process. When it comes to cheating the system, in general I am against permanent banning unless the behaviour is violent or destructively abusive. This will

happen and the student is learning a different set of skills. Kids cheat in classrooms as well, and businessmen cheat at work. Let's put in safeguards, monitor, and deal with it, without negating the benefits that an MMORPG can also provide. The benefits of gaming can far outweigh the affects of the cheaters.   Sat, 2/9/08 12:14 AM

2.   Even though the note says that 21st Century skills aren't really anything new, it seems that the skills you've grouped here don't really hang together and overlap a lot with other sections. On cheating, I think that this has to be an open discussion and HUGE part of the reflection. Cheating in a game is different than cheating in real life. For example, players could create alliances that exist outside of the game. Is this cheating or not? It happens all the time in the real-world, and laws try to regulate it, but it still happpens. Is it cheating to push the laws/rules to gain an advantage? I think cheating and discussions of rules is probably one of the most educational parts of these games.   Mon, 2/4/08 9:59 AM

3.   I'm not sure cheating is as big of a deal as you are making it – again, I think commercial MMORPG's are the best way to go here, and they are pretty good at finding cheaters. :-)   Mon, 2/4/08 6:32 AM

FINAL CONSENSUS CHECK, QUESTION 5

1.   I agree that reflection is another key difference for educational gaming   Sat, 2/9/08 12:17 AM

2.   I'm concerned that this doesn't mention the difficulty in having instructors who can provide the reflection guidance needed (in general, not just cultural).   Tue, 2/5/08 6:55 PM

3.   Reflection is the most important part of any educational aspect of a game and I think you've captured it well. However, I do think that in-game reflection would be valuable because it would of necessity break into game play.   Mon, 2/4/08 10:09 AM

FINAL CONSENSUS CHECK, QUESTION 6

1.   The costs of current MMORPG infrastructures are a concern for any one school. There are many servers and other infrastructure required that is cost prohibitive for a small environment; also, consider the scalability of running the operations is a consideration. I think MMORPG environments must be at least across schooling districts with some consideration to scheduling and optimizing around what a base system can support in concurrent players (CCU). Due to the high costs of developing MMORPG and the little garuantee that this investment will be liked by students or that the intended benefits are achievable, I think it is critical that existing MMORPGs be adapted for education purposes. The storylines and quests can be adapted have better material. Often

changing game play and adapting graphics can customize the environment for local norms and goals. At [our company], this is exactly the complex analysis and localization processes that we use to bring successful games from other countries to [a country] to resonate with a local population made up of many different cultures. In general, I suggest let the students coordinate themselves. The gameplay is usually enticing enough to inspire play. With a large and distributed (across timezones) population of players, ensuring there is a mass of players will happen organically. "Cultural resistance to video games in schools might also prove a challenge." This is a huge barrier. We need to provide accurate tools, feedback, and information to educate parents of the benefits. This should be a major focus for the education-gaming community. Like any new media (as TV and Radio at one point) the negative perception hinders the potential benefits. The Guttenberg printing press was a major concern for the governing powers of the day such as the church, because information and lessons could be disseminated in ways they could not control. Bad and good literature can be produced, but again, the benefits far outweigh the concerns. MMORPGs are no different. They offer a unique way to provide education, and teach things that other mediums are not as effective. This is a media to be embraced, not feared. I spent 6 years in [a metropolitan] educational system while working for [a large technology company] in the K-12 division. The hardest part for the adoption of technology in classrooms was that teachers were lost, as they will be with MMORPG. It helps to provide a support organization for teachers to teach and learn. This will facilitate the use and measurable results of MMORPGs in Education. Sat, 2/9/08 12:41 AM

2.   1. People don't take pilots seriously, no amount of "proof" changes people's deep down beliefs. It's naive to suggest that pilots or research studies would change anything. 2. Schools are not moving in this direction (last sentence). If anything, they are becoming more rigid and resistant to change. They are driving out the very teachers and administrators who would be able to create the systemic changes that would be necessary for games to play a larger part in education.   Mon, 2/4/08 10:13 AM

3.   Interesting thing about computers and students is kids play nicely with each other. I agree with you, part of the logistics is the computer to kid ratio, but I also regularly see kids playing well with each other when using a computer. Again, I think the idea of an educational MMORPG is a bad idea. I think if you modded a current COTS-MMORPG then that might work, but there are plenty of decent reasons to stay away from designing an educational mmorpg.   Mon, 2/4/08 6:41 AM

FINAL CONSENSUS CHECK QUANTITATIVE RESULTS

1. Motivation and Engagement: What is your level of consensus with the summary provided above?

Level of Consensus	Number of Participants
5. Complete Consensus	3
4. High Level of Consensus	8
3. Moderate Level of Consensus	1
2. Low Level of Consensus	0
1. No Consensus	0
Total	12

2. Context-Embedded Learning: What is your level of consensus with the summary provided above?

Level of Consensus	Number of Participants
5. Complete Consensus	5
4. High Level of Consensus	4
3. Moderate Level of Consensus	3
2. Low Level of Consensus	0
1. No Consensus	0
Total	12

3. Social Learning: What is your level of consensus with the summary provided above?

Level of Consensus	Number of Participants
5. Complete Consensus	4
4. High Level of Consensus	4
3. Moderate Level of Consensus	3
2. Low Level of Consensus	1
1. No Consensus	0
Total	12

4. Twenty-first century skills: What is your level of consensus with the summary provided above?

Level of Consensus	Number of Participants
5. Complete Consensus	7
4. High Level of Consensus	5
3. Moderate Level of Consensus	0
2. Low Level of Consensus	0
1. No Consensus	0
Total	12

5. Reflection: What is your level of consensus with the summary provided above?

Level of Consensus	Number of Participants
5. Complete Consensus	9
4. High Level of Consensus	2
3. Moderate Level of Consensus	1
2. Low Level of Consensus	0
1. No Consensus	0
Total	12

5. Infrastructure and Logistics: What is your level of consensus with the summary provided above?

Level of Consensus	Number of Participants
5. Complete Consensus	6
4. High Level of Consensus	4
3. Moderate Level of Consensus	2
2. Low Level of Consensus	0
1. No Consensus	0
Total	12

CURRICULUM VITAE

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EDUCATION

2003-2008	Ph.D. in Educational Technology, Walden University
1998-2000	M.Ed. in Cross-cultural Education, National University
1993-1998	B.A. in Liberal Studies, California Polytechnic State University at SLO

EMPLOYMENT

2006-2008	President and Founder, Educational Technology and Life Corporation
2004-2006	Coordinator – Educational Technology, Orange County Department of Ed.
2003-2004	Educational Technology Coordinator, Newport-Mesa U.S.D.
2001-2003	Educational Technology Coordinator, Estancia High School
1999-2003	English Teacher, Estancia High School
1998-1999	Substitute Teacher, Newport-Mesa U.S.D.

PUBLICATIONS

Wagner, M. (2007). Learning to game and gaming to learn. *Connected Newsletter: The K-12 Guide to Technology Integration*. 13(8), 4-6.

Wagner, M. (2007). Passion and professional development. *OnCUE Journal*. 29(1), 19.

Wagner, M. (2006). Ethical use of the read/write web. *OnCUE Journal*. 28(3), 10-11, 15.

Wagner, M. (2006). An introduction to blogs and the read/write web in education. *Gifted Education Communicator: A Journal for Educators and Parents*. 37(2), 9-13.

KEYNOTE PRESENTATIONS

Learning to Network and Networking to Learn. Technology Conference for Administrators. May 16, 2008. Tenaya Lodge, Fish Camp, Ca.

Learning to Network and Networking to Learn. San Diego Computer Using Educators Annual Technology Fair. November 3, 2007. San Diego, Ca.

Learning to Network and Networking to Learn. Cahuilla Computer Using Educators Annual Technology Fair. October 5, 2007. Palm Springs, Ca.

Two-Way Teaching with the Two-Way Web. Orange County Computer Using Educators Annual Technology Festival. January 20, 2007. Newport-Beach, Ca.

SELECTED WORKSHOP AND SESSION TOPICS

Video Games and Simulations
> Power Up: Educating Through Video Games and Simulations
> Learning to Game and Gaming to Learn: Video Games in Education
> Massively Multiplayer Schools: Are MMORPGs The Future of Education?

The Read/Write Web (The Two-Way Web, or Web 2.0)
> Two-way Teaching: How the Read/Write Web Changes Education
> Blog If You Love Learning: Best Practices for Educational Weblogs
> Be An Edublogger: Tools and Tips for Joining A Global Learning Community
> Wiki While You Work: Best Practices for Educational Wikis
> Broadcasting for All: Best Practices for Educational Podcasts
> Blogs, Wikis, and Google Docs: Which one is right for your lesson?
> It Really Is Really Simple: An Introduction to RSS for Educators
> Twitter Me This: Join a Global Learning Community and Feel Good About It
> With Power Comes Responsibility: Internet Awareness, Ethics, and Safety
> Learning to Network & Networking to Learn: Beyond the Tools

Online Resources
> Google More: An Introduction to Google Tools in Education
> Search, Learn, Share: Best Practices for Google Tools in Education
> The Data-Driven Classroom: Online Surveys for Educators
> Tools for Teachers, Skills for Students: Free Online Resources for Educators

Multimedia
> Picasa, PhotoStory, Audacity, & Movie Maker for Educators
> iLife for Educators: iTunes, iPhoto, iMovie, iDVD, and Garageband

Open Source Software
> What More Could You Ask For? Open Source Software in Education
> Build a Better Browser: Firefox Themes & Extensions for Educators

Productivity Software
> Microsoft Office for Educators (Alternative: Open Office for Educators)
> Apple's iWork for Educators
> Basic Teacher Technology Proficiency (Updated for Web 2.0)
> Netiquette for Education (Updated for Web 2.0)

And more…
> Using Technology to Support Your Language Arts Adoption
> Using Technology to Support Your Professional Learning Community
> Teaching 21st Century skills (Including Risk-Taking!)

CONFERENCE PRESENTATIONS

The topics above are regularly presented at schools, districts, and regional educational institutions, as well as at annual conferences such as the following:
> The National Educational Computing Conference (NECC)
> The Macworld Expo Educator Academy
> The Computer Using Educators (CUE) Conference
> The California League of Middles Schools & High Schools (CLMS/CLHS):
>> Annual Conference
>> Community and Leadership Conference
>> Literacy Institute
>> Technology Conference
> The California Association for The Gifted (CAG) Conference

CONFERENCE ORGANIZING

2008	Workshop Coordinator, CLMS Annual Conference, Sacramento, Ca
2008	Equipment Workshop Coordinator, FETC Conference, Orlando, Florida
2008	Workshop Coordinator, Macworld Expo for Educators, San Francisco, Ca
2007-2008	Workshop Coordinator, CLMS Technology Conference, Monterey, Ca
2005-2008	Conference Planning Committee, CUE Conference, Palm Springs, Ca

ASSOCIATIONS

Member, Computer Using Educators (CUE)
Member, International Society for Technology in Education (ISTE)
Google Teacher Academy Trainer
Google Certified Teacher

ADDITIONAL TRAINING AND EXPERIENCE

CUEtoYOU Professional Development Coordinator
CLMS/CLHS/NHSA Educational Technology Coordinator
AB75/AB430 Module 3: Technology for Administrators, Coordinator and Trainer
Teacher Technology Certification Trainer and Certifier, Orange County, Ca
District Technology Planning Consultant
Teacher Expectations Student Achievement (TESA) Training
Cognitive Coaching and Adaptive Schools Training
Enhancing Education Through Technology (EETT) Grant Coordinator
Campus Literacy Coordinator and Data Coordinator
Senior Project Training
Advancement Via Individual Determination (AVID) Training
Technical Support and Systems Administration Experience in Schools
Multicultural/ELD and Advanced Placement Teaching Experience