Core Knowledge Area Module Number 1:

Principles of Societal Development

Social Constructivist Theory

and Digital Game-Based Learning

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TABLE OF CONTENTS

Overview

This Knowledge Area Module (KAM) focuses on the relationship between social constructivist theory and the application of digital game-based learning in formal k12 education. The breadth section of the KAM begins by presenting a synthesized working theory of constructivist societal development, with a focus on the works of Dewey, Vygotsky, and Bruner. This working theory suggests that a social constructivist learning environment is one that facilitates context-embedded, inquiry-driven, and socially negotiated learning, ideally for the purpose of effecting positive social change. This is followed in the depth section by a critical examination of cutting edge digital game-based learning theories in light of this working theory. The depth section will focus on the work of Shaffer, Squire, and Steinkuehler from the *Games, Learning, and Society* program at the University of Wisconsin, Madison. Finally, the application section will conclude the KAM with the explicated design of a three-hour hands-on professional development session that provides educators with guidance in using digital game-based learning informed by theories of constructivist societal development to facilitate student learning.

Throughout each section, this paper argues that video games, particularly massively multiplayer online role playing games (MMORPGs), can serve as social constructivist learning environments, and thus as instruments for effecting positive social change in formal k12 education. As part of the application phase, this argument was made to an audience of k12 educators. They were also provided with hands on experience with an MMORPG, and they were presented with a variety of pragmatic techniques for beginning to implement the use of video games, including serious games for change, with their own students.

Breadth

Introduction

This breadth section of the KAM presents a synthesized working theory of constructivist societal development, with a focus on the works of Dewey, Vygotsky, and Bruner. This theory supports the argument that video games, particularly massively multiplayer online role playing games (MMORPGs), can serve as social constructivist learning environments, and thus as instruments for effecting positive social change in formal k12 education.

Though he wrote long before a social constructivist movement was formally named, Dewey might be considered among the first social constructivist educational philosophers. He aimed to move education from the "individualistic standpoint" (Dewey, 1915, p. 6) to "the broader, or social view" (p. 7) and "to conceive... the 'new education' in the light of larger changes in society" (p. 8). He was as concerned with societal development (democracy, experience, and art), as he was with education. Modern video games, and particularly MMORPGs, have become a dominant form of entertainment for American students. Participation in these games is an overwhelmingly social pursuit, and many of the games are complex and multimodal cognitive experiences. Many can be considered art, and some address themes critical to the survival of democracy. Dewey would see these games as every bit as important as what students are learning in school, and because he believed education should be as much like experience as possible, he might call for education in the form of these popular games.

Dewey theories certainly seem prescient today. Nearly a century ago he wrote that "knowledge is no longer an immobile solid; it has been liquefied. It is actively moving in

all the currents of society itself" (1915, p.25), a sentiment we now see echoed in Thomas Friedman's (2005) bestselling *The World is Flat*. Twenty-first century Educational technologists often suggest that we are still stuck with an industrial model of education, but Dewey, who lived during a time when the industrial revolution was exciting and new, derided the same system as "medieval" (p. 26). He criticized our school system as "made for listening" (p. 31) with "enforced quiet and acquiescence" (p. 62) and silence as a prime virtue (p. 63). As a result he felt schools had little space for the child to work (p. 32). They were instead designed to handle students "en masse" (p. 32-33), and did not provide individualized instruction (p. 45). He realized that the knowledge gained in schools was not used in life (p. 47), and he asked a question that still hits home for most in our society: "how many came to associate the learning process with ennui and boredom?" (p. 27) Ultimately, he considered school a superficial means of knowledge transmission (p.4), and he felt that the danger of school becoming irrelevant "was never greater than at the present time, on account of the rapid growth in the last few centuries of knowledge and technical modes of skill" (Dewey, 1916, p. 9). Little did he know that this trend would continue exponentially in the twentieth century and that the contrast between school and the exciting engagement of students' after-school lives would continue to grow. A medieval school system that requires students to be the passive recipients of knowledge cannot compete with the active learning by doing that goes on in an MMORPG.

In its place of the traditional schools, with which we are still burdened, Dewey suggested, and piloted, a new kind of progressive school. He called for a meaningful evolution of the system (1915, p. 28), for risk-taking in this innovation (p. 104), and for school to become "a group or community held together by participation in common

activities" (p. 55). Later, Vygotsky's theories on the social nature of learning, including the now familiar *zone of proximal development*, provided a formal framework for furthering Dewey's aims of education through social interaction. Bruner, in turn, finally provided an explicit effort to develop a social constructivist pedagogy – and he has brought these ideas forward to the brink of the twenty-first century. His later writings began to touch on issues related to educational technologies, such as the computer and the Internet. Now, video games, and MMORPGs in particular, can realize the promise in these theories. They encourage risk taking, they challenge players without frustrating them, and they not only compete with the exciting technologies students use at home, they are the most exciting technology students use – and the technology students spend the most time with.

In light of Dewey, Vygotsky, and Bruner's work, a social constructivist learning environment could be characterized as one that facilitates context-embedded, inquiry-driven, and socially negotiated learning. Ideally, each of these theorists believed that such an environment would also be a vehicle for effecting positive social change. It is just such an environment that this KAM will focus on as a working theory of constructivist societal development. It is also just such an environment that educational video games, including MMORPGs, can provide for students and their teachers.

Constructivism

Before exploring the specifics of context-embedded, inquiry-driven, and socially negotiated learning, it is important to understand the underlying epistemology of social constructivism. Constructivist philosophy, as typified by the work of Piaget, Papert, and Jonassen (Wagner, unpublished), is build upon the general claim that learners must

construct knowledge and meaning in their own minds, relative to their own perceptions and interactions with their environment. There is no objective meaning that can be passed from teacher to student. Social constructivism, then, can be said to include the premise that social interactions play a large role in shaping the experiences and meanings that learners internalize. Video games, of course, offer students ample opportunities for interaction and experimentation within an environment that is often social, whether within the game or in the social context within which the game is played.

Dewey (1915) recognized the importance of mental constructions and felt that "the real child… lives in the world of imaginative values and ideas which find only imperfect outward embodiment" (p. 60). Video games can be an ideal forum for students to exercise their imagination and to develop (and test) their values, often under pressure. In a very constructivist fashion, Dewey suggested that "thinking is the accurate and deliberate instituting of connections between what is done and its consequences" (1916, p. 151). Naturally, video games offer frequent opportunities to develop the predictive connection between action and consequence. Dewey further differentiated himself from empirical behaviorists with philosophies such as the belief that "the difference between an adjustment to a physical stimulus and a mental act is that the latter involves response to a thing in its meaning; the former does not." (p. 29) In games, players must respond to the meaning of an event within the context of the rules and mechanics of the game; there are no disembodied facts and skills - each has a meaningful purpose.

In a way similar to Piaget's (1952) theories of assimilation and accommodation, Dewey (1938) believed that "every experience enacted and undergone modifies the one who acts and undergoes, while this modification affects, whether we wish it or not, the quality of subsequent experiences" (p. 35). He also saw mind as "a process of growth, not

a fixed thing" (1915, p. 102), and at times his discussion of "distinctive phases of

capacity and interest at different periods" (p. 102) even foreshadowed Piaget's (1952)

stages. Students who play video games know the truth of these principles first hand. As

they undergo experience in a game they perceive their own growth as a player. The

formal structures of most video games reflect this. Players often progress through levels

and acquire higher amounts of experience points. In role-playing games their skill levels

and attributes increase quantitatively as well. As they master particular puzzles or styles

of play, players can also observe themselves improve at a game in ways the game

systems may not measure.

> Dewey may even have been the first to ask this now familiar question:
>
> "Why is it, in spite of the fact that teaching by pouring in, learning by a passive absorption, are universally condemned, that they are still so entrenched in practice? That education is not an affair of 'telling' and being told, but an active and constructive process, is a principle almost as generally violated in practice as conceded in theory." (Dewey, 1916, p. 38)
>
> There can be little doubt that video games are an active and constructive process.

Perhaps it should be no surprise then that this is also rejected by practicing educators (and

the main stream media) as it is established in theory, as will be seen in the following

depth section of the KAM.

Furthermore, Dewey (1915) conceived of an "individual mind as a function of

social life – as not capable of operating or developing by itself, but as requiring continual

stimulus from social agencies, and finding its nutrition in social supplies" (p. 62). He

even felt that social forces were responsible for the evolution of mind (p. 99). In this

respect, and in keeping with Dewey's belief that students have learned a great deal from

their environment before beginning school, it might be said that video games are

responsible for the development of students' minds long before they reach our school system today.

There were additional ways in which Dewey (1938) felt that the "external and physical side of activity cannot be separated from the internal side of activity" (p. 61). Like Papert (a student of Piaget and an early educational technologist), Dewey (1915) was interested in a very literal element of constructivism; he felt that students would learn best when engaged in "constructive or 'built up'" work (p. 128) in which they would be creating a product outside of themselves. In many cases, video games facilitate just this form of construction; players are able to generate characters, influence narrative, build objects, design (and run) cities, and even determine the course of a civilization – or of evolution.

Dewey (1916) may also have been the first to suggest that in schools "there may be training, but there is no education" (p. 29). The pedagogical changes that follow from Dewey's thinking might be summarized in his writing describing the opposition between traditional schools and his conception of the "new school":

> "To imposition from above is opposed expression and cultivation of individuality; to external discipline is opposed free activity; to learning from texts and teachers, learning through experience; to acquisition of isolated skills and techniques by drill, is opposed acquisition of them as means of attaining ends which make direct vital appeal; to preparation for a more or less remote future is opposed making the most of the opportunities of present life; to static aims and materials is opposed acquaintance with a changing world." (Dewey, 1938, p. 19-20)

While text books are static and idealized versions of academic content, video games can offer dynamic and pragmatic representations, in which even the simplest simulation requires that students actively make the most of their changing situation.

Dewey (1938) suggested that "basing education upon personal experience may mean more multiplied and more intimate contacts between the mature and immature than

ever existed in the traditional school, and consequently more, rather, than less guidance by others" (p. 21). In short, he was calling for "education of, by, and for, experience" (p. 29), and for Dewey, a big part of experience was social interaction. Clearly video games, especially role-playing games, are a far more experience based medium than traditional education. It has been suggested that while a student might make one decision in an hour long class, they make an average of two per second when playing a video game.

Though he was also writing prior to any formal constructivist movement, Vygotsky (1986) was similarly constructivist in his own thinking. He went so far as to claim that "direct teaching of concepts is impossible and fruitless" (p. 150). He believed that:

> "a concept is more than the sum of a certain associative bonds formed by memory, more than a mere mental habit; it is a complex and genuine act of thought that cannot be taught by drilling, but can be accomplished only when the child's mental development itself has reached the requisite level" (Vygotsky, 1986, p. 149).

Complexity is an important element of video games when it comes to learning. Games that can be mastered by mashing buttons or merely memorizing or practicing certain sequences are not the sort of games being advocated here. Complex games and simulations, especially role-playing games are more likely to incorporate the sort of genuine act of thought that Vygotsky is concerned with.

Naturally, Vygotsky's theory of the zone of proximal development (which will be discussed in greater detail in later sections of this paper) relied heavily on the social nature of knowledge construction. Though they may not have studied Vygotsky, it is this same principle that drives game designers to find ways to challenge their players without frustrating them.

Bruner (1986), for his part, was explicitly interested in thought as a way of "constructing reality" (p. 11) and in constructivism by name (p. 44). He explored "some of the ways in which we create products of mind, how we come to experience them as real, and how we manage to build them into the corpus of a culture as science, literature, history, whatever" (p. 45). Students create products of mind as they sort their way through video games, often without a manual, and they come to experience these things as real; they internalize the systems, strategies, and risk taking approaches that can be transferred and applied in other parts of their lives. Bruner's "central ontological conviction [was] that there is no 'aboriginal' reality against which one can compare a possible world in order to establish some form of correspondence between it and the real world" (p. 46). According to Bruner, constructivism is based on the assumption that "there is no unique 'real world' that preexists and is independent of human mental activity and human symbolic language; that what we call the world is a product of some mind whose symbolic procedures construct the world" (p. 95). In his constructivist view, "what exists is a product of what is thought" (p. 96). For Bruner, even "self is a construction, a result of action and symbolization" (p. 130). Bruner (1971) believed that people construct mental models of their world (p. 5), in a way similar to how modern video game designers might construct a model of a system in order to represent it in a meaningful way within the context of a game or simulation – or the way that a player, without a manual, constructs and tests his own models of the underlying systems created by the designers.

Ultimately, Bruner (1990) believed that "the central concept of a human psychology is *meaning*, and the processes and transactions involved in the construction of meanings" (p. 33), and as his career progressed Bruner became increasingly convinced of

the importance of social forces in these processes (as will be described later in this breadth section). It is now clear that video games facilitate such meaning making, and that video game playing is an overwhelmingly social experience whether or not the game is a multiplayer game (as will be explored in the depth section of this KAM).

It follows from the social constructivist philosophy of Dewey, Vygotsky, and Bruner, that there is a good deal of *incidental* learning goes on in a child's life, even outside of school, and even when he or she is playing a video game or simulation. However, these technologies can be harnessed for *intentional* formal learning if game designers understand the elements of an environment that would support learning of this type. The most fundamental element, and one that video games can excel at providing, is the need for learning to be embedded in a context, including a social context.

Context-Embedded

One of the central tenets of social constructivism is that learning is most effective when it is embedded in a meaningful authentic context. As Dewey (1915) claimed, school work is often "somewhat remote and shadowy compared with the training of attention and of judgment that is acquired in having to do things with a real motive behind and a real outcome ahead" (p. 12). Video games always have such motives and outcomes built in, especially in role-playing games. Dewey leveled a particularly unflattering accusation at traditional schools when he stated that:

> "the child comes to the traditional school with a healthy body and a more
> or less unwilling mind, though, in fact, he does not bring both his body
> and mind with him; he has to leave his mind behind because there is no
> way to use it in the school." (Dewey, 1915, p.80)

One reason for this, Dewey (1938) suggested later, was that the subject matter was "learned in isolation" (p. 25). Decades later, Bruner (1966) expressed a similar

concern when he wrote that "in a detached school, what is imparted often has little to do with life as lived in the society" (p. 152). Unfortunately, now students must leave their body and mind at home, as there is often no place for either in schools. Ironically, not only are video games often the most mentally stimulating activity a student will engage in during a given day, in many schools they are now providing an opportunity for physical exercise, as physical education programs around the world adopt games like *Dance Dance Revolution* into their curriculum.

To avoid the problem of learning in isolation, Dewey (1915) believed that "we must conceive of [academic subjects] in their social significance" in order that "the school itself shall be made a genuine form of active community life, instead of a place set apart in which to learn lessons" (p. 14). Outside of school, students form powerfully active communities around their video game play. Dewey (1938) also knew that "observation alone is not enough [because] we have to understand the *significance* of what we see, hear, and touch" (p. 68). In good video games, learning is always in context, and the player always has a goal in mind. Bruner (1986), too, was concerned with relevance in schools; he discussed the relevance of skill and the skill of relevance (p. 108), and the importance of personal and social relevance in students' studies (p. 114). His objective was "to produce skill in our citizens, skill in the achieving of goals of personal significance, and of assuring a society in which personal significance can still be possible" (p. 117). As Bruner wrote later in the twentieth century, he was also concerned with "the assumption of responsibility in the technological world" (p. 117). Players must take responsibility for the results of their actions in a video game – the days of "I jumped" are long over. They know that if they fail, the only way to progress is to practice, to take-risks, and to seek help.

Dewey (1915) also felt that the "reason that the present school cannot organize itself as a natural social unit is because [the] element of common and productive activity is absent" (p. 14), and that "there is no obvious social motive for the acquirement of mere [individual] learning, there is no clear social gain in success threat." (p. 15). However, when work is done in the context of producing results, Dewey observed that there arises an "infinitely wider discipline that comes from having a part to do in constructive work" (p. 17), and that when this is put into practice:

> "...the entire school is renewed. It has the a chance to affiliate itself with life, to become the child's habitat, where he learns through directed living, instead of being only a place to learn lessons having an abstract and remote reference to some possible living to be done in the future. It gets a chance to be a miniature community." (Dewey, 1915, p. 18)

This is exactly what happens both in multiplayer video games and around even single player games. In MMORPGs, this community is literal; within a raid party or guild there is always a context of producing results – and there is always an obvious social motive when supporting your guild-mates, or gaining their support, is involved.

This idea of uniting the school system with life was consistently important to Dewey (1915, p. 72). For example, he suggested that in order for students to study arithmetic and geography "not as isolated things by themselves, but in their reference to his social environment[, they should] become acquainted with the bank as a factor in modern life, with what it does, and how it does it" (p. 78). A multitude of high quality very popular video games make this possible; the *Lemonade Stand* game and the *Tycoon* series of games for instance. For Dewey, to study a subject such as history "is not to amass information, but to use information in constructing a vivid picture of how and why men did thus and so; achieved their successes and came to their failures." (p.151) Bruner (1996) echoed this when he wrote that "it is a lame excuse to say children can't [practice

history as a discipline]" (p. 91) The wide variety of history games on the market, including the explicitly educational simulation *Making History* make learning history as a discipline (and in context) possible as never before. Bruner was also concerned with cultural context because "learning to be a scientist is not the same as 'learning science': it is learning a culture, with all the attendant 'non-rational' meaning making that goes with it" (p. 132). It is now possible for video games to focus on being a scientist rather than learning science… in fact playing and exploring any common off the shelf game has more in common with the scientific method than studying a text for a science test. Players must form hypothesis and test their theories in order to discover how a game works and what strategies will be successful, much as scientists work to discover the underlying rules governing the universe and then work to exploit these to their advantage.

Dewey (1915) believed that when school is related to life, "it will no longer be a problem to correlate studies" (p.91) and that "the teacher will not have to resort to all sorts of devices to weave a little arithmetic into the history lesson, and the like. Relate the school to life, and all studies are of necessity correlated" (p. 91). Most video games are inherently cross-curricular or multi-discipline. For Dewey, the aim was "not 'covering the ground,' but knowledge of social processes used to secure social results" (p. 108). Some games, particularly serious games for change (which will be discussed again in this paper) have been designed to reveal social processes that achieve results. The United Nations World Food Program's (WFP) *Food-Force* is an example. Players come away with a deeper knowledge of the processes required to deliver food to the world's hungry than they are ever likely to get from the television or newspaper. Dewey sought a school in which the student is:

"given, wherever possible, intellectual responsibility for selecting the materials and instruments that are most fit, and given an opportunity to think out his own model and plan of work, led to perceive his own errors, and find out how to correct them - that is, of course, within the range of his capacities" (Dewey, 1915, p. 133-134)

As has been mentioned, video games, particularly role-playing games, can provide this kind of responsibility and learning by calculated risk taking, an important twenty-first century skill.

In Dewey's school any subject "must be derived from materials which at the outset fall within the scope of ordinary life-experience" (Dewey, 1938, p. 73). Then, "instead of the subject matter belonging to a peculiar study called botany [for example], it will then belong to life" (Dewey, 1926, p. 200). The motivation and engagement of a game that appeals to students can ensure that the subject matter falls within the scope of their interest. Bruner (1996) expands on this concept with the recognition of knowledge as "always 'situated,' dependent upon materials, task, and how the learner [understands] things" (p. 132). Bruner realized that "intelligence [is] not simply 'in the head' but [is] 'distributed' in the person's world - including the toolkit of reckoning devices and heuristics and accessible friends that the person could call upon... intelligence, in a word, reflects a micro-culture of praxis" (p. 132). Knowledge is similarly distributed when a student plays a video game – distributed in the game, in the tools they use to master the game (such as walkthrough guides and websites), and in the support system of friends and experts they might engage for help or mentorship in the game, particularly in an MMORPG.

The foundation of Dewey's (1938) call for learning in context, or for the "organic connection between education and personal experience" (p. 25), is his belief that thinking is a product of:

"meeting some difficulty, in reflecting upon the best way of over coming it, and thus leads to planning, to projecting mentally the results to be reached, and deciding upon the steps necessary and their serial order. This concrete logic of action long precedes the logic of pure speculation or abstract investigation, and through the mental habits that it forms is the best of preparations for the latter." (Dewey, 1915, p.135)

In this way, "experience then ceases to be empirical and becomes experimental. Reason ceases to be a remote and ideal faculty, and signifies all the resources by which activity is made fruitful in meaning" (Dewey, 1926, p. 276). In Bruner's (1996) words, the student then experiences "knowing as doing" (p. 150) and "understanding by doing something other than just talking" (p. 151). He advocated that we always "consider education and school learning in their situated, cultural context" (1996, p. x). Without a context-embedded socially relevant problem to overcome, learning loses much of its power. However, video game designers excel at providing a context for problem solving. Playing a video game is inherently experimental – it requires the sort of mental projection of results called for by Dewey and Bruner. As anyone who has ever watched a video game being played and then decided to take a turn themselves can identify with, *knowing* in a video game, must be *knowing as doing*… anything else is unhelpful when it comes time to do.

Dewey, Vygotsky, and Bruner all felt strongly that learning must be situated in an authentic context, including a social context. Clearly video games and simulations can provide an engaging and motivating context for learning, but they can also excel at providing another element of social constructivist learning environments; an open ended game or simulation can be ideal for facilitating the process of inquiry and discovery learning, reacting to each student (or player) individually in ways that have been impossible for traditional classrooms.

Inquiry-Driven

Another foundational principle of social constructivism is the belief that learning is most effective when it is driven by the students' own curiosity, interests, and drive to learn. Dewey felt so strongly about this that he wrote that there is:

> "no point in the philosophy of progressive education which is sounder than its emphasis upon the importance of the participation of the learner in the formation of the purposes which direct his activities in the learning process, just as there is no defect in traditional education greater than its failure to secure the active co-operation of the pupil in construction of the purposes involved in his studying." (Dewey, 1938, p. 67)

Video games exemplify this element of social constructivism, and of progressive education, as well. When students are playing video games and simulations, and particularly open ended games such as MMORPGs among others, they form their own goals and purposes and direct their own activities within the game. The game may include built in support or guidance, but ultimately the player is in control of how they will interact with the game world and develop their character(s).

Bruner (1996), too, felt that "the procedure of inquiry, of mind using... is central to the maintenance of an interpretive community and a democratic culture" (p. 98). It might be said then, that encouraging youth to participate in playing high quality video games is one way to prepare them to be participating citizens of our democratic republic.

Dewey (1915) understood that students' impulses come from many interests, such as "the interest in conversation, or communication; in inquiry, or finding out things; in making things, or construction; and in artistic expression" (p. 48), and he recognized that the spontaneous activities of children, including play and games, are capable of educational use (p. 117). It is no surprise that play in video games can also tap into these impulses. A great deal of conversation and communication occurs in-game and out of

game, both on and off line. Many students create things, including artwork, in the game, for the game, and related to the game.

Even Vygotsky, in a discussion of the *zone of proximal development*, acknowledged the importance of student's internal impulses (Rieber & Robinson, 2004, p.4). Bruner (1966), too, considered curiosity "one of the motives for learning" (p. 117). Curiosity is often what drives a student to try a new game, try to complete a level, or try to progress in the story of a game with a narrative, as many role playing games have. Bruner was particularly interested in "acts of discovery" (p. xii) and "the crucial role of self-generated discovering in learning a subject matter" (p. 39). Discovery in a good game is (or at least seems) to be generated by the player. Video games are rarely didactic; designers create an environment in which players can discover the rules and elements of the game world for themselves. This is part of the joy of playing. Bruner (1971) described the practice of Discovery Teaching as involving "not so much the process of leading students to discover what is 'out there,' but rather, their discovering what is in their own heads" (p. 72). Ideally, educational video games can strive for this goal. Even certain commercial off the shelf games are able to help students discover their own strategies, and to discover and challenge their own values.

Dewey (1915) believed that educational benefit arises once a student's impulse is acted upon, because "it runs up against the actual world of hard conditions, to which it must accommodate itself; and there again come in the factors of discipline and knowledge" (p. 38). This was the heart of inquiry for Dewey, interest realized through discipline (1916, p. 137-138). He felt that it is educative for a student "to realize his own impulse by recognizing the facts, materials, and conditions involved, and then to regulate his impulse through that recognition" (1915, p. 40). Students must act on their impulses

in order to progress in a video game, and they must regulate their impulses in order to be successful given the rules of the game.

Critical thought was an important element in the process of inquiry for Dewey; he felt that "there is no intellectual growth without some reconstruction, some remaking, of impulses and desires in the form in which they first show themselves" (p. 64) and that:

> "true reflective attention... always involves judging, reasoning, deliberation; it means that the child has a *question of his own* and is actively engaged in seeking and selecting relevant material with which to answer it, considering the bearings and relations of this material - the kind of solution it calls for." (Dewey, 1915, p. 148)

Playing video games requires critical thought, judging, reasoning, and deliberation on a basis far more frequent than a traditional classroom. Often, as a challenge is encountered in a game, players will then seek relevant materials to help them find a solution –clues within the game, and out-of-game help from friends, strategy guides, and online tips. A good deal of research and reading is sometimes involved.

Dewey (1915) expected children to work out solutions to their questions for themselves, but not without the aid of "questions and suggestions from the teacher" (p. 21). He cautioned that "a desire and impulse is not the final end. It is an occasion and a demand for the formation of a plan and method of activity... the teacher's business is to see that the occasion is taken advantage of" (p. 71), and he called for teachers to "direct children's activities, giving them exercise along certain lines, and… thus lead[ing them] up to the goal which logically stands at the end of the paths followed" (p. 37). Video games are an excellent medium for providing this sort of direction. Designers have failed if a player gets lost or too frustrated with a game and thus stops playing, so it is in their interest to be sure that each player receives the proper amount of direction. This can even vary by player through difficulty levels, or through sophisticated AI. Still, Dewey

cautioned that instruction should not be delivered "ready made" (p. 53), it must first be "needed, and then arrived at experimentally" (p. 53). Where it is all too easy for a traditional classroom to deliver a prescribed curriculum (and it is sometimes mandated), a good video game is always going to be a process of active experimentation. Otherwise, it would not be interactive, and would not be fun to play.

When it comes to writing, Dewey (1915) said, "there is all the difference in the world between having something to say and having to say something" (p. 56). Dewey believed that reading and writing can be taught "in a related way, as the outgrowth of the child's social desire to recount his experiences and get in return the experiences of others, directed always through contact with the facts and forces which determine the truth communicated" (p. 56). Nearly a century later, teachers are often surprised by how much reading and writing students are motivated to do related to their video games. Even classroom assignments, from kindergarten through the twelfth grade, are more enthusiastically embraced when students are allowed or even invited to write about the games that they play.

On account of the above beliefs, Dewey (1938) resisted standardization in education, stating that "a single course of studies for all progressive schools is out of the question; it would mean abandoning the fundamental principle of connection with life-experiences" (p. 78). He felt that in education, "purely external direction is impossible. The environment can at most only supply stimuli to call out responses. These responses proceed from tendencies already possessed by the individual... nothing can be forced upon them or into them" (1916, p. 24). Vygotsky (1978) also wrote that "there are highly complex dynamic relations between developmental and learning processes that cannot be encompassed by an unchanging hypothetical formulation" (p. 91). Bruner (1966), too,

called for "the personalization of knowledge" (p. 160), or a curriculum with "many tracks leading to the same general goal" (p.71), by suggesting that "the fact of individual differences argues for pluralism and for an enlightened opportunism in the materials and methods of instruction" (p. 71), and by advocating for curriculum that includes "different ways of activating children, different ways of presenting sequences, different opportunities for some children to 'skip' parts while others work their way through, different ways of putting things" (p. 71). Educational technologists have long expressed the virtues of a one-to-one student to computer ratio for this reason. Computers offer an unprecedented ability to individually differentiate education for each student. Video games share this potential, but are generally more engaging, motivating, and cognitively rigorous than most educational or edutainment software.

Educators need not worry about where to begin the process of inquiry. As Dewey (1926) suggests, "any experience, however trivial in its first appearance, is capable of assuming an indefinite richness of significance by extending its range of perceived connections" (p. 217). Even students' interest in their video games can serve this role in formal education. He also suggested that "normal communication with others is the readiest way of effecting this development, for it links up the net results of the experience of the group and even the race with the immediate experience of an individual" (p. 117). Many students already participate in such communication with their peers (and elders) regarding the games that they play and the information and strategies they must master to complete the games. Students' interests can be used as "points of departure whence children shall be led out into a realization of the historic development of man" (Dewey, 1915, p. 19). For example, Dewey discussed the use of sewing as a "point of departure from which the child can trace and follow the progress of mankind in history, getting an

insight also into the materials used and the mechanical principles involved" (p. 20). It

might be argued that a students' interest in *Civilization III* or even *Grand Theft Auto*

might be used as a similar gateway to knowledge. Bruner (1986) later observed that "the

old discussion has shifted from the *products* of scientific and humanistic inquiry to the

processes of inquiry themselves" (p. 44). While there is a product associated with some

games, and there may be strong feelings of victory upon completion of a game, for most

players the greatest enjoyment comes from the process of playing the game – perhaps

because they offer hours and hours of satisfying inquiry.

>   Dewey summarized the process of inquiry-driven learning in these five steps:

>   "The essentials of method are therefore identical with the essentials of
>   reflection. They are first that the pupil have a genuine situation of
>   experience -- that there be a continuous activity in which he is interested
>   for its own sake; secondly, that a genuine problem develop within this
>   situation as a stimulus to thought; third, that he possess the information
>   and make the observations needed to deal with it; fourth, that suggested
>   solutions occur to him which he shall be responsible for developing in an
>   orderly way; fifth, that he have opportunity and occasion to test his ideas
>   by application, to make their meaning clear and to discover for himself
>   their validity." (Dewey, 1916, p. 163)

>   Clearly video games excel at providing each of these essentials. The games are far

more experiential than most class work. They are inherently interesting for students, and

they offer students problem after problem. Players develop their own strategies and

solutions, which they are then able to test by applying them in the game.

>   Ideally, inquiry as an educational process can become something of a positive

feedback loop. Bruner (1966) not only recognized curiosity as a motivation for learning,

but also the "drive to achieve competence" (p. 117). More importantly, he suggested that

students "get interested in what [they] get good at" (p. 118), and that competence is self-

rewarding (1971, p. 77). The success that students experience in video games can and

does transfer into other areas of their lives, both as specific strategies that are useful

elsewhere, and as a general sense of self-esteem and belief in their own ability to overcome challenging obstacles through hard work.

Digital game based learning has the potential to exemplify the sort of inquiry-driven learning advocated by Dewey, Vygotsky, and Bruner. Modern games can go one step further than simply providing individualized instruction for each student (or player), they can also network students (or players) together in ways never before possible, thus facilitating socially negotiated learning.

Socially Negotiated

The fundamental principle of social constructivism is that meanings are not only constructed in the mind of an individual, but that these meanings are also socially negotiated between individuals in a culture. In order for knowledge to be useful, it must have meaning in a social context. Video games and simulations, particularly multiplayer games, can provide such a context and facilitate this social construction and negotiation of meaning.

Dewey (1938) was interested in social issues, social conditions, social planning (p. 80-81), and social ends (1926, p. 201), and he believed that "all human experience is ultimately social... it involves contact and communication" (1938, p. 38). This was true for Dewey even whether other people were involved or not.

> "Interaction is going on between an individual and objects and other persons. The conceptions of *situation* and of *interaction* are inseparable from each other. An experience is always what it is because of a transaction taking place between an individual and what, at the time, constitutes his environment, whether the latter consists of persons with whom he is talking about some topic or event, the subject talked about being also a part of the situation; the toys with which he is playing the book he is reading...; or the materials for an experiment he is performing." (Dewey, 1938, p. 43-44)

Similarly, even single player games can offer a social context for meaning making, as the player interacts with the computer generated environment and non-player characters.

For Dewey, "education must involve the social world of the child and the community" (Mooney, 2000 p. 4). Long before social constructivism existed as a formal philosophy, Dewey (1916) wrote that "meaning depends upon connection with a shared experience" (p. 6) and that "persons modify one another's dispositions" (p. 31). One of the greatest values of popular video games is their ability to serve as a shared experience in a way much more experience-like than mot forms of popular media.

Dewey (1938) advocated for education to include more authentic experience, and Vygotsky (1997) expressed that "experience is 'socially impregnated' through and through" (p. 53). Vygotsky even went on to claim that "any "environment is a social environment, because… in his interaction with the environment, man always makes use of his social experience" (p. 53-54). That being said, Vygotsky felt that "education... is possible only on the basis of an appropriately guided social environment" (p. 210) and that "the nature of man's education... is wholly determined by the social environment in which he grows and develops" (p. 211). For his part, Bruner (1996) believed that:

> "it is a grave error to locate intelligence in a single head . It exists as well
> 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." (Bruner, 1996, p. 154)

This is evident in video games. Players often call upon the knowledge distributed in the game environment and non-player characters, and beyond the game environment in the books, websites, and friends to whom they go for additional help. Video games also have the potential to bring more of the sort of authentic experience Dewey called for into

a traditional classroom, and a multiplayer game can both be social and include a structure that can provide the sort of guidance Vygotsky called for.

Vygotsky was primarily concerned with social speech (1986, p. 16, 34-35; 1978, p. 26-27) and social experience as a source of "changes occurring in the internal structure of the child's intellectual operations" (p. 22). Vygotsky thought that "personal and social experience cannot be separated" (Mooney, 2000 p. 82), and he "showed that children's cognitive development is affected not only by their physical development, but also by their social surroundings and interactions" (p. 85). Moreover, Vygotsky (1986) reversed Piaget's thinking and provided a conception of development as a progression from the social to the individual (p. 36). In fact, development became more of a sociological process for Vygotsky, rather than a biological process, as it had been for Piaget and others before him (p. 94). Bruner (p. 1996) later described the way his own thinking about development moved from Piaget's constructivism to what Bruner called "culturalism" (p. 3). Based on the their theories on development, it stands to reason that both multiplayer and single player video games can play an important role in a child's development as a social being.

Vygotsky focused on the significance of cooperation and collaboration in teaching and learning (Dixon-Krauss, 1996, p. 77) as he highlighted "the *social origin* of psychological ideas" (p. 78). He wrote that "the mechanism of social behavior and the mechanism of consciousness are the same... we are aware of ourselves, for we are aware of others, and in the same way we know others" (Vygotsky, 1979, p. 1, as quoted in Dixon-Krauss, 1996, p. 78). "Vygotsky (1962) stated that language and all other learning are centered in social interactions... children gradually come to know and understand the content knowledge that others in their environment know and understand" (Dixon-

Krauss, 1996, p. 79). Video games can of course provide the framework for cooperation and collaboration that Vygotsky is interested in. More importantly they can provide opportunities for the social interaction necessary for students to develop their language and cognitive skills. Some games can even help them come to know and understand academic content through these interactions.

Writing about Vygotsky, Dixon-Krauss (1996) went so far as to say that "without social interaction, meaning of context and content would not exist" (p. 78). Vygotsky himself wrote that "all higher mental functions are internalized social relationships" (Vygotsky, 1981, p. 164, as cited in Dixon Krauss, 1996, p. 113) and that "every function in the child's cultural development appears twice: first, on the social level and, later, on the individual level" (Vygotsky, 1978, p. 57, as quoted in Tryphon & Voneche, 1996, p. 17). According to Vygotsky (1978), "the history of the process of *the internalization of social speech* is also the history of the socialization of children's practical intellect" (p. 27). Bruner (1966) concurred; it was his believe that "mental growth is in very considerable measure dependent upon growth from the outside in - a mastering of techniques that are embodied in the culture and that are passed on in a contingent dialogue by agents of the culture" (p. 21). Interaction with games, within games, and about games can offer the outside stimulation that is prerequisite for individual development.

Rieber and Robinson (2004), also writing about Vygotsky, said that "only in the process of working with other children does the function of the child's logical thinking develop" (p. 472). The child "transfer(s) external social behavior into intra-psychic functions" (Tryphon & Voneche, 1996, p. 6). In this way, Vygotsky showed the "importance of learning as an interactive experience" (Mooney, 2000 p. 90). Far more

than a traditional classroom does, both multiplayer and single player video games offer more opportunities for students to work with other children and to learn through an interactive experience. MMORPGs, or course, may represent the ultimate opportunity to collaborate with others in an interactive video game environment.

Vygotsky (1978) understood that "children's learning begins long before they attend school" (p. 84) and this process was not limited to children.

> "The adult, even in his most personal and private occupation, ... thinks socially, has continually in his mind's eye his collaborators or opponents, actual or eventual, at any rate members of his own profession to whom sooner or later he will announce the results of his labors. This mental picture pursues him throughout his task. The task itself is henceforth socialized at almost every stage of its development." (Vygotsky, 1923/1974, p. 59, as cited in Tryphon & Voneche, 1996, p. 146)

Most children in the 21st century begin playing video games, and become accustomed to the opportunities for social interactivity long before starting school. Similarly, many adults are engaged in more life long learning through their game play than through their careers or continuing education. Even when playing alone, players are dealing with virtual collaborators or opponents, and video game players often look forward to sharing their exploits (or scores) with others, either face-to-face or online. Many game designers offer opportunities for players to share and be recognized for their achievements. Any use of a video game in education, or any game designed for education, would ideally take advantage of this inherently social element of play as well.

Rieber and Robinson's (2004) discussion of Vygotsky also suggested that "social institutions are first and foremost in determining what makes the world the way it is" (p. 8). Dewey (1938) hoped that in a school "the primary source of social control [would reside] in the very nature of the work done as a social enterprise in which all individuals have an opportunity to contribute and to which all feel a responsibility" (p. 56). He also

hoped that subject matter, such as science, would be taught "through acquaintance with everyday social applications" (p. 80), and that language would be taught with its "normal connection with shared activities" (1916, p. 38). Similarly, "Vygotsky's approach start[ed] exactly where the real world is: in authentic social interaction" (Dixon-Krauss, 1996, p. 80). According to Dixon-Krauss (1996), "collaboration, derived from Vygotsky's theory, serves as a powerful vehicle of socialization in human psychological development" (p. 79) and "collaborative learning can have a positive effect on [student's] cognitive development" (p. 79), affective development, and social development (p. 80). In the tradition of Vygotsky, even "access to knowledge, including literacy, is socially constructed" (Cutts-Dougherty, 1991, as cited in Dixon-Krauss, 1996, p. 176). If video games are to be used to develop access to knowledge of this kind, and if they are to motivate students through an opportunity to contribute to society, they will need to be designed specifically for this purpose. Though many games offer an opportunity to contribute to the game playing culture through authoring related web sites or modding (modifying) the games themselves, Dewey and Vygotsky would be even happier with the sorts of games that are now called *serious games*. These games are meant for a purpose other than to entertain. They are meant to educate, train, or inform. *Games for change* are specifically focused on motivating players to effect positive social change of the sort that will be discussed in the next section of this paper.

In contrast, the sort of isolated learning that takes place in traditional schools "preclude[s] the social sense which comes from sharing in an activity of common concern and value, [and] the effort at isolated intellectual learning contradicts its own aim" (Dewey, 1916, p. 39). In a traditional school, according to Dewey, "we may secure technical specialized ability in algebra, Latin, or botany, but not the kind of intelligence

which directs ability to useful ends" (p. 39). When "isolated from their connection with the present environment in which individuals have to act, [these subjects] become a kind of rival and distracting environment" (p. 80). If, however, these subjects are "connected with human activities having social breadth, [then] the range of active responses called into play and flexibly integrated is much wider" (p. 67). As Dewey says, "their value lies in their use to increase the meaning of the things with which we have actively to do at the present time" (p. 80). For Dewey (1926), "the subject matter of education consists primarily of the meanings which supply content to existing social life" (p. 192). Bruner (1996) too looked beyond schools for sources of education, saying that:

> "education does not occur only in classrooms, but around the dinner table
> when family members try to make joint sense of what happened that day,
> or when kids try to help each other make sense of the adult world, or when
> a master and apprentice interact on the job" (Bruner, 1996, p. xi)

It is likely that if Bruner were writing this ten years later, he might include video games in the above list. It is often through games, particularly those such as role playing games that rely heavily on the players taking on a new identity in a narrative, that students make sense of their world and the adult world, and video games, especially those that simulate adult activities, are the modern interactive equivalent of an apprenticeship.

Ultimately, Dewey (1938) believed that "intellectual organization is not an end in itself but is the means by which social relations, distinctively human ties and bonds, may be understood and more intelligently ordered" (p. 83). Gaming that is explicitly designed for educating students might be thought of in the same way. Dewey (1916) also saw value in these social connections; he felt that "not only is social life identical with communication, but all communication (and hence all genuine social life) is educative" (p. 5). He also felt that "any social arrangement that remains vitally social, or vitally shared, is educative to those who participate in it" (p. 6) and that "the very process of

living together educates" (p. 6). In this way, even the popular games of today can be said to be educative, as has been argued elsewhere in this paper. Still, Dewey did point out the important difference between the sort of *incidental* learning that happens when "living with others" (p. 6) and the more *intentional* "deliberate education of the young" (p. 6).

What he hoped to avoid, though, was the tendency of education to be "cast in a mold and [run] in a routine way [thus losing] its educative power" (Dewey, 1916, p. 6). He felt a society was undesirable if it set up "barriers to free intercourse and communication of experience" (p. 99) as traditional schools often do. Instead Dewey calls for a society and "a type of education which gives individuals a personal interest in social relationships and control, and the habits of mind which secure social changes without introducing disorder" (p. 99). The contemporary culture surrounding video games encourages the free communication of experience, and as the *serious games* and *games for change* movements demonstrate, it is also possible to achieve this deliberately in a video game.

While "Dewey thought that children need assistance from their teachers in making sense of their world" (Mooney, 2000 p. 6), it was Vygotsky who formalized the educational value of social connections with his concept of the *zone of proximal development* (ZPD), which refers to:

> "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers." (Vygotsky, 1978, p. 86)

This concept suggests "that ignorant learners can do far better in understanding a matter when prompted or 'scaffolded' by an expert than they can on their own" (Rieber & Robinson, 2004, p. 12). "Vygotsky argued that what children can do with the assistance of others is 'even more indicative of their mental development than what they

can do alone" (Tryphon & Voneche, 1996, p. 146), and that "what children can do now in social interaction becomes, in time, part of their independent repertoires" (p. 147). Vygotsky (1978) observed that students "enlist the assistance of another person in accordance with the requirements of the problem posed for them" (p. 29). The ZPD also illustrated that "interactive situations... allow students to stretch and grown mentally" (Mooney, 2000 p. 91). It is just this sort of interactive situation that video games and simulations excel at providing students. In fact, the most important requirement for a video game to be fun for players is that it meet them at their level of competency and *challenge* them without *frustrating* them. A video game must remain squarely in a player's ZPD in order to be accepted. If a game is too easy, it is rejected and does poorly commercially. If it is too hard, it is too frustrating, and players quickly give up. Good games do what teachers can only aspire to; they adjust to every player in order to provide an appropriate challenge so that they might grow in skill and remain motivated to continue growing. Aside from the obvious elements of engagement and motivation, this may be the most important and clear reason for considering the use of video games for *intentional* learning in formal education environments.

Even in the absence of an expert, "learners 'scaffold' for each other" (Bruner, 1996, p. 21), and community "provides 'scaffolding' for novices" (p. 21). Bruner (1996) saw the ZPD operating as a two-way street because "learning is an interactive process in which people learn from each other, and not just by showing and telling" (p. 22). In his experience, the totality of "our knowledge about the world and about each other gets constructed and negotiated with others" (p. 65). Bruner did caution, though, that "making sense jointly need not be *hegemony*... nor unanimity, but more consciousness. And more consciousness always implies more diversity" (p. 96-97). Here is where multiplayer

games, particularly the expansive and open-ended worlds of MMORPGs, become relevant. It is through these highly nuanced and complex games that players are able to enter into apprenticeships and to mentor others, and in which meaning can be made in a wide diversity of ways, as is reflected by the variety of playing styles and player guilds in MMORPGs. These ideas are explored further in the discussion of Steinkuehler's work in the depth portion of this KAM.

The obvious corollary to the principle of the ZPD is that "learning should be matched in some manner with the child's developmental level" (Vygotsky, 1978, p. 85). It also follows that "learning which is oriented toward developmental levels that have already been reached is ineffective from the viewpoint of a child's overall development" (p. 89) because "instruction ... oriented to the child's weakness rather than his strength, ... encourag[es] him to remain at the [current] stage of development" (1986, p. 189). Therefore "the only "good learning" is that which is in advance of development" (1978, p. 89). Regarding Vygotsky's theory and the assessment of student work, Tryphon and Voneche (1996) wrote:

> "How much help is required provides a better index of students' future learning trajectories in a domain than do static tests. The ease with which students apply, or transfer, principles they have learned is regarded as an indication of student understanding of those principles; and this transfer performance is the most sensitive index of a student's readiness to proceed within a particular domain" (Tryphon & Voneche, 1996, p. 163)

In this way, the playing of video games and simulations, including MMORPGs, and the observation of students playing, might be a better assessment of their abilities than a traditional standardized test. The key, of course, is to find or develop games that can help educators assess what it is they are charged to teach and assess, or else to redefine academic standards to be more in line with the authentic education theories of Dewey, Vygotsky, and Bruner.

In Vygotsky's theory, there was not just one *zone of proximal development* for a child. "Social settings create zones of proximal development" (Tryphon & Voneche, 1996, p. 147), and Vygotsky believed there were indefinitely many developmental zones; "intellectual development is viewed... as a 'ladder,' in Piaget's account, and as a 'web,' in Vygotsky's account" (Tryphon & Voneche, 1996, p. 113). In this way, open ended video games – or multiplayer games, and the social activities that surround them, might serve as a better means of developing students various abilities then a traditional step-by-step classroom.

Bruner (1966) acknowledged Vygotsky's belief that "thought is often an internal version... of dialog." (p. 19). Bruner (1986) wrote that "most of our approaches to the world are mediated through negotiation with others. It is this truth that gives such extraordinary force to Vygotsky's theory of the zone of proximal development" (p. 68). He referred to the ZPD as the "capital... that exists between what people can recognize or comprehend when present before them, and what they can generate on their own" (p. 76). Bruner (1971) went so far as to say that "man's intellect then is not simply his own, but is communal in the sense that its unlocking or empowering depends upon the success of the culture in developing means to that end" (p. 7), a thought that is captured in his phrase "culture-free is intelligence-free" (p. 22). He elaborated, saying:

> "what is most unique about man is that his growth as an individual
> depends upon the history of his species - not upon a history reflected in
> genes and chromosomes but, rather, reflected in a culture external to man's
> tissue and wider in scope than is embodied in any one man's competency."
> (Bruner, 1971, p. 50-52)

Later Bruner (1996) wrote that "learning, remembering, talking, imagining: all of them are made possible by participating in a culture" (p. xi). He believed that "you cannot understand mental activity unless you take into account the cultural setting and its

resources" (p. x), and that "human mental activity is neither solo nor conducted unassisted, even when it goes on 'inside the head" (p. xi). He even concluded that "It is this cultural situatedness of meanings that assures their negotiability and, ultimately, their communicability" (Bruner, 1996, p. 3). Video game players rarely, if ever, succeed in a video game unassisted. Perhaps assistance comes from non-player characters in the game, or perhaps from other players either in the game, or who are playing the game independently. The game playing culture values sharing tips and "cheats," and individuals are valued for their contributions to the community's body of knowledge and others' ability to succeed in a game. Video game players understand this intuitively, and theorists such as those discussed in the depth portion of this KAM have explicated how it is manifest in games.

Bruner (1971) took the ZPD one step further, making the powerful suggestion that social interaction is responsible for "amplifying skills and knowledge: what 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" (p. 53). One important consequence of this for education is Bruner's (1996) suggestion that a student's intellectual abilities "may be as much affected by the accessibility of symbolic systems as by the distribution of genes" (Bruner, 1996, p. 11). Video games may be some of the most complex and sophisticated symbolic systems known to man, and students can develop important 21st Century literacies through playing these games. Also, as has been mentioned before, the cultures both in-game and out-of-game that support players can provide the amplifying affect discussed by Bruner. This is especially true in an MMORPG, in which what an individual can accomplish in

concert with a party of others or a guild thoroughly eclipses what the individual can accomplish on his or her own.

Bruner (1990) found the narrative an important part of this process (p. 43, ,50, 52) because:

> "human beings, in interaction with one another, form a sense of the canonical and ordinary as a background against which to interpret and give narrative meaning to breaches in and deviations from "normal" states of the human condition. Such narrative explications have the effect of framing the idiosyncratic in a "lifelike" fashion that can promote negotiation and avoid confrontational disruption and strife. (Bruner, 1990, p. 67)

For this reason, Bruner (1990) was particularly interested in what he called folk psychology: "the culturally shaped notions in terms of which people organize their views of themselves, of others, and of the world in which they live" (p. 137). Video games, especially role playing games, can offer players opportunities to interact with one another within a narrative. They can also offer opportunities for players to create their own folk psychology, both in open-ended games, and in the social circles related to the games.

Bruner also explored the flip side of socially negotiated meaning - the effect it has on the culture as opposed to the individual. For him, "emotions, cognitions, and actions...[are] aspects of a larger whole that achieves its integration only within a cultural system" (Bruner, 1986, p. 117). He wrote that "a culture is constantly in process of being recreated as it is interpreted and renegotiated by its members" (p. 123). According to Bruner, this interaction and negation can even serve as an intrinsic motivation for students because it "involves a deep human need to respond to others and to operate jointly with them toward an objective" (1966, p. 125). There is no question that this motivation is at work as students help each other to succeed in video games or to succeed in a mutual goal within a multiplayer game such as an MMORPG.

Dewey (1938) advocated for education to include more authentic experience, and Vygotsky (1997) expressed that "experience is 'socially impregnated' through and through" (p. 53). Vygotsky even went on to claim that "any "environment is a social environment, because… in his interaction with the environment, man always makes use of his social experience" (p. 53-54). That being said, Vygotsky felt that "education... is possible only on the basis of an appropriately guided social environment" (p. 210) and that "the nature of man's education... is wholly determined by the social environment in which he grows and develops" (p. 211).

It is already common for competitive as well as cooperative video games, and the social groups that focus on them, to facilitate the kind of collaborative learning that Dewey, Vygotsky, and Bruner were interested in. However, the focus of that learning is sometimes suspect, particularly in games with violent or anti-social themes. Games are beginning to emerge that provide not only a context-embedded, inquiry-driven, and socially negotiated environment, but also a focus on more meaningful social change.

Social Change

Each of these philosophers wrote with a purpose to their educational philosophy. As many educators are, all three were interested in effecting positive social change.

Dewey, largely due to his wife's influence, "was interested in social problems and their relationship to education" (Mooney, 2000, p. 1). He advocated for schools that instill (or in his words, "saturate") students with "the spirit of service, and…the instruments of effective self-direction" in order that we might have a "society which is worthy, lovely, and harmonious" (Dewey, 1915, p. 29). He also felt that in an ideal family "statements are made, inquiries arise, topics are discussed, and the child

continually learns," (p. 35), because he participates by sharing his experiences (p. 35).

Dewey "urged parents to think of new ways they could all find to help children learn to

be socially responsible people, without trying to cling to times gone by" (Mooney, 2000

p. 3). One way that parents, and schools, can accomplish this today is to take advantage

of students' experiences with video games to initiate conversations that help students to

explore and discuss the social issues inherent in the games, even games that are not meant

for social change – even, and perhaps especially, the violent games.

> In *The School and Society*, Dewey (1915) wrote that

>> "The primary business of school is to train children in co-operative and
>> mutually helpful living; to foster in them the consciousness of mutual
>> interdependence; and to help them practically in making the adjustments
>> that will carry this spirit into overt deeds."

> As students collaborate in their participation in playing video games they develop

these very values of mutually helpful living and mutual interdependence, and for the

same reason that video games inherently offer an active rather than passive learning

environment, they also require that this spirit of collaboration carry into overt deeds.

Players must *do* in order to succeed in a game, they can not merely pay their values lip

service.

> Vygotsky's educational theory was "a theory of cultural transmission as well"

(Rieber & Robinson, 2004, p.10 472). He noted (and formalized) the fact that "it is only

necessary to change the social environment, and human behavior likewise changes at

once" (Vygotsky, 1997, p. 48). Vygotsky defined education as

>> "a systematic, purposeful, intentional, and conscious effort at intervening
>> in and influencing all those processes that are part of the individual's
>> natural growth... a process of social selection... [that] creates... the outward
>> personality [from the multiple potential personalities of a child]. Out of the
>> individual, as biological type, it forms, though selection, man as social
>> type." (Vygotsky, 1997, p. 58)

This can be an argument both for the development of explicitly educational games – games designed as constructivist learning environments, and for the importance of adults engaging students in conversations about the popular commercial games that the students are already playing.

In Vygotsky's wake, Bruner (1966) thought that "by [exploring the limits of man's perfectibility, education] can… have its major social impact by keeping lively the society's full sense of what is possible" (p. 38). Bruner went on to say that "if we are to do justice to our evolution, we shall need, as never before, a way of transmitting the crucial ideas and skills, the acquired characteristics that express and amplify man's powers" (p. 38). Bruner aimed to "make children aware that there is a structure in a society and that this structure is not fixed once and for all" (p. 83). Later he wrote that "it is far more important, for appreciating the human condition, to understand the ways human beings construct their worlds... [than] the products of these processes" (1986, p. 46). Bruner understood 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). For this reason, and because "culture is constantly in process of being recreated as it is interpreted and renegotiated by its members," Bruner (1986) felt that "education is (or should be) one of the principal forums for performing this function - though it is often timid in doing so" (p. 123). Games such as the United Nations World Food Program's (WFP) *Food Force*, Carnegie Melon's *PeaceMaker*, and Cisco's *Peter Packet* are beginning to be designed explicitly with the goal of helping players understand ways in which they can help change society for the better.

Dewey's (1926) pedagogical philosophies aligned with this view. His support for cross-curricular (and context-embedded) education was at least in part an effort to avoid

Wagner 40

"the isolation of social groups and classes" (p. 249). As video games are inherently cross-curricular and context embedded, they might also be a useful part of such an education. Dewey called it "the business of education in a democratic social group to struggle against this isolation" (p. 249), and he went on to define the "problem of education in a democratic society" as the need to "construct a course of studies which makes thought a guide of free practice for all and which makes leisure a reward of accepting responsibility for service, rather than a state of exemption from it" (p. 261). In today's society, leisure for those who play video games includes a great deal of challenging thought, and might also be focused on the sort of social change Dewey sought. Individualized instruction was another passion of Dewey's and he called for a progressive society that would "utilize and support" individual diversities rather than dominate or repress them, as more conservative traditional education practices often do (p. 305). He explained that:

> "A society based on custom will utilize individual variations only up to a limit of conformity with usage; uniformity is the chief ideal within each class. A progressive society counts individual variations as precious since it finds in them the means of its own growth. Hence a democratic society must, in consistency with its ideal, allow for intellectual freedom and the play of diverse gifts and interests in its educational measures." (Dewey, 1926, p. 305)

If video games are to be used in pursuit of this goal, it is the open ended games and simulations that may be best suited to encouraging and nurturing individual variations in creative problem solving. As has been suggested earlier, video games of all sorts excel at individualized instruction, as they meet students at their own level and challenge them without frustrating them, all without interrupting other students, who can be equally engaged in their own learning games.

Dewey (1926) called for a school that "develops power to share effectively in social life... [, interest] in that continuous readjustment which is essential to growth...[,

and] in learning from all the contacts of life." (p. 360). In fact, he even felt it was "futile to conceive the moral end as the unifying and culminating end of education [unless the learning which accrues in the regular course of study affects character]" (p. 360). Vygotsky, too, believed that "an educational system without definite, positive societal goals is impossible" (Rieber & Robinson, 2004, p.174). This is why it is important to explore the social goals of video games, even those that do not profess any such goals explicitly. The goals of popular games may not be as terrible as mainstream media makes them out to be, but they must be examined (and with the students who play the games) none the less.

Most importantly in the context of technology, Dewey (1926) felt that "industrial life is now so dependent upon science and so intimately affects all forms of social intercourse, that there is an opportunity to utilize it for development of mind and character" (p. 320). Technologies such as video games and simulations that allow students to create and participate in ways that were never before possible also make Bruner's vision more important than ever. Bruner (1986) felt that if a student "develops a sense of self that is premised on his ability to penetrate knowledge for his own uses, and if he can share and negotiate the result of his penetrations, then he becomes a member of the culture-creating community" (p. 132). To Bruner, "the language of education is the language of culture creating, not of knowledge consuming or knowledge acquisition alone" (p. 133). Video game players are very much a part of a culture creating community. Many games, particularly MMORPGs, take on a new life once designers release them to the players, and players not only create characters and other creations within the games, but also modify the games themselves. As has been discussed before,

they also frequently publish their creations, and share their experiences, via online forums and fan sites.

Because of the importance of helping students to become conscious creators of culture, Bruner (1986) felt education's central concern was "how to create in the young an appreciation of the fact that many worlds are possible, that meaning and reality are created and not discovered, that negation is the art of constructing new meanings by which individuals can regulate their relations with each other... the power to recreate reality, to reinvent culture" (p. 149). Video games may be the ideal medium for instilling the belief that many worlds are possible and that students can influence (and even create) new worlds. Many games are set in fantasy or science fiction settings, and in every game, players are able to influence the outcome of events in that world, and perhaps even the nature of the world. In a very concrete sense, it is realistic for students to embark on the adventure of modding or creating new game worlds themselves. The technical skills are within the grasp of surprisingly young children.

Later, Bruner (1996) even asked if

"Given the revolutionary changes through which we are living, [would schools] do better to dedicate themselves to the.. risky, perhaps equally quixotic ideal of preparing students to cope with the changing world in which they will be living? And how shall we decide what that changing world will be and what it will demand of them? … education is not just about conventional school matters like curriculum or standards or testing." (Bruner, 1996, p. ix)

It may be that by playing a variety of games with a variety of underlying rules requiring a wide variety of strategies to be successful, and by moving from game world to game world often taking on new identities, students are developing some degree of skill in dealing with change. Perhaps video games can be harnessed and intentionally used this way in formal education.

Because "education is not an island, but part of the continent of culture" (Bruner, 1996, p. 11), he also asked if "schools and classrooms [can] be designed to foster... tradition-inventing" (p. 24). He was explicitly interested in schools as "counter-cultures" that "serve to raise the consciousness and meta-cognition of their participants as well as enhancing their self-esteem" (p. 78), and that facilitate the "cultivation of a new awareness about what it is like living in a modern society" (p. 82). Video game players are accustomed to tradition inventing, and many perceive themselves as counter-cultural on account of their status as "gamers." Certainly they are unafraid to play games that have been derided or dismissed by the mainstream media. The very recognition of this may raise their awareness of their role in modern society, and some games, including the much maligned *Grand Theft Auto* include elements of sophisticated social satire that can serve to raise awareness as the player engages the game as well.

Ultimately, Bruner called for

"the kind of community effort that can truly address the future of our educational process - an effort in which all of the resources of intellect and compassion that we can muster, whatever the price, are placed at the disposal of the schools... all the standards in the world will not, like a helping hand, achieve the goal of making our multicultural, our threatened society come alive again, not alive just as a competitor in the world's markets, but as a nation worth living in and living for." (Bruner, 1996, p. 118)

The move to include video games and simulations in formal k12 education will be an expensive one, but if Bruner's call is to be answered, this society will not spare the expense, and will instead give students the tools that will help them develop a competitive edge – and a social consciousness to guide them in applying their skills.

The desire of Dewey, Vygotsky, and Bruner to effect positive social change can be put to work in modern video games. Some games have been designed with the explicit

purpose of changing player's attitudes, and it could be said that any game meant to be educational is a game meant for social change.

Conclusion

In light of Dewey, Vygotsky, and Bruner's work, a social constructivist learning environment can clearly be characterized as one that facilitates context-embedded, inquiry-driven, and socially negotiated learning. Ideally, such an environment is also a vehicle for effecting positive social change. Clearly video games and simulations, particularly MMORPGs, can provide all of these elements of a social constructivist learning environment and may thus be powerful tools for *intentional* learning in a formal k12 education environment.

Each of these theorists saw education as an integral part of life in general. You might say they were interested in education *and life*. Dewey (1915) hoped that a progressive school would be concerned with "living primarily, and learning through and in relation to this living" (p. 26). To do so, he hoped schools would offer access to "all the media necessary to further the growth of the child" (p. 26). Today that media would include educational technologies such as video games and simulations. Dewey would let little stand in the way of providing these technologies to students. He felt that the imperative to reform education was "not a question of the waste of money or the waste of things… but the primary waste is that of human life, the life of the children while they are at school, and afterward because of inadequate and perverted preparation" (p. 64).

Bruner shared these sentiments. He called "John Dewey's *My Pedagogic Creed*, a movingly concerned document" (Bruner, 1966, p. 23). In keeping with Dewey's love of democracy, Bruner understood that "the political process... is slow, perhaps, but is

committed to the patient pursuit of the possible" (p. 23), but three decades later he

concluded that

> "we shall have to bring far greater resources to bear in designing our
> educational system. For one thing, if we are to respond to accelerated
> change, then we shall have to reduce turn-around time in the system. To
> do this requires greater participation on the part of those at the frontiers of
> learning." (Bruner, 1966, p. 37)

The technologies, such as video games and simulations, are now available to

bring these philosophies to fruition as never before. It is the responsibility of educators,

educational technologists, and policy makers everywhere to be sure that the necessary

resources are brought to bear, and in a timely way, so that constructivist learning

environments such as these theorists describes might come to be in our formal public

education systems.

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Depth

Introduction

This depth section of the Knowledge Area Module (KAM) is a critical examination of cutting edge digital game-based learning theories in light of the working theory of constructivist societal development developed in the breadth section. This examination will focus on the work of Shaffer, Squire, and Steinkuehler from the *Games, Learning, and Society* program at the University of Wisconsin, Madison. Their theories support the argument that video games, particularly massively multiplayer online role playing games (MMORPGs), can serve as social constructivist learning environments, and thus as instruments for effecting positive social change in formal k12 education.

These theorists ask the question, "how can we use the power of video games as a constructive force in schools, homes, and workplaces?" (Shaffer, Squire, & Gee, 2005, p. 105). Squire (2002) is even interested in what people are learning from commercial off the shelf games such as *SimCity*, *Civilization*, *Tropico*, and *SimEarth*, and he argues that it is critical to determine if such games can be used in formal learning environments (p. 1). Steinkuehler (2005) is also "keenly interested in the intellectual substance of such virtual worlds: What do people learn though participation in such spaces? And how is it that this learning happens?" (p. 20).

These questions are motivated by the observation that "school is increasingly seen as irrelevant by many students who are past the primary grades" (Shaffer, Squire, & Gee, 2005, p. 110). Teachers and parents are concerned about students' apparent lack of attention span in school, while the same children are clearly able to remain interested in playing video games for hours on end. Steinkuehler writes that:

"what students do with online technologies outside the classroom is not only markedly different from what they do with them in schools (e.g. instant messaging, blogging, sharing files, consuming and producing media, engaging in affinity spaces, gaming, building social networks, downloading answers to homework, and researching for school projects and assignments), but it is also more goal-driven, complex, sophisticated, and engaged. If we care to understand the current and potential capacities of technology for cognition, learning, literacy, and education, then, we must look to contexts outside our current formal educational system rather than those within. Video games are an excellent starting point for such investigation." (Steinkuehler, in press, p. 3)

This is because video games, and the social activities that surround them, allow gamers the opportunity to participate in nearly all of these forms of communication, creation, and learning. MMORPGs in particular allow instant messaging within the game. Many players blog about their experiences, and provide tips for others. Some share files for modding their games, and most build social networks and download tips and research related to their games. By its nature, gaming is goal-driven and engaging, so there is great promise for their use as social constructivist learning environments in formal education.

Sixty-five percent of high school and college students describe themselves as gamers (Jenkins, Klopfer, Squire, & Tan, 2003, p. 2). Now it seems "the challenge is how to design games that communicate more sophisticated content" (p.2). So, in these theorists' vision for a public high school just a few years from now, "games are enhancing traditional educational tools such as lectures, discussions, lab reports, homework, fieldtrips, tests, and text books. Games are being allowed to do what games do best, while other kinds of teaching support those lessons" (Jenkins, Klopfer, Squire, & Tan, 2003, p. 1). The time for taking steps toward this future is now, as they believe "the medium [of video games] is now robust enough to support a broad range of school content" (Jenkins, Klopfer, Squire, & Tan, p. 3).

Each of these theorists displays social constructivist tendencies, sometimes explicitly. For instance, Shaffer is interested in the use of video games and simulations to implement Dewey's philosophies. He writes that:

> "Dewey's work, written in an industrial era, cannot be applied directly to educational practice in an age increasingly marked by social and economic transformations of new technology... What would it mean if we took this program seriously today? What new relationships among learning, technology, and citizenship emerge if we ground educational practice in the postindustrial technologies of communication and information? What would such a program look like, and what would its implications be?" (Shaffer, 2004a, p. 1401)

Shaffer and his colleagues are especially concerned with using video games to answer these questions. They explored the use of existing commercial games to enhance the relationship between learning, technology and citizenship, and they experimented with the creation of new games to further these connections.

In fact, Shaffer (2004a) advocated for establishing "a laboratory for experiments in education and democracy" (p. 1402) like Dewey's school in Chicago, but made for the information age, "when the school is no longer the only (or necessarily even the primary) focus of education and when the boundaries of cognitive, social, and moral development are more complex and porous than even 30 years ago" (p. 1402). Like Dewey, these theorists also believed that "the foundation for innovation has to be laid from the start... it starts in kindergarten and before" (Shaffer & Gee, 2005, p. 6-7), and "the problem is that *innovative work* is by definition something that *can not be standardized*" (p. 12). As was discussed in the breadth section of this KAM, video games may be an excellent medium for differentiating instruction for all students.

Also, like Dewey's early foreshadowing of Thomas Friedman's (2005) *The World is Flat*, Squire, Steinkuehler, and Shaffer discuss similar themes. Shaffer said that:

"this crisis is not just a crisis of economics or politics. At its core, this is a crisis in education—a crisis in education unlike any we've seen before.... The coming crisis is this: Young people in the United States today are being prepared—in school and at home—for 'commodity jobs' in a world that will, very soon, only reward people who can do 'innovative work' and punish those who can't." (Shaffer & Gee, 2005, p. 1)

Video games are more like 21st Century tools, and the cultures that surround them more like the cultures of the 21st Century workplace, than the tools and cultures of traditional education could ever be. In addition to the other cognitive benefits of video games, they also encourage students to develop technical skills that will be valuable in a new economy that has moved beyond a commodity economy – and beyond an information economy – to an economy of ideas or creativity.

So, as Dewey, Vygotsky, and Bruner were, it is clear that Squire, Steinkuehler, and Shaffer were equally interested in social change. It is also clear that they found video games and simulations to be a promising medium for effecting this change. Before discussing the specifics of their drive for social change, though, it is first important to understand their fundamentally constructivist philosophies as well.

Constructivism

Each of these theorists were conducting research on the power of video games and simulations to serve as learning environments because they fundamentally subscribed to a constructivist view of learning. This view was built upon the work of theorists in the breadth portion of this KAM. Shaffer and Squire reminded us that "a century ago, John Dewey argued that schools were built on a fact fetish, and the argument is still valid today" (Shaffer, Squire, & Gee, 2005, p. 107). When considering the relevance of Dewey's ideas in the 21st century, they claimed "there is a lot being learned in these games… because these virtual worlds aren't about memorizing words or definitions of

facts… video games are about a lot more" (Shaffer, Squire, & Gee, p. 107). Elsewhere

Squire wrote that "knowledge developed through game play is not pointless information

to be recalled for tests, but is valuable information when confronting new challenges and

solving problems" (Jenkins, Klopfer, Squire, & Tan, p. 6). Squire was even explicitly

constructivist when he discussed Orson Scott Card's 1985 science fiction novel, *Enders*

Game, and he described the learning environment depicted in the book as one in which

"games teach by encouraging competition, experimentation, exploration, innovation, and

transgression... a constructivist utopia" (Squire & Jenkins, 2004, p. 7). In his explication

of the book he wrote that:

> "instead of replacing the textbook, [Card] argued, educational
> games should be more like the school corridors, where kids experiment,
> interact, create, and share what they create with others, outside the rigid
> structures that contemporary games impose. At their best, games are
> imaginary worlds, hypothetical spaces where players can test ideas and
> experience their consequences." (Squire & Jenkins, 2004, p. 8)

It follows that video games for education should involve more than simply

memorizing facts, as many "edutainment" products do. Rather, games for education

should provide students with authentic challenges and problems to solve, and should

encourage exploration, experimentation, interaction, innovation, creation, transgression,

and sharing. The games Shaffer, Squire, and Steinkuehler are interested in are

sophisticated and complex, unlike the previous generation of educational video games,

such as *Reader Rabbit* or *Math Blaster*. This element of sophistication should be

considered when selecting (or designing) games for a 21st Century education.

Squire felt that Card "predicted the more open ended, highly responsive

environments represented by next-generation games such as Grand Theft Auto 3,

Morrowind, or Deus Ex" (Squire & Jenkins, 2004, p. 8), environments that Squire in turn

advocated for in formal education. Steinkuehler (2006) also found such environments "an

extremely valuable context for the study of cognition" (p. 2). She was particularly interested in using games to study "how a given sociocultural context shapes and influences individual activity and meaning making through socialization and enculturation… and how the individual shapes and influences the culture in which he or she participates in return" (Steinkuehler, 2006, p. 2). The attributes of video games she found useful for study are the very attributes that make them valuable in education. Particularly promising are those games that are open ended, and that facilitate a two-way functioning of socialization through which both the society and the individual can influence the development of the other.

These theorists were interested in the construction of knowledge by students, even in a very literal and pragmatic sense. As Shaffer wrote, "today it is not nearly good enough to be able just to read that textbook—you have to be able to produce and not just consume, to make knowledge and not just receive it" (Shaffer & Gee, 2005, p. 9). In this way, Shaffer follows in the constructivist tradition of educational technologists Papert and Jonassen (Wagner, unpublished). Video games offer many opportunities for players to produce content and to make knowledge, particularly in open-ended games like MMORPGs, but also in activities based on a game, such as modding a game or authoring an online walk-through.

Based on their constructivist philosophies, Shaffer, Squire, and Steinkuehler were each interested in games that can provide student players with an environment that facilitates context-embedded, inquiry driven, and socially negotiated learning.

Context-Embedded

One of the central tenets of social constructivism is that learning is most effective when it is embedded in a meaningful authentic context. Shaffer, Squire, and Steinkuehler, believed this context can be provided by video games and simulations.

The essence of their perspective is captured by Shaffer and Squire's understanding that "video games are important because they let people participate in new worlds" (Shaffer, Squire, & Gee, 2005, p. 105). Put another way, "games take advantage of situated learning environments" (p. 108). More importantly, "the virtual worlds of games are powerful because they make it possible to develop *situated understanding*" (p. 106). Consistent with the constructivist ideals discussed above, many video games and simulations require students to apply their knowledge in context; "instead of learning facts, information, and theories first and then trying to apply them, the facts, information, and theories are learned and remembered because they were needed to play the game successfully" (Shaffer & Gee, 2005, p. 21-22). In some even more powerful examples, "the virtual worlds of games are rich contexts for learning because they make it possible for players to experiment with new and *powerful identities*" (Shaffer, Squire, & Gee, 2005, p. 106). By allowing students to take on new identities and participate in new worlds where they can develop situated understanding and apply that understanding in context, video games can provide a meaningful environment for learning. These games can be commercial off the shelf games that are repurposed for educational goals, or they can be games designed to provide a context for learning the content of traditional academic subjects.

Squire explores several specific games designed to provide learning in context. For example, in the prototype of the educational video game *Supercharged!* students are

learning in context by controlling the path of electrons in simulated molecules (Jenkins,

Klopfer, Squire, & Tan, p. 5). Such games are "motivating and authentic" without being

"dangerous and expensive" (p. 7). In another example, MIT's *Revolution*, a mod (or

modification) of the commercial game, *Neverwinter Nights*, students learn about the

American revolutionary war by taking on the role of a character in colonial

Williamsburg. In *Revolution,* "the game world is big enough so that each student can play

an important part, [yet] small enough that their actions matter in shaping what happens"

(Squire & Jenkins, 2004, p. 16).

> "*Revolution* builds on what we already know about the value of combining
> research and role-playing in teaching history, that is, the game offers kids
> the chance not simply to visit a "living history" museum like
> Williamsburg, but to personally experience the choices that confronted
> historical figures." (Jenkins, Klopfer, Squire, & Tan, p. 9)

Not only does *Revolution* embed "primary documents from the period in the

game" (Squire & Jenkins, 2004, p. 18), it also provides a perspective that students could

never learn from reading a text. Squire pointed out that:

> "a central assumption underlying the game is the interplay between
> personal and local concerns (making a living, marrying off your children,
> preparing for a party) and the kinds of national and very public concerns
> that are the focus of American history classes (the Stamp Tax, the Boston
> Tea Party, the shots fired at Lexington, the winter at Valley Forge)"
> (Squire & Jenkins, 2004, p. 17).

This example highlights three of the most powerful benefits of context-embedded

learning in a video game. First, "students learning in the context of solving complex

problems not only retain more information but tend to perform better in solving

problems" (Squire & Jenkins, 2004, p. 28). Secondly, and more powerfully, "games

encourage role playing, which can... help students... to adopt different social roles or

historical subjectivities" (Squire & Jenkins, 2004, p. 28). In terms of the narrative

involved in role playing, Squire (2003) even suggests that "interactive digital storytelling

should emerge as a legitimate art form in the upcoming years, and video games seem to be paving the way" (p. 9). Finally, games provide a kind of learning that is impossible using traditional linear teaching methods. Video games allow learners to: "manipulate otherwise unalterable variables... [and] view phenomena from new perspectives" (p. 6). These three things can serve as benchmarks for evaluating games for use in education, and for designing games for education. Ideally, a game for education should provide an environment that helps develop students' problem solving skills, encourages them to role-play new social identities, and allows them to manipulate important variables so that they can generate and test their own theories about the subject matter.

Steinkuehler (in press) also discusses the importance of identity in players' learning process (p.20). She is particularly concerned with Massively Multiplayer Online Role Playing Games (MMORPGs), games in which thousands of players can take on unique identities within a persistent online world. The element of context is so important that she considers playing an MMORPG to be "participation in a multimodal, and digital textual *place*" (Steinkuehler, 2005b, p. 98). Within these places, "information is given 'just in time,' always in the context of the goal-driven activity that its actually useful for – and made meaningful by – and always at a time when it can be immediately put to use." (Steinkuehler, 2004b, p. 7) Ultimately, within the context of these game places, Steinkuehler feels that "the reader becomes or inhabits a symbol, enabling him or her to interact with signs *as if* they are the very things they represent" (Steinkuehler, 2005b, p. 99). This is undoubtedly a social process for Steinkuehler, who wrote about "the situated meanings individuals construct, the definitive role of communities in that meaning, and the inherently ideological nature of both" (Steinkuehler, in press, p. 17). Video games for education can provide a powerful context for learning when they allow students to

participate in rich digital places where they can interact with symbols to develop situated meanings within a community.

Shaffer, too, was interested in the context games can provide for learning. Alluding to the work of Papert, he discussed the concept of *"computational microworlds*, which Hoyles, Noss, and Adamson (2002) define as 'environments where people can explore and learn from what they receive back from the computer in return for their exploration'" (Shaffer, 2005, p. 18). Drawing on vocabulary and concepts developed by Papert, he found that "new computational media in the form of video games, simulations, and other microworlds expand the range of domains that can be made accessible to students as a medium for meaningful activity" (Shaffer, 2005, p. 28). Put simply, Shaffer believed that "new technologies make it easier for students to learn about the world by participating in meaningful activity" (Shaffer, 2004a, p. 1403), and that "new technologies support Dewey's vision of bringing the ''life of the child'' into an environment for learning" (Shaffer, 2004a, p. 1404). Video games are among these new technologies, as they can offer opportunities for exploration, feedback, and meaningful activity. Games for education can be explicitly designed to provide these things in such a way as to engage students and draw them into the learning environment.

Shaffer explained the ways in which "knowing *that* and knowing *how* - ...declarative and procedural knowledge - are incomplete without the capacity of 'knowing *with*' which... [he] describes as providing 'a context within which a particular situation is perceived, interpreted, and judged'" (Shaffer, in press, p. 10). In fact, Shaffer's (2005) work related to learning in games is focused on what he calls *epistemic frames*, or "a form of knowing *with* that comprise[s], for a particular community, knowing *where* to begin looking and asking questions, knowing *what* constitutes

appropriate evidence to consider or information to assess, knowing *how* to go about

gathering that evidence, and knowing *when* to draw a conclusion and/or move on to a

different issue" (p. 22). For Shaffer,

> "the ability of students to incorporate epistemic frames into their identities
> (or portfolio of potential identities) suggests a mechanism through which
> sufficiently rich experiences in technology-supported simulations of real-
> world practices… may help students deal more effectively with situations
> in the real-world and in school subjects beyond the scope of the interactive
> environment itself." (Shaffer, in press, p. 19)"

Games for education can thus be chosen or designed to provide instruction not

only in academic content, but also in processes and the application of these knowledge

and processes in context. Also, they can be chosen or designed to provide opportunities

for students to develop their portfolio of identities.

Ideally the knowledge that students construct within the context of a game will

transfer to use in other contexts (Shaffer, 2004a, p. 1411). Shaffer (in press) concluded in

one of his studies that "students developed useful real-world skills and understandings in

computer-supported role-playing games" (p. 3). In a particular example, he shared that

> "games such as Escher's World can accomplish, in a very general but very
> important sense, the elusive educational goal of producing worthwhile
> effects that transfer from one context to another (Bransford, Brown, &
> Cocking, 2000) – in Natalie's case, from a summer role-playing game
> using mathematics and digital art to performance in school more
> generally." (Shaffer, in press, p. 4)

Without transfer of skills, a video game for education has failed in its purpose.

Such games should therefore be chosen for their potential to help students develop

valuable real-world skills and understandings.

In Shaffer's approach, "students do things that have meaning to them and to

society, supported all along the way by structure, and lots of it—structure that leads to

expertise, professional-like skills, and an ability to innovate" (Shaffer & Gee, 2005, p.

12). He believed that "new technologies connected to computer games, video games, and simulations—as well as handheld computing devices and the Internet—can let students learn to innovate by participating in simulations of professional practica" (p. 14). What Shaffer calls *epistemic games* "are about having students do things that matter in the world by immersing them in rigorous professional practices of innovation" (p. 12). In his vision, "with epistemic games students don't have to wait to begin their education for innovation until college, or graduate school, or their entry into the work force. In these games, learning to think like innovative professionals prepares students for innovative work" (p. 19). Video games and simulations for education, then, should include sufficient structure to provide an environment where students can develop professional skills by participating in simulations of professional practice, and where students are able to innovate within these simulated contexts.

This approach is modeled after practices developed long before video games and simulations. Shaffer explains that "the key step in developing the epistemic frame of most communities of innovation is in some form of *professional practicum…* [or] environments in which a learner acts in a supervised setting and then reflects on the results of his or her action with peers and mentors" (p. 14). Such practicum are clearly social in nature and are directly related to Vygotsky's zone of proximal development, which is discussed in more depth later in this portion of the KAM. It follows that games in education should provide similarly social (and supervised) environments that challenge students without frustrating them.

Shaffer's focus on such practicum also supports his efforts to achieve authenticity in the learning environment. Earlier he wrote that:

"pedagogical praxis seeks to create environments that are thickly authentic… [and] authenticity is an alignment between activities and some combination of (a) goals that matter to the community outside of the classroom, (b) goals that are personally meaningful to the student, (c) ways of thinking within an established domain, and (d) the means of assessment. Thickly authentic learning environments create all of these alignments simultaneously for example, in the case of pedagogical praxis, when personally meaningful projects are produced and assessed according to the epistemological and procedural norms of an external community of practice." (Shaffer, 2004a, p. 1406)

Video games and simulations, of course, can provide a learning environment with all of these elements. Even many popular commercial games are focused on subjects that matter to the community, and that are personally meaningful to the students. The game structure alone lends an opportunity for students to become involved and invested in the subject matter. Games for education should also include a means of assessment, and ideally should be created with the purpose of helping students develop ways of thinking relevant to a particular domain, whether a professional practice such as Shaffer is concerned with, or an academic discipline such as science, mathematics, business, or even literature.

Later Shaffer summarized the benefits of epistemic games based on professional praxis when he wrote that:

"epistemic games of all kinds make it possible for students of all ages to learn by working as innovators. In playing epistemic games, students learn basic skills, to be sure. They learn the "facts" and "content" that we currently reward. But in epistemic games students learn facts and content in the context of innovative ways of thinking and working. They learn in a way that sticks, because they learn in the process of doing things that matter. Epistemic games thus give educators an opportunity to move beyond disciplines derived from medieval scholarship constituted within schools developed in the industrial revolution—a new model of learning for a digital culture and a global economy."   (Shaffer & Gee, 2005, p. 24)

This may be the most powerful potential of video games and simulations to serve as learning environments. They can allow even young students to learn to apply their

skills and knowledge, and to innovate, in context as they learn, rather than years later when their power to solve problems creatively has been stunted by years of rote schooling. This capacity to encourage innovation can be a powerful criterion for choosing or designing games for education.

In this ever-changing digital culture and economy, there are increasingly new technologies that can provide the learning environments necessary for an epistemic game. For instance, the emerging concept of ubiquitous gaming, or augmented reality, describes games that can be "played anytime, anywhere and often play out across multiple media" (Squire & Jenkins, 2004, p. 22), usually on GPS enabled handheld devices. This combination of the real and virtual worlds may improve the transfer of skills. It is important to note that the military, the heaviest users of video games and simulations for training purposes, compliments these with real-world simulations whenever possible (Squire & Jenkins, 2004, p. 9). Ultimately, Squire cautions that games are only simulations, not the real thing:

> "In short, playing Civilization might be a tool that can assist students in understanding social studies, but playing the game is not necessarily participating in historical, political, or geographical analysis. Therefore, building on our earlier discussion of transfer, there is very good reason to believe that students may not use their understandings developed in the game - such as the political importance of a natural resource like oil - as tools for understanding phenomena outside the game, such the economics behind The Persian Gulf War or contemporary foreign policy, even in a game as rich as Civilization III" (Squire, 2002, p. 9).

The role of the teacher is thus particularly important in mediating a student's understanding of a game and transferring that understanding into application in novel contexts. If video games and simulations are to be used to provide a context for learning, this should not be in the absence of a teacher to facilitate and coach students through the experience.

Even so, games can provide a powerful environment for context-embedded learning, particularly because they are able to adapt to the learner, thus providing an unprecedented level of individualized instruction and inquiry-driven learning.

Inquiry-Driven

Another foundational principle of social constructivism is the belief that learning is most effective when it is driven by the students' own curiosity, interests, and drive to learn. Shaffer, Squire, and Steinkuehler support this ideal as strongly as did Dewey, Vygotsky, and Bruner, but they live in a time when technology makes a great deal more possible.

As Shaffer reflected, "computers expand the range of what students can realistically do—and thus the range of concepts that can be 'experienced'—far beyond what the Pragmatic Progressive Dewey might ever have imagined. Computers and other new technologies accomplish this by making it possible to create *virtual worlds*" (Shaffer, 2005, p. 16-17). Video games may be the most common form of virtual worlds, and such games, particularly MMORPGs, can thus support the development of students' islands of experience. Shaffer defined an island of expertise as "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, in press, p. 5), and he explained that islands of expertise "develop 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, in press, p. 6). These islands are not necessarily focused on traditional academic subjects such as history or math, but "may be rooted in dinosaurs, mythology,

computers, science, or art, but their real import is the preparation they give these children for life-long learning as they face the ever increasing demands of complex language, symbols, and practices at higher and higher levels of schooling" (Shaffer & Gee, 2005, p. 7). Video games can both provide a context for developing such islands of interest, and be the focus of students' interest. For example, a student's interest in *Age of Mythology* can lead to an interest in Greek and Roman mythology, and then to literature and literary criticism. As a context for developing islands of expertise, the virtual worlds provided by video games should be selected for their flexibility in harnessing students' interests, capacity in helping students develop deep rich knowledge, and the opportunities they offer for collaborative interaction. The massive and multiplayer worlds of MMORPGs may be ideal for meting these conditions, particularly if specifically designed for educational purposes.

Shaffer's epistemic frames have a basis not only in content knowledge, but also in "interest, identity, and associated practices" (Shaffer, in press, p. 10). Like Dewey and other social constructivists, Shaffer (2005) believed that "curricula must be adapted to the needs and abilities of learners" (p. 7), and that the purpose of education was "to take a child's initial intentions and expressive impulses and move them down productive lines of inquiry" (p. 9). He also fell in line with the progressive model with his focus on "channeling individual intentions into reflective media—that is, into media in which the constraints and affordances are relevant to the processes of inquiry being developed." (Shaffer, 2005, p. 10-11) Video games can of course serve as the initial interest with which to begin a productive line of inquiry such as Shaffer calls for, or they can provide the media (constrained by their rules and underlying mechanics) appropriate for developing the process of inquiry.

Shaffer was interested in opening "multiple legitimate pathways to learning: a multiculturalism of inclusion and diversity… in which the different backgrounds and perspectives of students are respected as legitimate points of entry into the educational landscape" (Shaffer, 2005, p. 28-29). He dubbed this *multisubculturalism*, "a view of education that focuses on diverse educational goals rather than diverse pathways to a single pedagogical end—and thus a view of learning more suited to the diverse ways of thinking and living that characterize our increasingly integrated world" (Shaffer, 2005, p. 2). Drawing a distinction between his ideas and Dewey's, Shaffer says that while Dewey "embraced diversity philosophically, his pedagogy allowed for only a weak form of multiculturalism… [that] celebrated multiple pathways to understanding, but multiple pathways to a single form of understanding… a *multiculturalism of means*, rather than a *multiculturalism of ends*" (Shaffer, 2005, p. 6). Video games and simulations for education should, then, support both multiple pathways to learning, and multiple learning goals.

Video games do provide both a multiculturalism of means and a multiculturalism of ends in a variety of ways. Steinkuehler (2004b) writes about the way games offer a "socially- sanctioned precociousness and wonder, that simple secular instinct that provides motivation for scientific inquiry" p.7). Based on her observations as an ethnographer within MMORPGs, she reports that "gamers transform design curiosities into empirical questions by collecting data (in spreadsheets), building mathematical models based on that data, and then placing those models in competition with one another to see which can most accurately predict (read: exploit) the system" (p. 7). Simply put, video games allow players to "pose hypothetical questions to a system" (Squire, 2003, p. 6) and to "draw meaning from every element in their environment to solve problems that

grow organically from their own goals and interests" (Squire & Jenkins, 2004, p. 15). In addition, Steinkuehler (2005b) documented ways in which MMORPGs "serve as both the *tool for* (e.g. archiving digital documents, accessing participant information) and *object of* (e.g. fan fiction, virtual social interaction) inquiry" (p. 96). Ultimately, the "freedom to explore can be both meaningful and motivating for students, affording them a sense of control and personal investment in their inquiry" (Shaffer, 2005, p. 28). These elements of video games have long been understood to be valuable elements of a social constructivist learning environment that facilitates inquiry-driven learning. Video games that are to be used in education should therefore include these elements of wonder, hypothetical questioning, and solving problems of interest to the students. Here again, MMORPGs are an ideal medium for providing each of these things.

Squire, in particular, wrote about several specific games that facilitate inquiry-driven learning. In the prototype *Prospero's Island*, which offers students an interactive world modeled after Shakespeare's *The Tempest*, students can "reshape the world and rework the narrative of the original play" (Squire & Jenkins, 2004, p. 21). The game's "focus on the performance process suits a nonlinear, more open-ended medium where no two players will have exactly the same experience" (p. 21). The prototype *Supercharged!,* mentioned in the previous section, also includes elements of inquiry and choice (Jenkins, Klopfer, Squire, & Tan, p. 6). In addition, Squire writes about the opportunities for inquiry in the commercial off the shelf game, *Civilization III*. He concluded that "exactly what students learn from the game-playing experience depends heavily on the goals they set for themselves." (Squire & Jenkins, 2004, p. 13). And, in his experience the questions they ask about the game are "are also driven by the students' personal histories" (Squire & Jenkins, 2004, p. 14). Even though the simulation of history

provided by the game is a highly simplified version of history, which may not directly help students to learn the traditionally taught events of history, Squire even found that the "what if" questions students asked about the game "can motivate further reading or discussion, helping them to refocus on why the actual events unfolded the way they did" (Squire & Jenkins, 2004, p. 14). When games encourage inquiry-driven learning, they help students not only to master cyclical and systems content, but also to access the traditional linear content within an authentic context. Based on these examples, games that are chosen or designed for education should provide individualized experiences and goal setting in a way that allows students to reshape the game-world and that motivates further reading and discussion. Here, too, a teacher can play an important role in extending students' learning beyond the games by taking advantage of their interest in the game.

Shaffer returned to Dewey in his discussion of inquiry-driven learning in games. He concluded that "the challenge is in finding a way to channel students' inherent interests into the development of 'discipline, culture, and information'" (Shaffer, 2005, p. 8). Ultimately, Shaffer, Squire, and Steinkuehler were all interested the ways games could effect such positive social change, but before exploring ways in which this is made possible, it is important to understand how games can facilitate socially negotiated learning in general.

Socially Negotiated

The fundamental principle of social constructivism is that meanings are not only constructed in the mind of an individual, but that these meanings are also socially negotiated between individuals in a culture. Video games, and the social systems that

focus on video games, can provide a social context for meaningful new learning, as the research of Shaffer, Squire, and Steinkuehler shows.

Shaffer (2005) discussed "virtual worlds in which students can interact using a wide range of practices in real and imagined spaces... [and which] make it possible for students to participate in adult activities that are hard to access, or even inaccessible, with traditional materials"   (p. 19) He found that video games also "make it possible for more students to learn about the world by participating in a broader range of meaningful activities... [and that they] make it possible to dramatically expand the reach of ... Dewey's ideas" (p. 20). He concluded that game-based learning environments "can be developed based on valued communities of practice" (p. 32). Shaffer wrote about learning as a process of participation in *communities of practice*, or groups "of individuals who share a repertoire of knowledge about and ways of addressing similar (often shared) problems and purposes" (Shaffer, in press, p. 10). Video games and simulations can be selected for use in an educational context based on the degree to which they allow students to participate in meaningful activities within a community of practice.

Steinkuehler (2006) suggested that some games, including MMORPGs, "are social simulations" (Steinkuehler, 2006, p. 4) because they are:

> "learning environments, albeit naturally occurring, self-sustaining, indigenous ones dedicated to play rather than work or school. They are rich settings for reciprocal forms of teaching and apprenticeship, as successful in-game problem solving often requires access to the collective intelligence (Levy, 1997/1999) of the communities attending them." (Steinkuehler, 2006, p. 3)

If MMORPGs are to be designed for educational purposes in work or school, they will need to maintain these elements of reciprocal teaching and problem solving within a community.

Steinkuehler supported her perspective with the belief that "cognition is 'a complex social phenomenon...distributed – stretched over, not divided among – mind, body, activity and culturally organized settings (which include other actors)'" (Lave, 1998, p.1, as cited in Steinkuehler, in press b, p. 3). She also invoked Bruner when she explained that "we have come a long way from studies in which information processing was mistaken for meaning making" (Bruner, 1990, as cited in Steinkuehler, in press b, p. 4). Steinkuehler shares with other social constructivists a view of "*cognition as (inter)action in the social and material* world" (Steinkuehler, in press b, p. 3). In order to function well as a social constructivist learning environment, a video game for education must therefore support development of distributed cognition and meaning making through social interaction. Though many games, especially multiplayer games, can provide this, MMORPGs seem a natural medium for providing this form of support for students.

Squire, in collaboration with Steinkuehler, says that understanding video games "as cultures and not just environments is crucial... these communities are defined by and through their cultural practices – the shared customs, procedures, rituals, and beliefs" (Squire & Steinkuehler, in press, p. 3). In collaboration with Shaffer, Squire urges readers to "look at video games because they create new social and cultural worlds - worlds that help us learn by integrating thinking, social interaction, and technology, all in service of doing things we care about" (Shaffer, Squire, & Gee, 2005, p. 105). They also expressed that "game playing can be a thoroughly social phenomenon" (p. 106). In fact, they felt that "the virtual worlds of games are powerful... because playing games means developing a set of *effective social practices*" (p. 106), and they understood that "part of the power of games for learning is the way they *develop shared values*... the situated

understandings, effective social practices, powerful identities, and shared values that make someone an expert" (p. 107). Ultimately, Steinkuehler felt that "the mechanisms for learning entailed in gameplay in virtual cultures/worlds are contingent on the game not only as a *designed object* but also as a *social practice*" (Steinkuehler, 2004b, p. 8). If video games, including the MMORPGs that Steinkuehler studied, are to be used in a formal educational environment, they must also still serve as a similar social practice. They must function as social and cultural worlds, within which students can engage in effective social practices and develop shared values.

Many games provide a social world within the game. These social environments can support learning with either a cooperative or competitive game structure, or both. Shaffer explored "collaborative learning in a setting marked by competition as much as cooperation… [in which the] processes of collaborative learning... were fundamentally similar to collaborative learning processes observed in more cooperative contexts" (Shaffer, 2004b, p. 2) He concluded that "computer-supported collaborative learning need not always be synonymous with cooperative activity; however, the design of tools to support collaborative competition may share many of the properties of tools that support cooperation" (p. 18). In both cooperative and competitive games, he found "collaborative learning in a setting marked by competition as much as cooperation" in which the "processes of collaborative learning... were fundamentally similar to collaborative learning processes observed in more cooperative contexts" (Shaffer, 2004b, p. 2). He found that even in competitive games, students would engage in *reciprocal coaching* of each other's play, and "as a result, students were able to develop important collaborative skills of giving and accepting constructive criticism without simultaneously having to engage in the complex process of managing a shared project" (Shaffer, 2004b,

p. 4). In an educational setting, games can be selected for their ability to facilitate collaboration, whether through cooperation or through competition via reciprocal coaching. Even single player games can offer these benefits.

Still, multiplayer games have the most potential for facilitating socially negotiated meaning making and learning. The genre of game with the most promise in this respect is the Massively Multiplayer Online Role Playing Game (MMORPG or MMOG), which is the focus of Steinkuehler's research. She claims that "despite frequent public dismissals and indictments, MMOGs do constitute complex and nuanced sets of multi-modal social and communicative practices" (Squire & Steinkuehler, in press, p. 4). She explains that "collaborative activity is the hallmark of MMOGaming and few people who log in remain social isolates" (Steinkuehler, in press b, p. 19). In fact, she considered MMORPGs "rich spaces for social interaction and enculturation, requiring complex cognitive/cultural knowledge and skills" (p. 25). More importantly, she found that MMORPGs "operate as sites for socialization, enculturation, and learning" (Steinkuehler, 2005, p. 30). At a straightforward level, "the basic medium of multiplayer games is communication" (Steinkuehler & Williams, in review, p. 11), and at a more sophisticated level, MMORPGs allow "*socially [and] materially distributed cognition* [to] aid us in unpacking the situated interactions of individuals with their environment, tools, artifacts, representations, and other actors" (Steinkuehler, 2005b, p. 96). In fact, MMORPGs "[engage] members in identities, values, and practices markedly similar to the intellectual and social practices that characterize high level, conceptual communities of innovation in fields such as science, technology, and engineering" (Steinkuehler, in press, p. 3-4). Steinkuehler explained that:

"MMOGs are sites for socially and materially distributed cognition, individual and collaborative problem-solving across multiple multimedia, multimodal 'attentional spaces' (Lemke, n.d.), significant identity work (Turkle, 1994), empirical model building, joint negotiation of meaning and values, and the coordination of people, (virtual) tools and artifacts, and multiple forms of text – all within persistent online worlds with emergent cultural characteristics of their own." (Steinkuehler, in press b, p. 7)

These factors are what make MMORPGs appealing as educational environments. They inherently encourage collaborative activity; in fact, collaboration is required in order to make any significant progress in the games. They also provide a mechanism for socialization, enculturation, distributed cognition, and - ultimately - learning that can be co-opted for formal educational purposes.

From Steinkuehler's perspective MMORPGs "instantiate the notion of social construction – that, oftentimes, the sense we make of events, contexts, and other people are sociocultural products, not natural facts" (p. 6). She was even interested in "formulating such games as a highly visible medium for understanding... how socially constructed worlds of meaning are collaboratively achieved" (p. 6). MMORPGs might also be valuable if used *in order to* help students develop their sociocultural meaning making powers as a part of their education.

Perhaps the most important thing MMORPGs have to offer is the way in which they allow players to "project themselves into roles that may not have available to them in the everyday offline world – not just fantasy roles, such as an elf or princess, but also sociocultural roles, such as the powerful leader of a successful campaign" (Steinkuehler, in press, p. 14). Unlike single player games, MMORPGs allow "individuals, through their self-created digital characters or 'avatars,' to interact not only with the gaming software (the designed environment of the game and the computer-controlled characters within it) but with other players' avatars as well." (p. 6). Knowledge, experience, and

meaning is then "distributed across members of the 'party' and... the individuals

participating profit from such collaboration" (p. 18). Ultimately, MMORPGs are:

> "complex social spaces of affiliations and disaffiliations, constructed
> largely out of shared (or disparate) social and material practices – ways of
> behaving, communicating, interacting, and valuing through which
> individuals enact not just their character class, be it elf or princess, but the
> 'kinds of people' (Hacking, 1986) that they construe themselves to be and
> that others can recognize. Such play requires complex and nuanced sets of
> multimodal social and communicative practices that are tied to particular
> communities and one's identity within them." (Steinkuehler, in press b, p.
> 24)

It would be a powerful thing for formal education to be able to offer a similar

learning environment. If MMORPGs were put to intentional educational use, they could

allow students to experiment with new sociocultural roles, to interact with other students

(players) in ways traditional school does not facilitate, and thus learn to create and call

upon distributed knowledge, experience, and meaning.

Within these spaces, players share a great deal, including "interest(s), goals,

and/or activities... word choice and grammar... practices for both production and

interpretation... practices for social interaction... ways to coordinate... folk theories...

systems or ways of valuing some 'things' and not others... and epistemologies"

(Steinkuehler, in press, p. 18-19). Students in k12 education could share similar

experiences if MMORPGs were put to use in a classroom environment, and the

classroom, especially the secondary classroom, could become more of a community than

is traditionally the case.

Squire, in collaboration with Jenkins, agreed that using a multiplayer framework

allows players "to become a real social community, reflecting the differing opinions and

competing interests that shape… events" (Squire & Jenkins, 2004, p. 17). Later, in

collaboration with Steinkuehler, he came to the conclusion that "MMOG social structures

appear to be powerful means for mobilizing players' identities" (Squire & Steinkuehler, in press, p. 4). In their study, they observed that MMORPGs "are neither designed nor wholly emergent, but rather arising at the intersection of player goals, expectations, and design features" (p. 7). In short, an MMORPG "as a world and culture is not solely the result of design decisions but also of the goals and intentions of players" (p. 14). These "interacting (and at times contradictory) forces [reminded them] of the similar challenges faced by educators designing classroom and school cultures" (p. 7). Their reflections offer something of a warning for those who would design educational MMORPGs; "because MMOGs are living, breathing cultures, player practices do not always align with the intentions of designers as one might anticipate" (p. 17). However, and more importantly, their reflections reveal another common feature between MMORPGs and social constructivist learning environments: students (or players) are co-creators of meaning and their learning, along with their teachers (or the designers).

Elsewhere, Squire found that

"the power of a multiplayer game is that it is a living community, in which each student has a different set of experiences. Students can compare and contextualize experiences through class discussion. By bringing the game into the classroom, students are forced to pull back from the immediate play experience and reflect on the choices they have made." (Jenkins, Klopfer, Squire, & Tan, p. 9)

This power is what makes video games, particularly multiplayer games, and especially MMORPGs, an ideal platform for effecting positive social change, which will be discussed in the next section. But before continuing with that discussion, it is also important to understand how many elements of socially negotiated meaning making exist not only in-game, but also in the cultures that surround video games, whether multiplayer or not.

Steinkuehler (in press) notes that in MMORPG communities, "consumption is production, manifested in gamer-authored practices, products, and social networks" (p. 9). In her ethnographic studies, she discovered that "through their in- and out-of-game activities, game communities effectively assert their right 'to form interpretations, to offer evaluations, and to construct cultural canons" (Steinkuehler, in press, p. 9-10). In an educational context, game playing would not replace all other forms of class work, but might very well inspire creations in other mediums.

Squire (2003), too, found that "video game playing is situated in social and cultural spheres that are perhaps more important than the game itself" (p. 10). Not only MMORPGs or other multiplayer games, but according to squire, gaming in general is "a social phenomena, occurring in social groups distributed both through traditional social networks… and through the Internet" (p. 10). After all,

> "video game playing occurs in social contexts; video game playing is not only a child (or group) of children in front of a console, it is also children talking about a game on the school bus, acting out scenes from a game on the playground, or discussing games on online bulletin boards" (Squire, 2003, p. 10).

It is this sort of excitement that educational technologists hope to tap into for teaching and learning purposes by bringing video games into the classroom.

Like Shaffer, Squire wrote that "in many ways, these groups resemble communities of practice; they have their own practice (game playing), language, and socially acceptable ways of behaving" (p. 11). Social constructivist educators struggle to create such communities of practice in classrooms, and video games may be a medium that can be put to beneficial use in this way.

It may be the opportunity for reflection among these communities that is most valuable with respect to learning. Squire & Jenkins (2003) explain that video games are

"no replacement for experience—or even field trials and manuals. Rather, [they are] a tool that [players] can use to explore ideas and talk about their practice" (Squire & Jenkins, 2004, p. 27). This reflection is part of what these theorists have dubbed "*Meta-gaming*, the conversation that goes on around the game, [and] becomes a form of literary analysis" (Squire & Jenkins, 2004, p. 22). In an educational setting, Squire and Jenkins (2004) suggest that "the game can be consumed by individual students on their own time and then brought into the classroom as an object for analysis and interpretation" (p. 20). Ideally, if games are used in education, students will not only play the game, but also then reflect on, and even write about their experiences. Other students could then critique or analyze their writing and game experiences such that each student might benefit from what others have written and experienced. In this way, the classroom might become the same sort of living community that many game players participate in outside of school.

MMORPGs still remain the most powerful genre for facilitating reflection and meta-gaming, because as Steinkuehler (in press) notes, MMORPGs "are a thoroughly collaborative space, not only beyond the game (in fan sites, discussion boards, game information databases, etc.) but also within the game itself" (p. 4). Steinkuehler (2006) also notes that MMORPGs encourage "interaction among community members with a wide range of skill, age, and maturity, [as well as] reciprocal forms of teaching and learning… in all directions throughout the social network" (p. 4). Like Shaffer, she too observed in MMORPGs "interwoven forms of competition and collaboration that appear to foster the high levels of engagement" (p.4). In terms of their relevance to formal education, whether or not MMORPGs are used in schools, Steinkuehler cautions that "understanding such indigenous, voluntary, self-sustaining, naturally occurring learning environments may prove quite crucial to the future theorization and development of

contexts for learning, both online and off" (p. 4). (See the appendix for a convenient excerpt of Steinkuehler's writing that provides a broad but succinct summary of research related to the social learning that occurs in video games, particularly MMORPGs.) If these studies are considered before the use or design of MMORPGs for education, the games might be able to help social constructivist educators break away from standardized methods, and allow their students high levels of engagement as they interact with a wide variety of people.

Of even greater interest and value for educators is the way in which Vygotsky's Zone of Proximal Development (ZPD) is at work in many video games, including and especially MMORPGs. In many - if not most - games, "novices learn by observing and getting feedback from peers" (Shaffer, 2004b, p. 5). In video games, as in all cooperative activities, "a learner develops understanding… by observing work done by his or her peers within… the *horizon of observation* of the learner: the parts of the task he or she can observe from his or her role in the activity" (p. 16). Shaffer acknowledged that understanding also develops through *error correction*, "the need to respond to critical challenges from peers"(Shaffer, 2004b, p. 17). Ideally, a video game for education should include opportunities for observing other players, and for receiving feedback and error correction from these other players, their peers.

In MMORPGs, "newcomers 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" (Steinkuehler, 2004b, p. 7). In general, MMORPGs, "are not mastered by overt instruction but rather through apprenticeship… [as] 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. 5). Steinkuehler illustrates Vygotsky's ZPD at work in

MMORPGs with her explanation of the way a more experienced 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).

Later Steinkuehler (2006) cited Vygotsky when she discussed game designers

"valuing of seeking out challenges just beyond the current level of one's ability (cf. zone

of proximal development; Vygotsky, 1978), whether you are Level 5 or 55" (p. 3). Video

games, particularly MMORPGs, in education would allow students more opportunities to

learn by doing. Social constructivists such as Dewey, Bruner, and Vygotsky have long

eschewed overt instruction, and video games are a technology that can facilitate their

ideals in the classroom, meanwhile providing the structure and scaffolding that students

need to succeed when deriving their own meaning form their experiences.

Squire, too, concluded that "games encourage collaboration among players and

thus provide a context for peer-to-peer teaching and for the emergence of learning

communities" (Squire & Jenkins, 2004, p. 29). He found that in games, as in the military,

"learning is guided by more experienced members of the military community, and the

meaning of these activities is negotiated through social interactions" (p. 9). In his

discussion of Orson Scott Card's *Enders Game* as a model, Squire also noted that good

games "automatically adjust to the skill level and objectives of each student" (p. 7).

Elsewhere, in his discussion of the prototype educational game *Environmental Detectives*

he suggested that "future iterations… might provide greater scaffolding… by analyzing

patters of investigation and suggesting to students when it might be appropriate to switch

modes if they are relying too heavily on one source of data or another" (Jenkins, Klopfer,

Squire, & Tan, p. 8). By following Squire's lead in the use of video games, other

educators might be able to offer their students the same opportunities for peer-to-peer

learning, mentoring by more experienced students, and ultimately, more individualized

(and interactive) instruction.

Many games, particularly such explicitly educational prototypes, make use of "the

ways in which professionals are trained as a model for learning environments" (Shaffer,

2004a, p. 1404). Shaffer suggests that professions with internships that exemplify the

ZPD in context, "such as accounting, architecture, mediation, engineering, journalism,

law, and medicine[,] can provide particularly powerful models for developing

technology-based learning environments in which young people can learn important

skills, habits, and associations" (Shaffer, 2004a, p. 1405). Shaffer summarized advice that

can benefit all educational game designers when he wrote:

> "(a) pedagogical praxis can be used to design effective programs for
> students from a range of cultural and socioeconomic backgrounds; (b)
> environments based on professional learning practices can support
> learning in a range of domains (including mathematics, biology, ethics,
> communication arts, and civics), leading to significant changes in attitudes
> and mores as well as the refinement of cognitive skills; and (c) learning
> practices from a range of professions (including architecture, mediation,
> and journalism) can inform the development of learning environments for
> middle and high school students... teachers, curriculum developers, and
> other practitioners might borrow from this work in developing new and
> innovative curricula to expand the range of pedagogies used in traditional
> classrooms, which has in fact happened in several instances." (Shaffer,
> 2004a, p. 1416)

Educational video games and simulations should thus be guided by effective

pedagogy and authentic professional practices if they are to offer students the same sorts

of benefits a traditional internship might offer.

The fact that the Zone of Proximal Development is well understood and well used

by game designers may help educators accept that the skills learned in video games can

and do transfer into other areas of players lives. Squire (2002) argues that "socio-cultural learning theory, activity theory, and educational research on transfer are three theoretical traditions that might also be of use to game studies" (p. 7). Shafer (2004b) documented ways in which simulated negotiation (p. 8) "helped students understand [the issues being studied]" (p. 15). Even in video games, "by participating in professional learning practices, students can internalize and transfer these epistemological norms to new situations" (Shaffer, 2004a, p. 1417). This works because "thoughtful enactment of a practice necessarily involves making decisions about ways of knowing, ways of deciding what is worth knowing, and ways of adding to a collective body of knowledge and understanding" (p. 17). Also, by "learning to participate in a practice, students internalize these ways of thinking, which they are able to apply in other venues" (p. 17). Properly designed educational games, those that offer simulations to aid understanding and allow students to make authentic decisions and contribute to a collective body of knowledge, can thus help students to internalize and transfer their knowledge for use in situations beyond the game and beyond school.

 As mentioned earlier, Shaffer also writes a good deal about *epistemic games*, or "games that are based on the epistemic frames of socially valued practices" (Shaffer, in press, p. 19). He reports that "because they develop epistemic frames of important communities of practice, such games have the potential to help students develop ways of thinking that persist beyond the game environment" (p. 19). He feels that "these epistemic frames of socially-valued communities of practice, made approachable by new technology, may provide a more inclusive model for learning in a technological society" (Shaffer, 2005, p. 33). As he wrote earlier, "computers and other information technologies can make it easier for students to become active participants in meaningful

projects and practices in the life of their community" (Shaffer, 2004a, p. 1401). In Shaffer's vision, "new technology reinvigorates Dewey's (1915) idea of linking school with society" (p. 1401). His conclusion is powerful vision for the future of education:

> "Epistemic games based on the ways in which professionals acquire their epistemic frames may thus provide an alternative model for organizing our educational system. Epistemic games make it possible for students to learn through participation in authentic recreations of valued work in the world, and thus give educators an opportunity to move beyond disciplines derived from medieval scholarship constituted within schools developed in the industrial revolution – a new model of learning for a new mode of learning through immersive game technologies." (Shaffer, in press, p. 19)

Epistemic games can even help students "think about ethical dilemmas using the epistemological framework" (Shaffer, 2004a, p. 1414) at work in the game. To bring about this future in education, enterprising educators should seek to select (or even design) games that allow students to participate in socially valued practices in order to complete authentic and meaningful projects that link school with society. Some commercial games, including MMORPGs, already offer some opportunities for this sort of learning. A good deal more would be possible if these games were designed explicitly for education.

In addition to the social learning that can occur both in-game and in the culture that surrounds the game, students and teachers can also learn through the process of creating games themselves. As Squire notes, "by creating their own games, [students and teachers] can build an even deeper understanding of the issues at hand" (Jenkins, Klopfer, Squire, & Tan, p. 8). In this way, the future might be brought about by any teacher willing to learn the necessary skills and tools, or even by the students themselves.

With such powerful new learning tools and environments now at hand, it only remains to determine a worthwhile end toward which to apply their use.

Social Change

As did Dewey, Vygotsky, and Bruner, each of these theorists wrote with a purpose to their educational philosophy. Shaffer, Squire, and Steinkuehler would all like to see video games put to use as a force for positive social change in education. Shaffer and Squire, for example, called for the design of "games that develop for players the epistemic frames of scientists, engineers, lawyers, political activists, and members of other valued communities of practice - as well as games that can help transform those ways of thinking for experienced professionals" (Shaffer, Squire, & Gee, 2005, p. 111).

There are already many examples of single player games designed to effect positive social change (such as the World Food Program's *Food Force*, Carnegie Mellon's *PeaceMaker*, and the projects of *Games for Change*). Even so, "it is through MMOGs that players have the greatest ability/responsibility to explore, construct, and resist those concerns of dominant culture's representations" (Walls, 2005, as cited in Steinkuehler, in press, p. 13). In response to Oldenburg's concern that "American lifestyles, for all the material acquisition and the seeking after comforts and pleasures, are plagued by boredom, loneliness, alienation" (Oldenburg, 1997, p. 13, as cited in Steinkuehler & Williams, in review, p. 4), Steinkuehler and Williams (in review) found that MMORPGs "function as one novel form of a new 'third place' for informal sociability... [and that] participation in such virtual 'third places' affects participants' social capital in terms of both broad but week social networks (bridging ties) and deep but narrow social networks (bonding ties)" (p. 2-3). In her literature review, Steinkuehler also found that "large percentages of MMOGamers play online with 'real life' romantic partners, family members, co-workers, and friends" (Steinkuehler, in press, p. 15). In many cases, "teenagers mentored adults twice their age and education in how to lead a

clan" (Steinkuehler & Williams, in review, p. 20). Steinkuehler and Williams concluded

that MMORPGs can serve as "a window into new worlds of people and ideas" (p. 22).

Video games, especially MMORPGs, could offer students opportunities for authentic

interaction with peers, experts, and others in the community outside of the school.

Through these interactions they could build both broad and deep social capital as they

explore, construct, and influence their culture at large.

 As Shaffer and Squire point out, "video games have the potential to change the

landscape of education as we know it" (Shaffer, Squire, & Gee, 2005, p. 111). They

explain that:

> "even if we sanitize games, the theories of learning embedded in them run
> counter to the current social organization of schooling. The next
> challenges for game and school designers alike is to understand how to
> shape learning and learning environments to take advantage of the power
> and potential of games and how to integrate games and game-based
> learning environments into the predominant arena for learning." (Shaffer,
> Squire, & Gee, 2005, p. 110)

 Since it is a certainty that students will play video games, and since there is no

doubt that a good deal of *incidental* learning will take place, Shaffer, Squire, and Gee

(2005) also ask important questions such as: "who will create these games, and will they

be based on sound theories of learning and socially conscious educational practices?" (p.

111) Ideally video games, including MMORPGs, can be put to use for *intentional*

learning in formal academic contexts. Unfortunately,

> "the real problem is that the kind of immersive, experiential learning that
> games support runs directly counter to contemporary trends in education.
> Games may be seen as suspect in an era of standardized tests, where
> knowledge is considered measurable by scan-tron sheets, where teachers
> are held in suspicion for their practices, and where education debates
> center around what instructional methods produce the largest increases in
> standardized test scores." (Squire & Jenkins, 2004, p. 30)

As Squire and Jenkins (2004) went on to point out, "students' ability to participate in complex social practices; learn new knowledge; and perform well in novel, changing situations needs to be considered valuable learning" (p. 31) before the introduction of video games into formal education will be able to effect positive social change on a large scale.

However, social constructivist teachers, educational technologists, and administrators can begin this revolution as soon as they are prepared to effect positive social change themselves. They can oppose the trends of traditional medieval and industrial education by carefully selecting video games and simulations for use in their classrooms based on their own pedagogical values. Then they can begin to influence the intentional learning that their students will experience from games. Eventually, as they are able to provide proofs of concept, the values of traditional educational institutions will begin to change with increasing momentum.

Conclusion

Digital game-based learning works, even when explicitly educational goals are at stake. In one study, Squire found that "on average, students who played *supercharged!* did about 20% better on the post-test than students in the control group" (Jenkins, Klopfer, Squire, & Tan, p. 6). There is as little doubt now that games *can* be put to work for *intentional* learning in a rigorous academic context, in addition to the *incidental* learning that is already going on at home. Based on the critical examination of Shaffer, Squire, and Steinkuehler's work, it is clear that video games can provide a learning environment that fits well with the principals of societal development subscribed to by

social constructivists. Video games can facilitate context-embedded, inquiry-driven, and socially negotiated learning. They can also help effect positive change in society.

Now, as Squire and others point out, the challenge is entirely different:

"The next challenges will be as much economic (how do we pay for the development of educational games); social (how do we train a generation of teachers to integrate such games meaningfully into their total curricular activities); and political (how do we make a case for the kind of in-depth understanding these games facilitate in an era of standardized testing?)." (Jenkins, Klopfer, Squire, & Tan, p. 2)

Organizations such as *Serious Games*, *Games for Change,* and the *Games, Learning, and Society* program at the University of Wisconsin – Madison have risen up to take on these challenges. The *Education Arcade* at MIT, or example, aims to "do for games what the Children's Television Workshop did for broadcasting: support experimentation and implementation of fresh new ideas, which might not emerge otherwise in the current commercial context" (Jenkins, Klopfer, Squire, & Tan, p. 3).

Squire (2002) felt that "understanding and unpacking how learning occurs through game play, examining how gameplay can be used to support learning in formal learning environments, and designing games explicitly to support learning are three areas that educational research can contribute to game studies" (Squire, 2002, p. 7). Consequently, he called for researchers to undertake "design experiments… which examine how instructional programs which employ video games could be useful for instructional technologists" (Squire, 2003, p. 11). Classroom teachers, site and district educational technologists, and educational administrators at all levels can begin implementing such design experiments themselves, using commercial off the shelf games if nothing else.

Especially in the case of MMORPGs, Steinkuehler felt that video games can "function as a highly visible and therefore thoroughly traceable medium… for the study

of cognition, learning, and literacy in online digital contexts" (Steinkuehler, in press, p. 4-5). The value of video games, especially MMORPGs, as a research *medium* was clear when she pointed out that they are "naturally occurring, self-sustaining, indigenous versions of the kinds of online learning communities much present research seeks to design and understand while, at the same time, providing a 'highly visible medium' for the collaborative construction of mind, culture, and activity" (p. 26). After all, these games are "sites for socially and materially distributed cognition, complex problem solving, identity work, individual and collaborative learning across multiple multimedia, multimodality 'attentional spaces'… and rich meaning-making and, as such, ought to be part of the educational research agenda" (p. 30). Steinkuehler (2006) pointed out that "The ability to simulate entire worlds and cultures populated by actual individuals working in concert (or discord) with one another with which researchers can run trials of full-scale social change is veritably unprecedented" (p. 4). Touching on issues of context and inquiry, she wrote that "the proper unit of study for research on MMOGs is not individual 'identities' per se but rather their construction as crucially situated within the context of broader discourse(s) that inform them" (Steinkuehler, in press, p. 22), and she cautions that "the public conversations happening around games in contemporary media say more about who we are and what we think and value than they do about who gamers are and what they think and value" (p. 25).

She also cautions that "we need to better understand what contemporary informal online learning environments do well and do miserably if we want to leverage those features that are productive and eschew those that are not" (Steinkuehler, 2004b, p. 8). It is important to realize that learning communities are as important as curricular material when designing learning environments. Steinkuehler warns that "unless we are designing

appropriate social structures to accompany such technological systems… we cannot

easily leverage the learning mechanisms within MMOGs for play in creating MMOGs for

instruction" (Steinkuehler, 2004b, p. 8). It is here that educators who wish to pioneer the

application of these theories in the classroom can once again lead the way; they can be

sure to explore various social support systems for their students as they begin the

adventure of integrating video games and simulations into traditional classrooms.

    With these things in mind, Steinkuehler proposes five areas of research:

> "(1) Investigation into the complex ways in which the small, routine
> activities of participants constitute, and are constituted by, macro-level
> Discourses within the game (Steinkuehler, 2004ba, 2005a, 2005c), (2)
> exploration into the cultural resources game community participants
> leverage in the authoring of identities (both their own and others) within
> such virtual worlds (Steinkuehler, in press), (3) research that examines
> how individuals are enculturated into such Discourses (Steinkuehler,
> 2004b), (4) analysis of the literacy practices within and beyond such
> virtual spaces and how they operate to create and maintain a coherent
> world of both practice and perspective(Steinkuehler, 2003, 2004c, 2004d,
> 2005b, 2005d, 2005e), and (5) exploration of how the Discourse of
> MMOGs is caught up in conversation with other Discourses and how
> participation in them is situated within gamers' everyday lives
> (Steinkuehler, 2004ba; Steinkuehler & Williams, 2005)." (Steinkuehler,
> in press, p. 21)

    Practicing educators, too, can explore these elements as their own students begin

playing video games, perhaps even MMORPGs, in the classroom.

    Steinkuehler (in press) expressed a "sincere hope… that education does not make

[an] error of underestimation when it comes to the capacity of such spaces to profoundly

shape the cognition and culture of the net-generation of kids" (p. 29), and she felt

"serious commendations are due to those educational technology designers who are

leveraging gaming technologies toward educational ends" (Steinkuehler, 2004b, p. 8).

Many more educators can be deserving of Steinkuehler's commendations by selecting

appropriate games to use with their students and then sharing their experiences with other educators via formal or online publications.

Shaffer (2004a) felt that such game-based learning environments "suggest a way to move beyond current curricula based on the ways of knowing mathematics, science, history, and language arts… [to] a system in which students learning to work (and thus to think) as doctors lawyers, architects, engineers, journalists, and other knowledge workers" (p. 1418). He saw this as "one way to return to Dewey's intellectual program... in another era of dramatic social and economic transformation brought about by new technology" (p. 1418). Shaffer and Gee (2005) concluded that this is "the first good news we've had about our education system in quite some time: *The very same technologies that are making it possible to outsource commodity jobs make it possible for students of all ages to prepare for innovative work.*" (p. 14) It is bordering on moral imperative for educators to take advantage of these technologies to prepare their students to be competitive and to contribute in the 21st Century.

With a focus on the work of Squire, Steinkuehler, and Shaffer, this depth section of the Knowledge Area Module (KAM) has provided a critical examination of digital game-based learning theories in light of the working theory of constructivist societal development developed in the breadth section. Their theories support the argument that video games, particularly massively multiplayer online role playing games (MMORPGs), can serve as social constructivist learning environments, and thus as instruments for effecting positive social change in formal k12 education.

The purpose of this analysis was to provide educators with guidance for implementing digital game based learning, a subject about which each of these theorists writes about explicitly. To this end, this analysis will be applied in the following

Application section of the KAM, which will culminate in the development of a three-hour

professional development workshop for educators.

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Annotated Bibliography

Shaffer, D. W. (2004). Pedagogical praxis: The professions as models for post-industrial education. *Teachers College Record*, 106(7), 1401-1421.

> Shaffer proposes a theory of pedagogical praxis, which states that "computers…
>
> can make it easier for students to become active participants in meaningful
>
> projects and practices in the life of their community" (p. 1401). He looks to
>
> professions such as architecture, mediation, and journalism as models of such
>
> professional practice, and he seeks to create learning environments that are
>
> similarly "thickly authentic" (p. 1406). Shaffer builds his literature review and his
>
> theory on the foundation of Dewey's work, making this article particularly
>
> valuable in the context of this KAM, which also begins with Dewey's theories.
>
> Shaffer then offers for discussion several case studies that support his theory.
>
> These are not video games such as this KAM is focused on, but because these are
>
> concrete applications of his ideas, they are particularly valuable in this emerging
>
> field, which can sometimes be dominated by anecdote and conjecture.
>
> Unfortunately, this article also suffers from an over-use of jargon, though not
>
> nearly as painfully as in some of Shaffer's other work.

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.

> Here Shaffer explores "the nature of collaborative learning in a setting marked by
>
> competition as much as cooperation" (p. 2), and he concludes that a good deal of
>
> collaborative learning is still possible in a context of competition. Error correction
>
> and feedback from peers, including *reciprocal consulting*, makes this possible
>
> without students having to manage collaborative projects. As in the previous

article, Shaffer builds his theory on the work of Dewey and others, including

Hutchins, whose *horizon of observation* serves as an extension of Vygotsky's

zone of proximal development discussed in this KAM. Shaffer then supports his

claim by citing interviews with students involved in experimental projects

involving computer-supported role-playing games. These were formal

experiments with pre and post tests of students' conceptual understanding of the

subjects being taught. In a very constructivist manner, Shaffer used student

generated concept maps as part of these assessments. Shaffer's theories and

conclusions can easily and legitimately be applied to the use and design of

educational video games and simulations.

Shaffer, D. W. (in press). Epistemic frames for epistemic games. *Computers and
    Education*.

    Shaffer begins with a review of literature that establishes *epistemic frames* as

"ways of knowing, of deciding what is worth knowing, and of adding to the

collective body of knowledge and understanding of a community of practice" (p.

2). He then establishes that some computer supported role-playing games can

serve as *epistemic games,* in which students might develop such *epistemic frames*

and incorporate them into their identities. The article includes two formal case

studies that support this claim. Unfortunately, the article and the terminology

Shaffer originates are unnecessarily inaccessible; the narrative is dominated by

academic jargon, the worst of which is Shaffer's own contribution. Also, though it

discusses role-playing games, and though its conclusions may apply to video

games (including massively multiplayer online role playing games), this article

does not directly address such games. Shaffer's case studies are focused on

traditional classroom role-playing that is supported by computers. Still, this is a valuable and concrete contribution to the field.

Shaffer, D. W., Squire, K. R., Halverson, R., and Gee, J. P. (2005). Video games and the future of learning. *Phi Delta Kappan,* 87 (2), 105-111.

This article is directly related to the subject of this KAM. The authors (two of whom are the focus of this KAM, and one of whom was included in a previous KAM) ask the question, "how can we use the power of video games as a constructive force in schools, homes, and workplaces?" (p. 105) In answer to this question they discuss the design of learning environments that "build on the educational properties of games but ground them deeply in a theory of learning" (p. 105). Their discussion includes the importance of motivation (games are "personally meaningful"), context (players "participate in new worlds" and "develop situated understanding"), socially negotiated meaning (through development of "effective social practices" and "shared value," and through experimentation with "powerful new identities"), 21st century skills (players "become critical consumers of information"), and even the role of the teacher (through a list of challenges and needs in the conclusion). They also discuss social change through the use of games for initiation, transformation, health education, learning history, and the mathematics of design. As Shaffer does independently, they ground their work in Dewey's theory, and then progress to discussion of *epistemic frames* and *epistemic games*. The article also contains work that clearly originates from Squire, and from Gee, another leader in the field. The article lacks a formal discussion of any experiments or case studies, and offers little concrete

evidence for the authors' claims, but still serves as an excellent (and inspiring) overview for educators.

Squire, K. (2002). Cultural framing of computer/video games. *Game studies,* 2 (1). Retrieved May 24, 2006, from http://www.gamestudies.org/0102/squire/

In this article Squire addresses several questions relevant to this KAM. He asks what people are learning about academic subjects by playing certain commercial off the shelf games, and he asks how these games might be used in formal learning environments. Though he doesn't offer answers to these questions, he does argue their importance and suggests some "theoretical traditions that game studies can draw upon as it matures as a field" (p. 1). He offers an overview of the current state of games-based social science research before then challenging the reader to rethink the role of educational and social science research in digital gaming and finally discussing the creation of next-generation educational media. This includes an overview of those who are studying the impact of gaming and who are studying games in educational contexts. He brings to bear his knowledge of the learning sciences and of game playing as a social practice. He also explores learning through games as a transformational practice. This discussion is informed by his work on his dissertation exploring the use of *Civilization III* in the classroom, a study that was underway when the article was published. However, there is no formal discussion of such a study in the article and it serves as a theoretical treatise rather than a scientific report. Still, as an early contribution to an emerging field, this article retains its importance and relevance at the time this KAM was written.

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

Simply put, "this paper examines the history of games in educational research, and argues that the cognitive potential of games have [sic] been largely ignored by educators" (p. 1). Squire explores video games in American culture at large and using video games to understand engagement before focusing in on video games in educational settings. He then looks forward to the future of video games in education. His discussion includes sections on using video games for drill and practice, for simulations and strategy, for interactive fiction, and for collaboration. He even includes a section on having students be video game creators as well as consumers. Like Shaffer and Gee, Squire is interested in how "video game playing is situated in social and cultural spheres that are perhaps more important than the game itself" (p. 9). As with the previous article, this paper is lacking discussion of a formal study and includes few concrete examples. However, this article is an excellent review of literature and overview of the potential applications of video games in education.

Squire, K., Jenkins, H. (2003). Harnessing the power of games in education. *Insight,* 3 (5), 7-33.

This is an ambitious article that is overtly constructivist. The authors begin with a discussion of Orson Scott Card's science fiction novel *Ender's Game* in which "games teach by encouraging competition, experimentation, exploration, innovation, and transgression" (p. 7). This opening segment includes discussion relevant to the *zone of proximal development* and to the role of the teacher in a game-based learning environment. They go on to review some of the challenges

and opportunities faced by those who are implementing similar ideas in the real world. This overview offers a discussion that includes the importance of motivation, context, inquiry, socially negotiated meaning, narrative, cyclical and systems content, problem solving skills, and of the *zone of proximal development.* The article includes allusions to Squire's dissertation, to several case studies that serve as proofs of concept, and to original survey data, but the article does not represent a formal study conducted by the authors. Still, the references and ideas covered, including Papert's *microworlds*, are fundamentally important to understanding the study of video games in education. The conclusions of the article are particularly relevant to this KAM; good games can encourage problem solving, formation and testing of theories, role-playing, collaboration, and meta-cognition. The focus is on social context and applications throughout.

Squire, K. & Steinkuehler, C.A. (2005). Meet the gamers. *Library Journal.* April 15, 2005. Retrieved May, 24, 2006, from www.libraryjournal.com/article/CA516033.html

This is a brief and accessible article by two of the newest leaders in the field. They begin by providing a case for why educators, and librarians in particular, should pay attention to games; in short, "games are the medium of choice for many Millenials" (p. 1). From a very constructivist perspective, they then go on to explore ways in which players are creating knowledge together using multiple resources and tools. They recommend "gamelike libraries" (p. 3) with recommendations that might be just as appropriate to implement in any classroom. They encourage educators to connect with gamers, and encourage them to be unafraid of the change they will have to endure themselves to do so. A brief appendix of commercial off the shelf games that librarians and educators

might bring into a school for learning purposes accompanies the article. Though this represents neither a formal study, nor a thorough review of the field, they do include some of the important theorists, such as Gee, and this paper is a valuable contribution with some pragmatic suggestions for practicing educators.

Steinkuehler, C. A. (2004). A Discourse analysis of MMOG talk. In J. H. Smith & M. Sicart (Eds.), Proceedings of the Other Players Conference, Copenhagen: IT University of Copenhagen.

As the abstract states, "this paper outlines a functional linguistic analysis of talk within the MMOG *Lineage*" (p.1). Despite the seemingly light topic of gaming, this may be the most formal article included in this annotated bibliography. Steinkuehler provides a brief introduction to her topic and to MMOGaming. She then formally explains her method of cognitive ethnography and functional linguistics, though which she analyses a particular utterance to discover meanings relevant to the discourse occurring in the game. She performs a syntactic analysis and a discourse analysis, covering topics relevant to this KAM, such as community valued goals and identity. She concludes merely that the activities that people engage in when playing an MMORPG are "cognitively complex and consequential" (p. 11) and that researchers should seek to understand this rather than to dismiss these activities. There is little explicit relevance to education, but her work exploring MMORPGs as social spaces lays the foundation for later work exploring their application in formal educational environments. This researcher hopes to conduct such research as a part of his dissertation following this KAM.

Steinkuehler, C. A. (2004). 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.

In contrast to the article annotated above, this paper is explicitly focused on the use of MMORPGs in education, as its title would suggest. Steinkuehler offers an introduction to massively multiplayer online games, and their increasing popularity and importance in contemporary culture. She then introduces her own theoretical foundation via her research questions and her focus on cognition as action and interaction. This paper is directly related to the formal research she conducted for her dissertation. Data was collected through the methods of cognitive ethnography, and she used discourse analysis as her analytic method. Touching on issues of socially negotiated learning within a social context – and issues related to the *zone of proximal development*, inquiry-driven learning, and 21st century skills – she delivers some preliminary findings. She suggests that newcomers learn the game through participation in genuine game play, and through feedback from both the game system and other participants. She also places value on what she calls "socially-sanctioned precociousness and *wonder.*" She concludes by drawing implications from these findings. She commends the educational technologists who are exploring these issues, and then goes on to say that we need to better understand what the informal (and incidental) learning environments present in MMORPGs do well and do poorly if we are to design formal (intentional) learning environments meant for educating. She cautions that we cannot simply design games as learning environments, but must also design appropriate social structures to support them. This may be the most difficult challenge for schools that are traditionally very conservative and resistant to

change. This paper is directly related to the goals of this KAM, and to the work

the researcher hopes to continue in his dissertation.

Steinkuehler, C. A. (2005). The new third place: Massively multiplayer online gaming in American youth culture. *Tidskrift Journal of Research in Teacher Education*, 3, 17-32.

This article serves two purposes. First, Steinkuehler argues that Massively

Multiplayer Online Role Playing Games (MMORPGs) serve as a new form of

third place for informal sociability. A third place, as defined by Oldenburg, is a

place other than home or work where people can socialize. A third place is neutral

ground where rank and status are not important, conversation is the main activity,

there are regulars, and the mood is playful – among other properties. Steinkuehler

argues that MMORPGs fulfill this definition, and that they thus play an important

role in the lives of millions of people. She then turns to why such games matter

for educators, making this article particularly relevant to this KAM. She hopes

that educators do not underestimate the power of these spaces, and she argues that

educators should learn about the ways in which MMORPGs "operate as sites for

socialization, enculturation, and learning" (p. 30). Exposing educators to the

power of MMORPGs was one of the goals of the application section of this

KAM.

Steinkuehler, C. A. (2006). Why game (culture) studies now? *Games and Culture*, 1(1), 1-6.

This brief article is a broad justification for conducing game studies. The most

important element in relation to this KAM is Steinkuehler's argument that games

"function as naturally occurring, self-sustaining, indigenous versions of online

learning communities" (p. 1). Her discussion of ways in which games develop

problem solving skills in players is also relevant. She also explores ways in which

the games are both cultures, and cultural artifacts. She cites Squire, Shaffer, and

others, including Gee in her arguments, making the article a rich resource for this

KAM. However, the article serves primarily as an appeal to academics to

contribute to the study of games, and is not intended for an audience of educators.

Steinkuehler, C. A. (in press). Cognition and literacy in massively multiplayer online
    games. In D. Leu, J. Coiro, C. Lankshear, & K. Knobel (Eds.), *Handbook of Research
    on New Literacies*. Mahwah NJ: Erlbaum.

Mirroring many of Prensky's discussions of *digital natives*, Steinkuehler begins

with a discussion of the relationship between technology and our current

generation of youth. Though she acquiesces that the American educational system

has tried to keep up, she argues that students are using technology in more

sophisticated ways outside of school, and suggests that studying the learning that

happens when they play video games is an excellent place to begin an attempt to

understand and take advantage of this trend. She quickly moves into discussion of

Massively Multiplayer Online Role Playing Games (MMORPGs) and argues that

they "instantiate the notion of *social construction*… and provide a highly visible

medium for understanding… how socially constructed worlds of meaning are

collaboratively achieved" (p. 6). She supports this with a review of literature that

explores such diverse topics as economics, law, sociology, and anthropology. She

concludes with a proposal for additional research into MMORPGs as discourse,

complete with research questions. This paper thus serves as a crash course in the

field that Steinkuehler is pioneering, the study of cognition in MMORPGs.

Steinkuehler, C. A. (in press). Massively multiplayer online videogaming as participation in a Discourse. *Mind, Culture, & Activity*.

> Through a close analysis of language, Steinkuehler demonstrates "the complexity of practices that make up Massively Multiplayer Online Gaming" (p. 2). Like the others in this annotated bibliography, she is concerned with situated learning and "cognition as (inter)action in the social and material world" (p. 3). As the others began with Dewey, she cites the work of Bruner in her discussion of *meaning making*. She also includes a section dedicated to Gee's Discourse Theory, which she then applies to MMOGaming. This is a formal paper describing a linguistic analysis performed as part of a cognitive ethnography. Among other things, her analysis focuses on discourse in MMORPGs as a reflection of community valued goals and of the sort of identity play taking place in the games. She concludes that MMORPGs "are complex social spaces of affiliations and disaffiliations, constructed largely out of shared (or disparate) social and material practices – ways of behaving, communicating, interacting, and valuing" (p. 24). She suggests that this is in contrast to the representation of such games often presented by mainstream media, and she suggests that MMORPGs represent examples of just the very sort of learning communities educators are seeking to understand and to offer in schools. It remains for the reader to conclude that perhaps MMORPGs might be useful in formal educational contexts.

Steinkuehler, C.A., Black, R.W., & Clinton, K.A. (2005). Researching literacy as tool, place, and way of being. *Reading Research Quarterly, 40*(1), 7-12.

> Here the authors suggest that it may be too soon to utilize traditional clinical trials and quantitative methodologies in the study of meaning making practices with

new digital technologies, including video games. Instead they offer several alternative methodological approaches, including *activity theory*, which "provides a conceptual framework for mapping the transformation of complex systems of goal-oriented activities over an extensive scale of time" (p. 96), *distributed cognition*, which aids in "unpacking the situated interactions of individuals with their environment, tools, artifacts, representations, and other actors" (p. 96), and the *phenomenological approach* with a focus on "literacy as experience" (p. 97). Then, as they offer new metaphors for literacy, the authors suggest that single-player video games and massively multiplayer online games might provide "new definitions of what literacy is or *could be"* (p. 97). Particularly relevant to this KAM is their discussion of MMOGs and literacy as place and literacy as way of being. They conclude that in the hyper-networked world of the 21st century, qualitative methods may be the only way to understand and describe participation in modern social contexts. This is advice that should be taken to heart by researchers who will explore these technologies further, as this researcher hopes to do. Such research, though, will be difficult for traditional educational institutions to accept as evidence of the power and potential of video games to serve as learning environments. A wider cultural change will be necessary before the work that is being done (and will be done) will be able to effect positive social change in existing formal education environments.

Application

Introduction

The breadth section of this Knowledge Area Module (KAM) presented a synthesized working theory of constructivist societal development, with a focus on the works of Dewey, Vygotsky, and Bruner. In light of their work, a social constructivist learning environment was clearly characterized as one that facilitates context-embedded, inquiry-driven, and socially negotiated learning. Ideally, such an environment is also a vehicle for effecting positive social change. In order to provide educators with guidance for implementing digital game based learning, this working theory has served as a foundation for this application section of the KAM.

The depth section of the KAM was a critical examination of digital game-based learning theories in light of the working theory of constructivist societal development developed in the breadth section. The examination focused on the work of Squire, Steinkuehler, and Shaffer from the *Games, Learning, and Society* program at the University of Wisconsin, Madison. Based on the critical examination of Shaffer, Squire, and Steinkuehler's work, it was clear that video games, particularly MMORPGs might provide a learning environment that fits well with the principles of societal development subscribed to by social constructivists. Video games can facilitate context-embedded, inquiry-driven, and socially negotiated learning. In addition, they can help effect positive change in society. This in-depth analysis also served to inform this application section of the KAM.

Thus both the breadth and depth portions of this KAM supported the argument that video games, particularly massively multiplayer online role playing games (MMORPGs), can serve as social constructivist learning environments, and thus as instruments for effecting positive social change in formal k12 education.

The purpose of this application section was to prepare a three hour hands-on professional development session for providing educators with guidance in using digital game-based instruction informed by theories of constructivist cognitive development to facilitate student learning. The session will be delivered face to face via a Power Point slide show with segments of presentation, facilitated discussion, and hands-on experimentation. This companion document includes sections describing the rationale behind the session, the justification for elements of the session design, and a conclusion explaining how the theory of the previous sections is put into to practice. (Note: Though the actual delivery of this professional development session was beyond the scope of this KAM, it was designed for use as a pilot class for educators in the Technology Center at the Orange County Department of Education, and it was delivered as scheduled on May 9th, 2006.)

Rationale

This professional development session was an effort to help teachers better reach and better serve a generation of students who are fundamentally different than those who came before. Prensky (2006a) pointed out that "our kids are not like us" (p. 27). Having grown up in an era of ubiquitous cell phones, Internet access, and video games, our students can be considered *digital natives* (p. 28). If this is the case, then teachers are

digital immigrants, who may have trouble learning the language and culture of the natives – and may speak with an *accent*, such as printing out an email to read it (p. 28). To extend the metaphor further, this course is meant both to help teachers become aware of this generational gap, and to help them bridge the gap to become card carrying resident *digital aliens*. The hope is that teachers might change their teaching style, perhaps even by incorporating video games, in order to address the students in their *native tongue*.

There is little doubt that a good deal of *incidental* learning is taking place when students play video games. They even reject games that are too easy; as Henry Jenkins III of MIT said in an interview with the researcher, "the worst thing kids can say about homework is that it's too hard, while the worst thing they can say about video games is that they're too easy" (Jenkins, 2005). This course is also an attempt to help teachers harness the powerful multimedia technology of video games and put it to work for what Jonassen calls *intentional* learning in the context of formal education, driven by the assessment of content area standards (Jonassen, Howland, Moore, and Marra, 2003).

However, achievement of the academic standards is not the only thing valued by many educators, parents, community members, and businesses. This course aims to help teachers discover ways in which video games might help students to develop the twenty-first century skills of digital age literacies, inventive thinking, effective communication, and high productivity (North Central Regional Educational Laboratory and the Metiri Group, 2003). Especially important in the application of this KAM, which is based on social constructivism, is the area of effective communication, which includes skills such as teaming and collaboration, interpersonal skills, personal responsibility, social and civic responsibility, and interactive communication (p. 47-57).

Ultimately, this course is meant to help teachers see that video games, particularly

multiplayer role playing games, can serve as social consrtuctivist learning environments for students. As demonstrated in the breadth and depth portions of this KAM, such games can provide students with a context for learning, opportunities for inquiry, and frameworks for collaboration, and can thus serve as instruments for positive social change.

Design and Justification

The professional development session began with the instructor welcoming participants and introducing himself, his role as an Educational Technology Coordinator at the Orange County Department of Education, and his role as a student at Walden University. In keeping with the philosophy of beginning a technology presentation with a demonstration, the session moved directly into participants viewing a demo video for the educational video game *Dimenxian*, a game with high production values meant to teach students algebra. The promotional video included attention grabbing tag lines such as "homework just got harder" and "learn math or die trying."

Following the video, several minutes were spent on an opening anecdote, participants' introductions, and related discussion. In an effort to connect the content of the session with the participants' lives, both professional and personal, the presenter shared an anecdote about the rock band U2 and their live performance of the song *Miracle Drug*, which is about assistive technology and included a "message from the future" that things will be better. It was explained that this is why it is worthwhile to spend time learning about educational technologies, and video games in particular – because of the belief that these things might make life better for our students in the future. Participants were then asked to introduce themselves, and to share (in addition to

their name, site, and grade or subject taught) one thing they hoped for the future of education and what role they might play in it. As each participant introduced a thought, the presenter lead a discussion around any related issues relevant to the class. During this discussion, many of the theories evident in the breadth and depth sections of this KAM were introduced.

Following the opening discussion, the formal content was introduced, beginning with a review of a previous class, which had been a product of the application section of a previous KAM. This included a review of constructivist cognitive development as described in the works of Jean Piaget, Seymour Papert, and David H. Jonassen. These theories were explicitly related to digital game based learning through a discussion of the contemporary contributions of Marc Prensky, James Paul Gee, and Clark Aldrich.

This review was followed by a similar overview of the new material from this KAM. Based on the research from the breadth portion of this KAM, participants were introduced to the social constructivist theories of John Dewey, Lev S. Vygotsky, and Jerome Bruner. Digital game based learning was then addressed through the introduction of David Williamson Shaffer, Kurt Squire, and Constance Steinkuehler.

Following the overview, more in depth discussion of each theorist began. Participants were asked to recall and share their prior knowledge of John Dewey, and many participants were able to share a good deal. The presenter then focused on Dewey's (1938) belief that experience is education, and that education should be as much like experience as possible in order to be most effective. In a precursor to the later discussion of social change, the presenter also focused on Dewey's (1916) discussion of the role of education in a democracy. Finally, with a brief introduction of 21st Century Skills, particularly risk taking (North Central Regional Educational Laboratory and the Metiri

Group, 2003), the presenter pointed out Dewey's (1915) dedication to experimenting in schools in order to discover more effective practices rather than continuing in what he considered a medieval educational system. Throughout the discussion of Dewey's theories, parallels were drawn with the application of video games and simulations in the classroom, particularly with respect to Dewey's philosophy of learning by doing.

The discussion of Dewey transitioned well into a more in-depth discussion of Vygotsky with a discussion suggesting that if Dewey thought education was experience, and Vygotsky (1997) thought experience was social, then education must be a social enterprise as well. Participants were largely unfamiliar with Vygotsky's (1978) beliefs regarding the social nature of development, so these were covered as well. However, participants were familiar with the Zone of Proximal Development (Vygotsky, 1986), so discussion focused on its relevance and application in video games and simulations. The vision of academic video games that can adjust to each student's skill level and thus challenge students without frustrating them was offered here as well.

Having covered so many elements of social constructivism already, the following discussion of Bruner was comparatively brief. Still, participants were introduced to his theory of instruction (Bruner, 1966) and the ways in which he formalized social constructivist instructional strategies, many of which are evident in well-designed video games and simulations. Participants were also introduced to Bruner's (1996) thoughts on the process and culture of education, and to his philosophy of public education as "the patient pursuit of the possible" (1966, p. 23). Bruner was the first of the theorists discussed in depth who wrote about educational technology, and who understood that digital age literacies (North Central Regional Educational Laboratory and the Metiri

Group, 2003) were more important than static standards. Participants were introduced to these ideas and their relevance to video games in education.

This made a natural transition into discussion of more contemporary theorists who are studying the application of digital game based learning. The first of these discussed was David Williamson Shaffer. Participants were introduced to his theories on *epistemic frames* associated with various professions or pursuits and the *epistemic games* that can transmit these frameworks of meaning to players (Shaffer, in press). Some time was dedicated to exploring online overviews of the prototypes for learning games that Shaffer is developing at the University of Wisconsin, Madison.

Discussion then turned to Shaffer's colleague at the university, Kurt Squire. The presenter shared a brief synopsis of Squire's (2004) dissertation on the use of *Civilization III* in high school classrooms. Additional time was spent exploring online overviews of prototypes for learning games Squire contributed to as a part of MIT's Games to Teach Program. Participants were also exposed to the new *Games, Learning, and Society* minor, of which Squire is a founding faculty member, now available at University of Wisconsin, Madison.

Finally the in-depth discussion turned to Shaffer and Squire's new colleague, Constance Steinkuehler, whose 2005 dissertation explored cognition and learning in Massively Multiplayer Online Role Playing Games (MMORPGs). This exploration included some discussion of the sorts of teaching and learning that takes place between players of the games (Steinkuehler, 2005). Participants in this session were introduced to her ethnographic methods and to some of her anecdotes and conclusions. Discussion of Steinkuehler concluded with mention of the *Games, Learning, and Society* conference, which she co-chaired at the University of Wisconsin, Madison in 2005. Participants were

guided to the web site as a resource and to promote the upcoming 2006 version of the conference.

At this point, the presentation turned away from discussing specific theorists from the breadth and depth sections of this KAM to discussion of the theories synthesized in this KAM. This began with a brief overview of constructivist learning theory. Important elements covered by the presenter included the rejection of objectivism, the importance of students making their own meaning, and the importance of learning by doing. These were illustrated with familiar educational metaphors and then related to the application of computers, including video games and simulations, in education.

Following this was a discussion of the role that video games and simulations can play in motivating students. Though this section was cut from the written version of the KAM due to time and length constraints, participants were still exposed to the framework of engagement, challenge, and reward that video games might bring to formal education. The meat of this portion of the presentation, though, was the discussion of context-embedded, inquiry-driven, and socially negotiated learning.

The discussion of context-embedded learning touched on the importance of an authentic audience and purpose for student work, which lead to a discussion of the role of social context in learning. Once again, the theme of learning by doing (in context) was discussed. Each of these sections included examples of ways video games embody these ideals of social constructivism.

Similar examples were also shared in the discussion of inquiry-driven learning. These focused on the ways in which games can engage students' natural curiosity and then offer them an opportunity to explore a new environment (or world), with which they can interact as they learn actively. Such game worlds were related to the familiar concept

of discovery learning. Ultimately, the participants were lead to consider the way in which video games and simulations can offer individualized and student centered learning environments – and even instruction.

Then discussion turned to the ways in which video games and simulations can facilitate socially negotiated meaning making. This included examples of cooperative learning in both competitive and collaborative contexts, as Shaffer (2004b) explored. Throughout all of these discussions, frequent references were made to the theorists discussed earlier in the session.

Finally, discussion turned to the fourth primary element of the breadth and depth sections of the KAM, the capacity for video games and simulations to serve as tools for effecting positive social change. Here participants were reminded of the social change agenda of the social constructivists, Dewey, Vygotsky, and Bruner. The presenter also shared the games designed for social change by Shaffer and Squire, as well as Steinkuehler's obvious interest in social change through her involvement in the *Games, Learning, and Society* conference and minor.

Discussion then moved beyond these theorists to other work that is being done in the realm of effecting social change with video games. Participants were introduced to the Serious Games movement, which focuses on games that are created for a purpose other than to entertain – purposes such as to educate, train, or inform. The presenter also introduced participants to the Games for Change movement and the Games for Health movement. Their respective web sites were visited and participants were introduced to several more prototype games through Marc Prensky's (2006b) Social Issue Games website.

This was followed by another discussion based on material that was cut from the written version of the breadth and depth portions of this KAM. Participants were exposed to a brief overview of these theorists' thoughts on the importance of play, particularly social play, in the development of children. This focused on play as a means of children resolving unrealizable tensions, play as a forum for freedom and growth, and some of the paradoxes of play. In addition there was a brief discussion of the need for play to have rules, the difference between play and work, and the importance of narrative in play. Each of these concepts was in turn related to the application of video games in formal education.

Another section cut from the written version of the KAM was a discussion of 21st Century Skills and their relationship to the sort of learning that takes place in video games and simulations. This discussion also had to be severely cut down in the face-to-face professional development session, but there was still a brief overview of digital age literacies, inventive thinking, effective communication, and high productivity. Each of these was related both to the theories of the writers discussed above and to the incidental learning that occurs in video games – and the intentional learning that could occur in formal learning environments.

A final section that was cut from the written report, but was included in the face-to-face session, was a discussion of the role of a teacher when video games and simulations are used in a classroom. Using the familiar teaching framework of providing students with support as they move *into*, *through*, and *beyond* a lesson, participants were urged to offer students the prerequisite knowledge and perspective necessary to make sense of any games used in the classroom. It was suggested that as students actually play the games, the teacher should then serve as a coach and facilitator, much as the presenter

later modeled with the participants as they went hands-on with the MMORPG *Anarchy Online*. Finally, it was recommended that following a session of game play teachers aid students in reflecting on their learning and encourage the students to pursue further development. This segment was closed with a humorous discussion of Marc Prensky's comment during a presentation that if you have a good enough game, you don' need a teacher. This was followed with his published recommendation that teachers and parents always provide balancing messages to help students make sense of what they experience in a video game (Prensky, 2006a).

All of this discussion filled approximately 90 minutes, which was followed by a 10 minute break. Then, finally, teachers were able to get some hands-on experience with the MMORPG *Anarchy Online.* No credit card is required for *Anarchy Online* so teachers were able to register for free accounts during the session. (The game had been downloaded and installed in the computer lab prior to the session). The purpose was to allow participants, some of whom had never played a video game and most of whom had never played an MMORPG, to experience a little bit of what their students experience when they play similarly social games. Participants were able to create and customize a character (many of them for the first time). Then they were thrust into a strange and new science fiction world in which they had to learn, in context and as their own curiosity dictated, how to operate the game and now to make meaning of the world in which they found themselves. Once they moved beyond the beginners' orientation area, they were then also exposed to the full power of an MMORPG as they found themselves sharing a space with many people from all over the world, who could either collaborate with them or compete with them for resources.

Following nearly an hour of play time, participants were brought back together as a group to reflect on their experiences as players in an MMORPG. They were also asked what relationships they saw between their experience in the game and the theories that had been discussed. As in previous sessions, they noted how the presenter was no longer doing the "heavy lifting" and they were no longer in a primarily passive role. They became active learners in the game. Many were struck by the sense of disorientation as they dealt with the unknown, and they developed a greater respect for the sophisticated thinking and learning that takes place as their students play similar games.

The final 30 minutes of the three-hour session was focused on leaving the participants with some sense of how they might apply these theories in their own classrooms or teaching contexts. The presenter shared information about web-based games, commercial off the shelf (COTS) games, Mods (or player modifications) of such COTS games, commercial games that are beginning to be produced for education, and another brief discussion of games for change that teachers might actually implement.

Discussion of web-based games was introduced first because they can be played using a web browser without a need for the participants to install any software on school computers. Web based games are also generally free. Even so, they can be engaging and motivating to students, they are often content related, making them appropriate for school use, particularly with younger students.

Many commercial off the shelf games can by repurposed for use in formal education. Examples shared with the participants included *Civilization III & IV, The Sims 1 & 2, Sim City* (and other "Sim…" titles), *Age of Mythology* (and other "Age of…" titles), Zoo Tycoon (and other "…Tycoon" titles), the puzzle game *Myst* (and it's sequels), and many more. Many commercial games come with tool kits so that consumers

can create their own content for the game. This is called modding and the new games that result are called mods. Modding could be put to use by enterprising teachers (or students) to create new mods for an academic context. Examples of such games included *Neverwinter Nights*, which was used to create MIT's revolutionary war game *Revolution, Unreal Tournament*, a first person shooter which has been used for interactive chemistry quizzes, *Half Life*, another first person shooter that has been frequently modded, *The Sims*, a non-violent game that allows a staggering level of player customization, and many more. Finally, several commercial games designed for education were shared with the participants. These included Muzzy Lane's *Making History*, which is a multiplayer World War II simulation with built in assessment features, Tabula Digita's *Dimenxian*, an action game with the tag line "learn math or die trying," *3D Language*, a simulation in which players can wander the streets of Seville and talk to residents as they learn the Spanish language, and several prototypes at MIT and the University of Wisconsin, Madison.

In keeping with the theme of effecting positive social change in this KAM, participants were also introduced to some serious games for change that they might implement in their classes. For instance the United Nations World Food Program's (WFP) *Food-Force* teaches players about the program and about world hunger. *Food-Force* is offered for free online and comes complete with model lesson plans for teachers to use in conjunction with the game. Participants were also introduced to Carnegie Mellon's *Peacemaker*, a game that allows players to play either the Israeli Prime Minister or the Palestinian President and so come to understand the crisis in the Middle East from the inside out. Other examples included *Peter Packet,* a web based game that simultaneously teaches about IT concepts and global poverty.

Finally, though it will be beyond the technical skills of many teachers, participants were offered an overview of tools available for them (or their students) to create their own games for learning. After all, just the act of designing a game would require a student to master the content which the game is meant to teach, and the design process would be an ideal example of constructivist learning in action, particularly if students were to work in design teams and develop their social skills as well. Example tools for game creation included the Flash programming language, Garage Games' *Torque Game Builder*, and many other tools, including some free and open source software.

Though time ran out, a final discussion session had been planned. Participants were to use the *think, pair, share* strategy to consider possible uses for games in their classrooms. Each would think about the question individually, then discuss it with a partner, and finally share it with the group. Following this, they would be invited to brainstorm lesson plans using these ideas. When the session was implemented, time limitations dictated that the presenter move ahead to the final reflection questions, in which participants were asked to reevaluate their answer to the questions posed during the introduction segment. Participants were then asked what their next steps might be before the session with brought to a close with an online evaluation.

In the final evaluation 100% of participants strongly agreed that the presenter demonstrated knowledge of the subject matter, and was well prepared and organized. One hundred percent also agreed or strongly agreed that the presenter was able to stimulate interest and respond to participants needs. Several participants left enthusiastic positive comments such as "Great class! Good resources!" and "The professor was very

knowledgeable about the subject matter. Thank you for your time!!! I enjoyed trying to

play the game!"

    When asked how the session could have been improved, some participants shared

constructive suggestions as well. Below are some samples:

> I would love to attend an in-service that would give me information
> specifically for primary grades: 1 - 3. What I saw was pretty sophisticated,
> like for high school and up. My students are mostly English learners, in
> third grade. I admittedly don't know what games they are playing at home,
> so I need to do a little research there.
>
> I would have enjoyed more time to actually explore the games online,
> rather than learning about the theorists and those people that developed the
> games. I probably won't remember the names of all the theorists, but if
> there was a chance to learn by going online to their websites or something
> that would be a little more interesting.
>
> More practical applications versus theory. I would enjoy more ideas to
> take home and research or implement.

    This session may be offered again as a three-hour class, and will also be

repurposed as part of a three-day summer institute for teachers focused on the use of

video games in education. The feedback from participant evaluations will be valuable in

the presenter's effort to improve the session for these future events.

Theory to Practice

    The breadth section of this Knowledge Area Module (KAM) presented a

synthesized working theory of constructivist societal development, with a focus on the

works of Dewey, Vygotsky, and Bruner. This working theory was put into practice

through this application portion of the KAM. It was presented to and discussed with

participants during the first segment of the professional development session. Participants

might now apply this theory to their teaching, and to their own use of video games in the

courses they teach.

The depth section of the KAM was a critical examination of digital game-based learning theories in light of the working theory of constructivist societal development developed in the breadth section. This, too, was presented to and discussed with the participants in this professional development session, and again participants now have the opportunity to apply the theories of Shaffer, Squire, and Steinkuehler in their own classes.

Along with the breadth and depth portions of this KAM, the application portion has also supported the argument that video games, particularly massively multiplayer online role playing games (MMORPGs), can serve as social constructivist learning environments, and thus as instruments for effecting positive social change in formal k12 education.

In keeping with the underlying social constructivist philosophy, this application portion of the KAM also provided participants with a hands-on segment during which they were able to experience and reflect on the role of these theories in practice. Finally, participants were introduced to a variety of ways to apply these theories in their own classrooms, including the use of browser-based games, commercial off the shelf games, modded games, commercial games for education, serious games, games for change, and games for health. Ultimately, the focus was on the potential power of video games and simulations to serve as social constructivist learning environments and thus to serve as instruments of positive social change. The hope is that participants will indeed apply these theories in their own roles as educators and thus contribute to ensuring that the future is indeed a better place for their students.

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Appendix

The following is a convenient excerpt of Steinkuehler's writing that provides an

additional broad but succinct summary of research related to the social learning that

occurs in video games, particularly MMORPGs.

> "[MMORPGs] create rich political systems, hierarchies, and power
> structures (Curtis, 1992; Rosenberg, 1992) and the means for their
> enforcement (Lin, & Sun, 2005; Reid, 1994; Taylor & Jakobsson, 2003).
> They collaboratively construct a sense of 'space' and 'place' in worlds
> that exist, in reality, on servers alone (Clodius, 1994; Ducheneaut, Moore,
> & Nickell, 2004). They generate social capital, often in the form of formal
> guild and alliance networks (Clodius, 1996a; Steinkuehler, 2004bd;
> Steinkuehler & Williams, 2005). They devise rituals and performances
> that connect the individual to the social networks of which they are a part
> (Clodius, 1995; Clodius, 1996b) and generate in-game antics and
> adventures, archetypes and characters, and derivative fan art and stories
> (Steinkuehler, 2004bc; Steinkuehler, 2005d). Such communities
> instantiate their collective intelligence (Levy, 1999) in the form of
> unofficial user manuals that are far more accurate than official ones,
> authoring and maintaining database-backed websites that function as "how
> to" manuals for the game (Squire & Steinkuehler, 2005; Steinkuehler,
> 2005e), and they create in-game apprenticeship systems (Galarneau, 2005)
> that enculturate newcomers into valued cultural practices: Gamers who
> have already mastered the social and material practices requisite to
> gameplay apprentice, through scaffolded and supported interactions,
> newer gamers who lack such knowledge and skill (Steinkuehler, 2004b).
> Game communities are even part of the on-going production cycle of the
> actual game designs themselves (Humphreys, 2004): They debug games
> not only during beta testing periods but also on a continued basis once the
> game goes retail; they offer ideas for fixes and improvements to game
> companies' 'property' via official discussion boards and focus groups that
> are implemented (or ignored) at the companies' will; and, when all
> technical solutions fail, they generate in-game social norms that balance
> flawed game design (Steinkuehler, 2004ba). MMOGs are not merely
> designed objects; they are emergent cultures. And those cultures are
> created, maintained, and subsidized by the labor (of love) of those who
> actually play them." (Steinkuehler, in press, p. 12-13)