Knowledge Area Module VI:
Game-Based Learning for Teaching Business

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Abstract

Video game-based learning can be as rigorous, and more effective, than traditional learning because many of the components that make a good video game are the same components that underlay any successful learning experience. This KAM examines several components of theory and practice related to learning in a video game-based environment. Good video games provide an interactive learning environment where content is presented in effective context, where learners engage actively in a process of learning discovery and progress on to more complex activities and learning situations as their abilities and learning experience increases. Attracting players through fun and challenge, good video games provide a high level of engagement, which motivates the player to work hard, practice, and seek out learning experiences.

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VIDEO GAME-BASED LEARNING

Video games have been part of our culture for many years, although their potential for contribution to the body of understanding of learning theory is a subject more recently addressed. This KAM will examine several components of theory and practice related to learning in a video game-based environment. An overview of relevant learning theory, including those typically used in American school systems, and those typically found in video games, and how they differ, will be considered. Learning as a social construct, and the generational differences in learning practice is of important note, as are the roles of perspective and identity. A final analysis of what makes video game-based learning so engaging and effective is also be undertaken. For the purposes of this review, the term "video game" is used to refer to all digital games, whether played on a computer platform or on a special gaming product such as the XBox or PlayStation.

Video games first emerged on a widespread basis in arcades alongside pinball and other similar games in the 1970s (Kent, 2001). The games of this initial era were two dimensional, and often closely mimicked board games, where the players move pieces around a predetermined course (Kent, 200). Early research focused on the engagement video games presented. Why would a person spend hours and hours playing Pacman? Could this level of engagement be reproduced in other learning experiences? Games have since become significantly more complex and engaging, now providing detailed, changeable storylines with adaptable, create-your-own characters that are often played by thousands simultaneously worldwide over the Internet (Gee, 2004, p. 170). Consumers in the United States alone spend billions of dollars each year on the purchase of computer and video games (Dickey, 2005, p. 67). These are not restricted to young people.

According to the Entertainment Software Association, “in 2003 41% of the market for computer games and 22% of the market for video games was represented by middle-aged gamers” (Dickey, 2005, 67).

Game Categorizations

Video games can be categorized according to how they treat various aspects of style and content. For example, some games are intrinsic in nature, with the content being tightly linked to the game style (Prensky, 2000, p. 164). The Sims is a computer simulation game that lets players create and control the lives of virtual people (Maxis, 2005). The content determines much of the game structure and style, as the content choices in a typical Sims game will determine the city, railroad, or whatever the player is creating. An extrinsic game, in contrast, creates a game template into which any type of content can be presented. Trivia games, where the questions vary greatly within a predetermined game structure, are an example of extrinsic games (Prensky, 2000, p. 164). Some games are hard-wired, and cannot be adapted or changed from play to play, others run on “engines,” which allow some flexibility but provide boundaries within the game environment, still others utilize “shells,” which allows various types of information to be called into the program as needed (Prensky, 2000, p. 166).

Game timing is also a fundamental component of design, and a way of categorizing different game styles. Some games operate in real-time, where if the player doesn’t act, he or she usually loses. Other games will wait until the next player takes a turn, even if it takes days (Prensky, 2000, p. 168). Beginning gamers are often intimidated by time-limited games, particularly those where a goal must be accomplished within a fixed time limit (Gee, 2004, pp. 34-35). More recent games, therefore, often

provide a variety of game options related to timing (Gee, 2004, pp. 34-35). Some games are also session-based, where the player must complete a particular session before quitting the game or start over. Others are persistent-state, where the player can quit the game and pick back up at the same point at a later time (Prensky, 2000, p. 168). Many games combine aspects of the two, allowing a player to "save" after attaining certain levels of success, which is particularly important to very complex games (Gee, 2004, p. 35).

Games can also be considered based on the number of players possible. Some games only provide for a single player, others allow multiple players on the same computer or gaming apparatus. Some games can be played by many players over computer networks or the internet (Gee, 2004, p. 170). As games become more and more complex, so do the number of players who can take part and the variety of roles and activities they are able to pursue (Gee, 2004, pp. 54-56). Some games are reflective, where the player provides answers to questions while others are action games, where the player participates in the actions of the game, often as a character within a story (Prensky, 2000, p. 167). Finally, games can be categorized based on their graphic components. Video-based games use real-life pictures or realistic representations of the characters and environment in the game. Animation-based games, in contrast, are not realistic and typically present cartoon characters and environments (Prensky, 2000, p. 169).

Narrative Game Features

While many simpler games are easily described, components of more complex games are best explained. As Gee (2004) contends, "when people learn to play video games, they are learning a new literacy" (13). This new literacy has both its own

symbols and structure. Most games feature some sort of narrative, or story, as their backbone. Simpler games feature a fixed narrative, although the player can usually choose what order he or she plays each section of the narrative (Dickey, 2005, p. 73). More complex games feature branching stories. In this game design, the player chooses specific actions, which significantly affect the progression of the storyline and the ultimate outcome of the game (Dickey, 2005, p. 73). Narratives may also be plot-based, where a large number of characters are involved in actions that forward a particular goal or endeavor as well as the plot, or character-based, where the actions and decisions of the player as represented by one detailed or central character (Dickey, 2005, p. 73). The narrative is often communicated or supplemented within the game by backstory, which is simply background information that sets up the plot, or cut scenes, where the storyline is furthered by brief narrative events at certain levels of the game (Dickey, 2005). Both can be simple or complex, and can take any number of forms, from descriptions in the game manual to video scenes to clues or communications delivered to the character (Dickey 2005). Cut scenes are particularly used as information dumps, where the player is provided with key information, usually as a reward for advancing to a certain point in the game (Dickey, 2005, p. 73).

Identity

An important component of constructivist and game theories is the concept of identity. Many games allow the player to assume a created identity of some sort (Gee 2004, p. 120). The combination of this virtual identity and the player's real-world identity forms a “projected identity,” which allows the player to rise above the limitations of both (Gee, 2004, p. 65). The virtual and projected identities allow players to learn

about themselves and the domain in which these identities are situated. "Projective identities are the heart and soul of active and critical learning," allowing learners to be "engaged in real learning, learning as a refashioning of self" (Gee 2004, p. 120).

From a learning perspective, if learners bring damaged identities as learners to a learning opportunity, these identities must first be repaired before any meaningful, active learning can take place (Gee, 2004, p. 61). For example, if a child is sure he will fail at a particular activity, his identity as a learner is damaged in that area. Also, if another child has been taught that success in a certain learning situation is not appropriate for her gender or meaningful in her culture, she brings a damaged learner identity to the educational opportunity. In a school or formal educational setting, "if children cannot or will not make bridges between one or more of their real-world identities and the virtual identity at stake in the classroom - or if teachers or others destroy or don't help build such bridges - then, once again, learning is imperiled" (Gee, 2004, 61).

In such a repair situation, the learner must be enticed to attempt the learning activity, as many will have reached a point where he or she no longer even begins an attempt, then put in continued effort and achieve some type of success meaningful to him or her based on this effort (Gee, 2004, p. 62). Gee (2004) contends that video games provide just such "a learning space in which the learner can take risks where real-world consequences are lowered," which can allow such damaged learner identities to be repaired (62).

Perspective

The player's perspective is another important component of game design. Early games of the Space Invaders and Pacman genre featured a "God" perspective, where the

player viewed the whole playing area the way one might look down on a board game (Dickey, 2005, p. 72). More recent games, particularly shooter games, usually present the player a first-person perspective (Dickey, 2005, p. 72). Most players and game designers find first-person perspective provides a more engaging experience for the player (Dickey 2005, p. 72). In some games the player's character is not visible, but one actually "looks through the eyes" of their character. Others show part of all the player's character. None show the entire playing area at once. Enemies and rewards are hidden behind various features in the game, and features change as the character progresses from scene to scene (Gee, 2004, p. 78). "No longer is the focus on a God's eye view and mastery of a specific set of exercises, but rather information, events, actions, and activities are obscured from view and encountered as the learner moves through the learning materials and environment" (Dickey, 2005, 72).

Dickey (2005) observes the shift in recent years to a first-person perspective mirrors a shift from behaviorist to constructivist perspectives in learning (72). In a real-world interactive learning experience, the learner operates from a first-person perspective, causing the learner to become more active and, at least from their own viewpoint, central to the experience. The learner's decisions, just like the player's decisions in a video game, significantly influence the course and outcome of the learning situation. "The parallel between game design and learner positioning within differing theoretical perspectives of learning reveals that the values perpetuated in the design of contemporary of constructivist learning environments than for design from a behaviorist perspective" (Dickey, 2005, 72).

TRADITIONAL INSTRUCTION

Behaviorism, the theory on which much of our current educational practice is based, sees people's thinking and learning as a response to stimuli from the environment (Skinner, 1985, p. 291). Man is a machine, "dependent on external stimuli to function," knowledge is generated from experiences provided through the five senses, and the brain then creates ideas and thought from these experiences (Reynolds, Sinatra & Jetton, 1996, p. 95). Positive and negative reinforcement determine future behavior and decisions. "Everyday perception is the product of a vast number of experiences" combined over time through "reinforcing consequences" (Skinner, 1985, p. 292).

In many schools situations, students are viewed as cups to be filled. The student is rewarded for memorizing and recounting information, while instruction involves the teacher lecturing about facts and ideas generated by a third party (Gardner, 1991, p. 9). Gardner (1991) contends that students' success in the traditional schooling environment is not an indicator of their overall ability to learn, as this passive approach to learning experience rarely engages students fully (pp. 8-9). "Concepts are frequently abstracted from those situations in which they are relevant and of value, reified as facts, and treated as self-contained entities" (Barab et al, 2001, p. 52). Not surprisingly, when these abstracted definitions are presented to students, usually in text form without an experiential context from the students' past experience, engagement in learning is low (Barab et al, 2001, p. 52). Efficient transmission of data from teacher or book to pupil, rather than meaningful participation in a learning opportunity, becomes the focus and rewarded classroom activity (Lave & Wenger, 1991, p. 56). Unfortunately this can also lead to circular definitions, where meanings of individual events or concepts become self-

referenced and therefore fairly meaningless to the student (Barab et al, 2001, p. 52). "If the meaning of the concept only refers to itself, then it forms a closed circle, disembodied from the environmental particulars through which the concept gains meaning" (Barab et al, 2001, 52). Prensky (2000) concludes that formal training and education are usually less meaningful, not to mention incredibly unengaging, because of their focus on content and telling, rather than creating dialogue with the student (145).

Constructivist Learning

Video games, on the other hand, are based on more of a constructivist approach to learning. Constructivist theory holds that learning is most optimized when the learner performs experiments or tests the environment, then "actively constructs ideas and relationships in their own minds" based on these actions, rather than being told (Prensky, 2000, p. 162). In practice, this requires moving away from lecture or teacher-centered learning to "developing participatory learning environments that are technology rich and allow students to ground their understandings within their own concrete experiences" (Barab et al, 2002, p. 77). For example, rather than simply telling students about the solar system, they might be given a project where they create a virtual solar system on a computer platform, and then can change various aspects of their solar systems and experience the results. Emerging technologies can be very supportive of constructivist learning methods. Consider the difference between an interactive game and a "talking head" computer teaching CD. Video games are "the first medium to combine visual dynamism with an active, participatory role for the learner," allowing them to take meaningful actions and experience the results of these actions rather than simply view or listen (Prensky, 2000, pp. 55-57). This allows learners to be immersed "within context

that challenge, ground, and, ultimately, extend their understandings," while teachers shift from the provider of all right answers to guiding students as they experience their own learning process (Barab et al, 2002, p. 77).

The constructivist concept also allows the learner to control the speed of the learning experience, at least to some extent. This reveals another draw for younger learners to video games as opposed to traditional schooling instruction. The minds of people who grew up with video games, the "Game Generation" as some call them, "have been programmed to adapt to greater speed and thrive on it," being exposed early and often to twitch-speed video games and MTV (Prensky, 2000, p. 58). "Yet when they go to school or go to work, educators and trainers typically give them all the "nontwitch" features of the past: "tell-test" education, boring corporate classrooms, poor speakers lecturing at them, talking-head corporate videos, and, lately, endless "click and fall asleep" courses on the Internet" (Prensky, 2000, p. 58). The speed change causes many students to disengage from traditional learning formats, and therefore not have meaningful learning experiences in such environments.

Prensky (2000) supports such constructivist theory, although acknowledging additional relevant theories, contending that instruction can be evaluated along two dimensions, engagement and learning. Each dimension is considered as a continuum, with engagement and learning ideally moving higher together along a 45-degree line, if graphed (p. 150). Using Figure 1 (next page) as this graphic representation, Prensky (2000, p. 150) finds well-crafted video game-based learning to be effective because it requires high aspects of both components. He finds CBT (computer-based training) less effective because although it is high learning, it provides low engagement. Some

entertainment-oriented games, in contrast, are high engagement, but provide low learning opportunity (Prensky, 2000, p. 162).

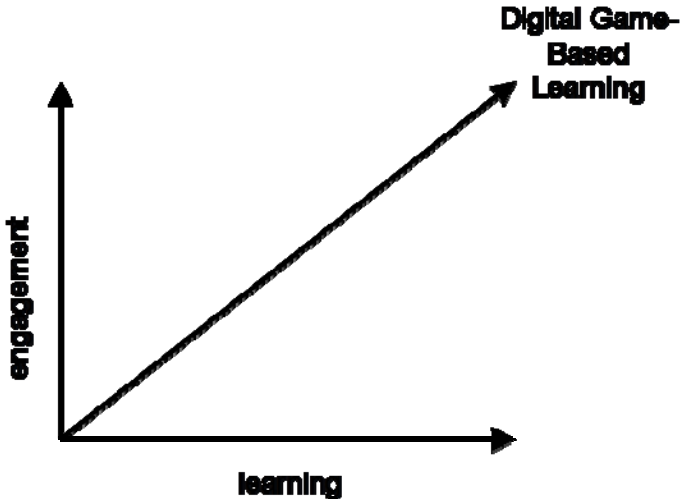

Figure 1: Prensky's Game-Based Learning

"Good digital game-based learning does not favor either engagement or learning, but strives to keep them both at a high level" (Prensky, 2000, p. 150). If learning is not emphasized, game-based learning slides toward being only a game, while not enough engagement moves the activity towards CBT. "It is much better to think about keeping both dimensions high than to think about trading them off" (Prensky, 2000, p. 150). Gee (2004, p. 6) also sees gaming design as based on constructivist principles. As he puts it, "you cannot play a game if you cannot learn it" (Gee, 2004, p. 6). Therefore, game designers must make games that customers can teach themselves to play. This requires the learner to be actively participating in the learning experience, rather than passively observing. Interestingly enough, the harder, more challenging games sell more than easy, watered-down ones (Gee, 2004, p. 6).

Activity Theory

Activity theory is another learning construct that is useful in examining the effectiveness of learning in the video-game format. It melds well with constructivist theory. Activity theory contends that establishing rich environments for learning, where the learner can act in a participatory fashion, supports the creation of activity systems (Barab et al, 2002, p. 76). Learners then use these systems to further extend their understandings of the environment (Barab et al, 2002, p. 77). Of particular importance in activity theory is the relationship between individual and social understanding of the environment and its systems. The components of activity systems include tools, subject, rules, classroom microculture, object, and division of labor. These combine to create an outcome (Barab et al, 2002, p. 77). "The components of activity systems are not static components existing in isolation from each other but are dynamic and continuously interact with the other components through which they define the activity system as a whole… examination of any phenomenon (e.g., learning in the classroom) must consider the dynamics among all these components" (Barab et al, 2002, p. 79).

In a video game learning environment, activity theory's emphasis on how individuals transform objects in the environment and the activity systems that allow this transformation, become obvious. The entire activity system, the player, computer, game, game design, and the like must all be considered as one holistic unit, with each component influencing the others (Barab et al, 2002, p. 77). "This perspective expands the unit of analysis from the mind of the individual (as in traditional cognitive research) or from the human–computer interaction (as in traditional human–computer interaction research), to the entire activity system" (Barab et al, 2002, pp. 79-80). This theory, as

well as video-game learning constructs in general, emphasis a shift away from seeing a learner as an individual, isolated thinker to an emphasis on a situated learning (Barab et al, 2002, p. 81).

Social Aspects Of Learning

Learning is considered more and more to be a social rather than individual occurrence. That is, learning is both shaped and directed by the social environment of the learners, and their present and past social constructs (Gee, 2004a, p. 8). Those who study learning theory and practice report a shift "from cognitive theories that emphasize individual thinkers and their isolated minds to theories that more fully acknowledge the role of the physical and social context in determining what is known" (Barab, Barnett and Squire, 2002, p. 494). Reading, for example, is held to be both a mental act and a social one. The reader must have life context or understanding in which to situation the reading, and this context is socially derived (Gee, 2004, p. 180). Thinking and learning are "attuned to and normed by the social groups to which we belong or seek to belong" (Gee, 2004, p. 180). A variety of research studies propose "radically new theories of what it means to know and learn, and that emphasize the reciprocal character of the interaction in which identities, as well as cognition and meaning, are considered to be socially and culturally constructed" (Barab, Barnett & Squire, 2002, p. 494).

In this sense, social relationship and the identity one develops from such relationship with society directly impacts the learning experience. "Developing an identity as a member of a community and becoming knowledgeably skillful are part of the same process, with the former motivating, shaping, and giving meaning to the latter" (Lave, 1993, p. 65). Barab, Barnett and Squire (2002) recognize that moving from what

they call an acquisition metaphor, where learners are “filled” with facts to a participation metaphor, where learners experience and influence the learning opportunity, requires a social or interactive orientation (pp. 532-533). According to Squire and Steinkuehler (2005), such a community view is already a given in most video-gaming constructs (p. 39). “Groups of people from around the world solve problems with an array of information, digital tools, resources, screen shots, and arguments... Commercial developers, doctoral students, and I6-year-olds in Nebraska play, think, and learn together” (Squire & Steinkuehler, 2005, p. 39).

Dickey (2005) cites the doctoral work of Bruckman (1997) regarding a game virtual world Moose Crossing (p. 68). Bruckman concluded that “virtual environments support the emergence of peer role models predicated on characteristics different from those occurring in traditional classroom settings” and “afford emotional support between participants, along with the presence of an appreciative audience” (Dickey, 2005, p. 68). Indeed, some internet-based games such as Everquest have hundreds of thousands of subscribers; the game Lineage boasts over two million players in South Korea alone (Gee, 2004, p. 170). Gee (2004) gives an example of such social support in the story of Adrian, a young Everquest player. When Adrian’s player is killed a group of players with whom he is associated worked and even “cheated” the game to resurrect him, one calling him long-distance from across the country (pp. 75-177). Internet sites devoted to describing and connecting game players provide further support and community (Dickey, 2005, p. 68).

Gee (2004, p. 27) contends that participants in such relationships share a semiotic domain. Situated cognition theory states that our thinking is tied to our physical body

and how it has and does experience the "material, social, and cultural world" (Gee, 2004, p. 8). Individuals experience worlds within these worlds, which Gee (2004, p. 24) calls semiotic domains. When individuals are asked to operate in a new semiotic domain, they must learn the construct of this domain or will be unable to learn within it. Gee (2004) contends the infamous "fourth-grade slump," where reading scores plummet in the fourth grade, is caused by the move from decoding to comprehension (p. 17). Students, who often have no context in which to understand what they are reading, move from learning to read to reading to learn, and their academic performance falls. "Content, the internal part of a semiotic domain, gets made in history by real people and their social interactions" (Gee, 2004, p. 29). The domain then influences their decisions, which further defines and builds the domain, a circular process. If students are not part of the domain in which learning is presented, they have no context for and therefore limited access to the learning experience.

In video games, one must often play the game to be able to understand the manual. This is because without experience or context for the semiotic domain of the game, the information in the manual is of little value. All true meaning is situated within one or more domains (Gee, 2004, p. 101). Once a player has spent some time in the game, he or she develops a basic understanding of the parameters of the game, “pockets” where future information and concept can be stored. When the player has thus become indoctrinated to the game, Gee (2004) contends they have joined an affinity group (p. 27). Affinity groups are collections of individuals similarly connected to a specific semiotic domain. They share a common endeavor, and knowledge is distributed among group members (Gee, 2004, p. 27). The cohort of players with which the previously

mentioned Adrian participates in Everquest, is an example of a narrow affinity group. All players and designers of a particular game could be considered part of a wider affinity group, defined by their participation in the semiotic domain that constitutes the virtual game world. This virtual world can also impact the real one; for example, virtual items related to Everquest have sold on EBay for two thousand dollars (Gee, 2004, p. 171).

Looking at learning in general, rather than focusing on video game-based situations, Lave and Wenger (1991) presented a theory of community participation in learning where the individual develops an identity within a community and then participates in relations with others in the community which further build and define it (p. 31). They called such communities of practice, emphasizing the importance of connecting individuals to communities and these same communities then legitimizing individual actions, a reciprocal practice. "Within the context of these communities, learning is conceived as a trajectory in which learners move from legitimate peripheral participant to core participant of the community of practice" (Barab, Barnett & Squire, 2002, p. 495). Community members are motivated to participate in learning activities that are meaningful to the community as a whole and assist in positioning the learner more centrally within the community (Barab & Duffy, 2000, p. 26). Members of a community of practice are socially interdependent and "share mutually-defined practices, beliefs, and understandings over an extended time frame in the pursuit of a shared enterprise" (Barab, Barnett, & Squire, 2002, p. 495).

All communities of practice have four components consistently present (Barab & Duffy, 2000, p. 33). The first, community history, provides a cultural and/or historical context within which the community members identify themselves. Second, community

members also share goals, beliefs, and stories that define appropriate practice within the community. Thirds, members recognize that the community is larger than themselves or any one group of members, and is constantly changing and evolving as new members enter and former members leave (Barab & Duffy, 2000, p. 33). Fourth, whether "real" or virtual, new members typically move from outside the community to a more central positioning as they participate in community activities (Lave, 1993, p. 65). Barab, Barnett, and Squire (2002), in their study of teachers participating in a learning-community teacher-education program, found "members were not simply learning about teaching practice (content) as they were situated within a community (context), but instead were learning about teaching practice through participation as a community member" (p. 533). In traditional learning environments, context is often thought to be either something arranged by the instructor to support the content presented or an individual attribute the student brings to the learning experience. In contrast, Barab, Barnett and Squire (2002) contend that context is an inherent part of any learning experience, which is neither preplanned or brought to the learning situation but arises out of the experiences of all participating in the situation (p. 533). Gee (2004) similarly contends that learning is a social process, from which goals emerge, meaning is negotiated, and success is relative within the context of the community (p. 2).

THE GAME GENERATION – HOW GAMERS THINK

Research exists analyzing the thought processes of those who play games regularly, and whether they differ from non-game players. Much of this has been done generationally, as younger people have a much higher rate of participation in and spend more time playing games, although middle-aged persons make the most purchases (Dickey, 2005, p. 67).

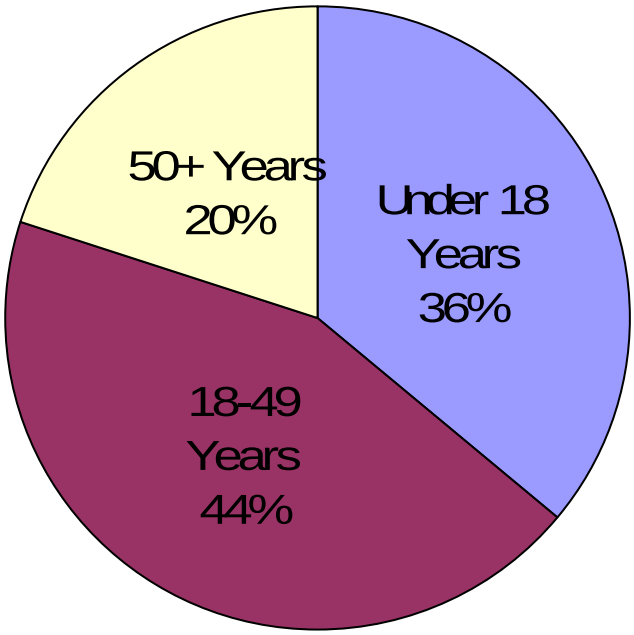

Figure 2: Game Player Demographics (ESA)

There is a measurable difference in thought and learning among those people for whom television and video games are a regular activity (Anon 2005, Beck & Wade, 2005, p. 51). "To understand today's Games Generation learners, it is key for us to distinguish and separate those mind changes that come from television from the mind changes of the next generations, influenced as well by *interactive* technologies such as

video and computer games and the Internet" (Prensky, 2000, p. 55). Most importantly, gamers or the game generation are used to being *active participants* in learning experience, and have low engagement when placed in the role of passive observers (Prensky, 2000, p. 55). "They've grown up with games… its a part of their lives," and the typical student is often just as " interested in taking apart the game and learning what components go into the games" as playing them (Anon, 2005).

Prensky (2000) describes ten cognitive style changes he has observed between the Games Generation and those without game experience (p. 52). The first, speed, has been mentioned but not fully explained. Most gamers are used to input at what is called twitch speed, where a high number of images or inputs is presented in a short period of time.

Table 1

Prensky's Cognitive Style Changes

1. Twitch speed vs. conventional speed
2. Parallel processing vs. linear processing
3. Graphics first vs. text first
4. Random access vs. step-by-step
5. Connected vs. standalone
6. Active vs. passive
7. Play vs. work
8. Payoff vs. patience
9. Fantasy vs. reality
10. Technology-as-friend vs. technology-as-foe

This differs significantly from conventional speed of presentation, which gamers may find boring compared to the input speed they are used to (Prensky, 2000, p. 58). They are used to learning in a connected environment, where wholes are broken into parts and interrelation of components is emphasized, and are often frustrated by standalone content with no apparent relation to other concepts and ideas. This lack of patience in both speed and presentation of content is considered to be due in part by their

experiences with and therefore expectations of immediate payoffs (Prensky, 2000, p. 60). They are also accustomed to seeing graphics before text, and will focus on visual images before words. Being able to read such images is more and more being recognized as a form of literacy in its own right, which presents important implications for traditional learning and instructional design (Gee, 2004, p. 13).

Gamers tend to process information in a parallel rather than linear fashion. Rather than mastering one step of a process and then building on it to move to the next, they experience various portions of a learning experience randomly or simultaneously, developing a context that eventually leads to mastery (Prensky, 2000, p. 59). This random access to inputs versus step-by-step access is considered normative among gamers, who sometimes feel constrained or bored by step-by-step structure (Dickey, 2005, p. 68). Gamers see technology as their friend, and are unafraid to experiment with it. From games to cell phones, everything is seen as working in a similar manner, which increases comfort levels among gamers as they typically have experience with at least one technology platform (Anon, 2005). As active learners, exploration and fantasy are highly valued, much to the often dismay of the passive, reality-based learners of previous generations. Similar conflict can occur due the gamers value of play versus work, and lack of attention to detail or first-time quality of product. There is a tendency among gamers to expect the opportunity to redo if necessary (Beck & Wade, 2005, p. 48).

“It's a generation brought up on video games, and the experience has defined the way its members see the business world, how they think about work and risk and success, and what they expect of themselves, these attitudes can be confusing to boomers— in fact, to anyone who doesn't intuitively understand game culture” (Beck & Wade, 2005, p.

48). In a business context, gamers consider risk to be real and natural, yet they attach less import to it. From a learning standpoint, the importance of decisions is significantly different between persons who had learning experiences based in the "real" world and those whose learning experiences are typically in virtual realms (Gee, 2004, pp. 63-66). "As intense and interactive as they are, games automatically teach two things about perspective: first, that a little distance is not just useful but normal: and second, that your point of view is a choice—and choosing correctly matters" (Beck & Wade, 2005, p. 51).

Learning In Video Games

Prensky (2000) contends that not only can educational content and game style be successfully combined, but it "*is* possible to combine computer and video games with a wide variety of educational content, achieving as good or better results as through traditional learning methods in the process" (p. 145). Ideally, the learning feels like a game throughout, but puts the learner in a learning situation, often without their conscious awareness of such, with content and context that guide the learner through experience of a given subject matter or area (Prensky, 2000, p. 145). Although some critics have discounted the content aspect of video game-based learning, Gee (2004) contends that video games do teach content: "They situate meaning in a multimodal space through embodied experiences to solve problems and reflect on the intricacies of the design of imagined worlds and the design of both real and imagined social relationships and identities in the modern world" (p. 48).

Video game-based learning works for three primary reasons, according to Prensky's (2000) research. First, games are engaging, which motivates people to learn. While this engagement must be balanced with learning, often traditional teaching

methods are not engaging, particularly for younger generations (Prensky, 2000, p. 147). Second, games are also interactive. They provide movement within the learning experience based on player action and decisions, where the player's choices have consequences regarding the progression and outcome of the game. The player learns through personal experience within the game domain, and discovers content in a contextual situation (Prensky, 2000, p. 147). Third, each game provides a unique combination of learning and engagement, which when properly balanced draws the player through the learning experience in a fruitful and productive way (Prensky, 2000, p. 147). Gee (2004) would concur that the unique combination of player involvement and subtle content and practice exposure provide a highly motivational learning environment for those who have learned to function within such a paradigm (p. 62). Barab and Duffy (2000) further support the learner-centered model provided by the video game-based learning context as optimum for problem solving and inquiry activities.

Of course different types of content and intended audiences require different structures to be effective (Prensky, 2000, p. 156). For example, if a game seeks to teach a theory, such as how people learn, it might be designed with open-ended simulations where the player could experience the varied results of their own learning choices. Such an open-ended simulation would be less effective, not to mention very hard to design, for a game that seeks to teach a foreign language. Similarly, a game intended to increase typing speed might emphasize timed drills, an important motivator since time is a key learning objective. A game designed to increase creativity, such as where one creates an artwork or structure, would likely be less effective under similar time constraints (Prensky, 2000, p. 156).

Prensky (2000) reports on a three-year study by the U.S. Navy regarding the effectiveness of games as a teaching tool, particularly for those personnel planning to serve on submarines (p. 147). Given that the games have built-in opportunities for success that are achievable by the target population, playing leads to a sense of purpose, or the perception of control of one's destiny. The complexity and mystery components typical of games (not know what will come next) lead to fascination and further engagement, while success at the game tasks combined with social reinforcement from other players, online game sites, and the like reinforce the player's sense of confidence. Researchers describe this cycle as initiate – persist – succeed, which "leads players of training games to remain involved as they initiate game play, adopt a role, control game play, practice skills, solve problems, persist to the end, and strive to win (which translates as "learn")" (Prensky, 2000, pp. 147-148).

Gee (2004) similarly concludes that video games reinforce a system of learning that involves four repeated steps (p. 90). First, the player probes the virtual world, and based on their reflection while probing, (second) forms a hypothesis about something. The player then reprobes (third) to test out this hypothesis and modifies (fourth) the hypothesis based on the results of reprobing (Gee, 2004, p. 91). This process is considered by many to be the basis of active learning in general, not only in video games. It additionally leads to greater commitment and engagement of the learner in the game. "No appreciative system is formed without probing, hypothesizing, reprobing, and rethinking through embodied action in a domain in connection with the affinity group associated with the domain" (Gee, 2004, p. 100).

Each new learning experience or revelation builds on those previously experienced, and causes new probing or questions (Schaller & Allison-Bunnell, 2003, p. 13). In very young children this can be as simple as binary opposites, but older people develop complex mental organization, and can typically experience real, significant learning and growth if given safe opportunities to explore the extremes of their reality and their place within it (Schaller & Allison-Bunnell, 2003, pp. 13-14). Video games can provide such learning opportunities. "A cycle of automatization, adaptation, new learning, and new automatization" is a required for those who want to survive as active thinkers and actors in a fast changing world that requires mastery of ever newer semiotic domains…Video games are quite adapt at creating and sustaining this cycle" (Gee, 2004, p. 70).

Players are also stretched to the edge of their ability on a regular basis, and rewarded when achieving results in such an extended position. "A good video game adapts to the level of the player, rewards different players differently (but rewards them all), and often stays at the edge of the player's regime of competence" (Gee, 2004, p. 121). This constantly challenges the player and keeps him or her in a learning situation, rather than interspersing areas of challenge beyond the player's current ability with situations far below their earned level of competence. Gee (2004) found that learners are most motivated when operating on the edge of their resources, where learning is challenging but not unaccomplishable, and will spend a lot of time practicing to achieve competence if such practice is not boring (p. 71). A combination of motivation and continued practice is fundamental to almost all conclusions regarding learning effectiveness (Din & Caleo, 2000, p. 98; Prensky, 2000, p. 148; Dickey, 2005, pp. 68-69).

A final learning concept that is particularly effective in video game-based learning is the practice of beginning players in a simplified version of the game for learning purposes. "In a good video game, the player learns to play the game by playing in a 'subdomain' of the real game" (Gee, 2004, p. 121). For example, a player may begin in a game subdomain where enemies are less skilled, where the game moves more slowly, or choices are limited. After mastering the subdomain, the player moves into the full game, which is itself usually geared to adjust to player competence, with the game becoming progressively more difficult as the player increases in ability, stretching player competence and social skill (Dickey, 2005, p. 70). Additionally, while the player is not thrown into the full game at the start, "learning is not started in a separate place (e.g., a classroom or textbook) outside the domain in which the learning is going to operate" (Gee, 2004, p. 122). This allows the learning experience to take place in context of its appropriate semiotic domain, as previously described. Unfortunately, this concept is rarely applied in traditional school settings, and provides another factor in the popularity and effectiveness of games as opposed to traditional learning methods (Gee, 2004, 122).

CONCLUSION

Video game-based learning shows promising potential as an effective learning environment because many of the components that make a good video game are the same components that underlay any successful learning experience. Good video games provide an interactive learning environment where content is presented in effective context, where learners engage actively in a process of learning discovery and progress on to more complex activities and learning situations as their abilities and learning experience increases. Attracting players through fun and challenge, good video games provide a high level of engagement, which motivates the player to work hard, practice, and seek out learning experiences. When such engagement is coupled with substantive learning opportunities, in any forum, real and significant learning occurs. Unfortunately, while this is a typical situation within the video game realm, fewer and fewer of today's students, particularly those who have experienced the difference of such learning in a gaming environment, are led to or can muster similar engagement (and therefore learning success) in traditional schooling situations.

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