Zone of Proximal Development

In Game Play


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*Introduction*

　　Game play has always been a large part of how we go about learning as children, adolescents and even as adults.  Games evolve as we grow with age.  We start out with simple games, for example as infants we are amused with peek-a-boo, as children we progress to games like hide-and-seek.  We move on to more advanced games in our adolescent years, games that involve more cognitive thinking and semiotic play.  As we grow into adulthood, we are still involved in games, even though we might interpret them differently than child's play.  We engage in sports, game shows and gambling. Gaming has deep seated roots and a habitual association with "play", however play is thought as being separate from everyday life, safe or consequence free and pleasurable or fun in nature (Malaby, 2007).  Malaby redefines the definition of games as "a semi-bounded and socially legitimate domain of contrived contingency that generates interpretable outcomes."  He believes that games are an integral part of our lives and possess a unique power over us.  Games are a way we interact with each other and learn about the world around us, whether we are aware of the learning or not.

　　With the onset of electronics, our world of gaming has broadened.  We have more options for playing games.  Video gaming much like other emerging technologies become disruptive as they challenge our existing social practices, capture our imagination and trigger our fears (Squire, 2007).  We are becoming literate in a new form of communication and play.  Literacy in this context means "technology that allows people to decode meaning and produce meaning by the use of symbols" (Gee, 2007).  One question to ask around this new literacy is, "How do players become literate in video game environments?"  Let's take a moment to illustrate becoming "game literate" with the wildly popular game called "Angry Birds" (http://chrome.angrybirds.com/). This is a very simple game played on mobile devices revolving

around the story of a family of green pigs who stole eggs from the nest of some very diverse and talented birds. The goal of the game is to sling shot the "angry birds" through the air to kill the pigs hiding under various objects. When you first start the game, there is a very short visual of why the birds are angry and how to operate the slingshot device to launch the birds. In the first game scene, you are presented with a pig hiding under some pieces of wood and an angry bird in a slingshot. At this point, you either figure out how to play the game by dragging your finger on the bird and launching him through the air to kill the pig, or you ask a friend to show you what to do. As the game progresses, you will find that different types of birds behave in different ways. You become game literate by experiencing the game and through methods of trail and error strategies. As you achieve higher levels, the game becomes more challenging with more types of birds, more pigs and hard obstacles to overcome.

In James Gee's book, *Good Video Games and Good Learning*, he describes a new field of learning emerging around the principles of video gaming. These games engage and motivate players into producing deeper and more fruitful learning (p. 132). Gaming environments may create superior opportunities to learn, especially for those players who are accustom to the video game setting. The game puts the player in control and encourages active participation, exploration, reflection and the construction of meaning (Galarneau, 2005). Gee states that the gaming experience should be both frustrating and life enhancing (Gee, 2007). Motivation and engagement happens when game play is not too boring or too frustrating. One game that does a good job of keeping the player both engaged and motivated is called "Little Big Planet" (http://www.littlebigplanet.com). This is a role-playing game where you navigate through puzzles and environments to achieve different levels. The player is not bored, as the environment is constantly changing and the game is not too difficult, because you slowly learn

through experimentation how to solve and master the puzzles.  There is also a character guide in the game who gives you hints before you enter each new level.  So the player is constantly in a space where he or she is prepared to learn and achieve new levels with the help of the game or a friend. This is the space where the zone of proximal development happens in video gaming.

The zone of proximal development (ZPD) is that area of learning where a player can problem solve independently to a point, but needs some guidance or collaboration from others to make it to the next level (Vygotsky, 1978).  There are many video games that use the zone of proximal development to engage and motivate player to master the next level of play.  Marc Prensky (2004) in his book, *Digital Game-based Learning* studied video game play and established several principles to assist developers in building the "zone" for game-based learning. The principles include: 1) Provide enough content so players will not become bored, 2) Design the game for players, not students, 3) Design the game so players want to complete their objectives and keep playing, 4) Assist the players in perceiving their knowledge has grown, because of their time investment in the game, 5) Help the players increase their chance of winning by the experience and knowledge gained through gameplay. Even though well-designed games can make the player feel enthusiastic, the game designer must keep in mind that the game's effectiveness may vary depending on the game objectives, the game environment, and the age of the players (Papastergiou, 2009). All of these principles described by Prensky, assist in creating the zone of proximal development.  One vintage learning based game demonstrating these principles and using ZPD is the Oregon Trail (http://www.oregontrail.com/hmh/site/oregontrail).  This game introduced in the 90's stands the test of time for engaging players to learn while they play.  The Oregon Trail game has been very successful in engaging children (and adults) to experience the day in day out difficulties of

navigating the trip from Missouri to Oregon in the 1800's. As one plays this game there are helpful hints throughout the gameplay assisting the player in discovering ways to progress on the Oregon Trail.  Without these hints it would be very difficult to find your way to the end of the game.  Another feature of this game is that there is more than one strategy that will get you to the end of the game.  This is where the assistance of a teacher or friend can help you level throughout the game in a completely different manor.  These are just two examples of how the zone of proximal development has been used to create a successful video gaming environment.

This research will explore some questions revolving around video game play and the zone of proximal development.   The main research question is:  How does the zone of proximal development impact players in video games?  The two supporting questions are: 1) How do player learn the complexity of video game play?  2) What motivates and engages players to persist to higher levels in game play?

*Discussion*

In exploring these research questions, it is important to make the knowledge transfer between motivation, engagement and learning from entertainment games to serious games. Serious games are a category of games designed for a certain purpose.  There is an entire industry built around serious games or game-based learning.   The real purpose of serious games is to combine content, pedagogy, and technology to form games making learning relevant and meaningful to both teachers and students. Students need to learn and develop deep interests in the content, not just get a high score on a test for the purpose of schooling (Foster, 2008). Serious gaming is way to integrate learning into an engaging environment for students.

It is important for students become active participants in constructing knowledge

(Greeno, Collins, & Resnick, 1996). Once this happens, the focus of learning shifts from covering the curriculum to working with ideas (Scardamalia, 2000). Games can become active learning agents for students both in and outside of the classroom. Computer and video games have created a new learning culture that corresponds better with students' habits and interests (Prensky, 2004). The use of games to master content is a powerful tool if used correctly. Games should provide possibilities for reflectively exploring phenomena, testing hypotheses and constructing objects (Kiili, 2004).

Another area to explore in regards to gaming and learning is an idea called "flow". Flow describes a state of complete absorption or engagement in an activity and refers to the optimal experience. The Flow Theory has eight components: 1) a challenge with attainable goals and known rules, 2) complete absorbing activities, 3) clear goals, 4) immediate feedback, 5) concentration on task, 6) a sense of control, 7) loss of self-consciousness and 8) transformation of time (Csikszentmihalyi, 1991). Gaming can create this flow type experience for players. When a person enters the state of flow they lose all track of time as they are totally and completely emerged in the activity. One might wonder if this experience of flow happens inside of the zone of proximal development. As an example, if a game player is totally engrossed in achieving a level, but they do not have the skills to overcome the task, yet they keep on playing thinking that eventually they will succeed. Then someone in the games lends them a clue they need to achieve the level or the game itself gives up a clue, so the player achieves the level and is motivated to continue on with the game. In this example, the player is in the zone of proximal development and with help overcomes and continues along the experience of flow.

As we look at flow within the computer environment, we can turn to Activity Theory (AT) to help us understand the application of human to computer interaction. To show AT in

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games, we see that players are embedded in a socio-cultural setting and their behavior is dependent upon the setting. The players are constantly interacting with the setting, continually changing it and creating meaning from the activities. Activity Theory takes on the base principles of Vygotsky's theory that tools occupy a mediating role in player reaction and interaction with the computer environment. So the computer environment interposes between the player and the object of their play to serve as the conductor of the player's activity (Verenikina, 2010).

One study conducted on computer games looked at socio-cultural play from an Activity Theory perspective. They found two types of extrinsic play. First, players are motivated by reflective play, in other words they want to talk to others about the game and form a community of like minded players. Second, players are motivated to explore the game to figure out what they can do in the game, so players are constantly testing boundaries and involved in expansive play (Ang, Wilson & Zaphiris, 2010). This study helps to prove that the zone of proximal development and flow really does happen inside of computer or video games, by showing us the players are testing the boundaries of the game and interested in building community of players to further their knowledge of the game. The players test the gaming environment boundaries and may achieve levels in the game, but at some point in the game they look to others in the community who can relate to their socio-culture in the game and help them to the next level of play.

There was another study conducted using ZPD as a framework for creating educational software called Ecolab. These researchers found ZPD to be an effective foundation for the software design, but also pointed to some difficulties encountered with collaboration and achievement of levels. The first difficulty was that effective collaboration differs greatly among

individual players.  The second difficulty was that the players were not effective at challenging

themselves to tackle problems, which lay beyond what they could achieve.  The players needed

to be guided toward the challenge aware that there would be support to assist them in achieving

the next level.  They point out that the support needs to be flexible and fade away as to make

sure the player uses persistent mental effort to achieve the outcome (Luckin, 2001).  This is

constant with the framework of ZPD, for if a player is in the zone, but does not have the

knowledge that there is some kind of assistance to make it over the challenge, then he will

become frustrated and give up.  One question for this research team might be, what is desire or

motivation factor for students to go beyond their level of knowledge?  They do need guidance,

but also they also need motivation to want to advance to the next challenge.

Another Vygotsky framework to be explored in reference to game play is the idea that the

social dimension plays a fundamental role in the development of human cognition and learning.

So does Vygotsky's framework connect to video learning based games? One study conducted on

children in Italy investigated the benefits of social interaction and learning outcomes in game

play.  They were exploring whether "play with peers" is more effective to learning than "playing

alone" and if the different circumstances of social interaction provokes distinctive measureable

learning outcomes. They also investigated how the role of competition affects learning in

children.  What they found confirms Vygotsky's framework. Children participating in the

gaming experience had higher learning outcomes when they were involved with social

interaction than when they play alone.  It is interesting to note, they also found the competitive

version of the game resulted in slightly higher results than the non-competitive version

(Garzotto, 2007). These finding are interesting as the most popular games for entertainment

purposes involve both competition and social interaction, which leads one to wonder why these

factors are not used more in learning based games.

Which leads us back to the original research question: How does the zone of proximal development impact players in video games? In exploring this question, we can help to determine factors that will lead to the development of more effective game based learning strategies. By implementing these strategies gameplay will encourage players to become more engaged and motivated in learning environments, thus achieving higher levels of knowledge acquisition.

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