

Virtually Real: A Psychological Perspective on Massively Multiplayer Online Games

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Massively multiplayer games (MMOs) are immersive virtual three-dimensional fantasy worlds in which people cooperate and compete with each other, as well as with the computer-generated denizens of that particular game world. Although typically seen as games, their strong social aspect suggests that they are a form of online communication tool, with which players interact to form friendships, create communities, and work together to accomplish a variety of goals. After an introduction to MMOs, this review explores how social aspects of the game imitate the real world in terms of choices that players make when interacting with others. Furthermore, player-to-player interactions are examined in terms of in-game group formation and how efficient communication is imperative for goal achievement. The review also explores how leadership skills learned in-game may be transferred to real-world scenarios. The reasons why people play MMOs are examined in terms of player motivations and how aspects of game play may have both positive and negative consequences for a player's well-being. The latter half of the review describes how MMOs are used as afterschool virtual teaching environments where students can use aspects of game play to learn, for example, leadership qualities. The review concludes with recommendations for using MMOs as virtual laboratories to explore aspects of human behavior.

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Massively multiplayer online games (MMOs) currently account for \$11 billion of the video game industry's \$44 billion worldwide revenue (Gamasutra, 2009). In the United States, 68% of households play video games, with 62% of these playing socially with others in person, while 23% pay to play games online (Entertainment Software Association [ESA], 2009). MMOs provide a rich variety of experiences for players, many of which are absent in console or PC-based games. For example, players can interact with others to explore extensive environments and battle against fierce computer-generated enemies, as well as other players within the game world, while at the same time developing the abilities and power of their character, or avatar. In this way they are given the opportunity to play the role of a hero (or a villain) in an immersive fantasy world. These opportunities, and the flexibility of choice they offer gamers, make it impossible to answer the question of whether the impact of MMOs is negative or positive. In many ways MMOs mimic the real world in which players form friendships and communities to defeat challenges and at the same time, attack, swindle, thwart, and exploit each other.

This review will attempt to offer an overview of what MMOs are, some of the research exploring human behavior in MMOs,

and how game play and player interactions affect a player's behavior both in-game and in the real world. To aid an understanding of how these games are designed, our review begins by providing a brief history of how MMOs emerged, followed by a description of the game design mechanics inherent in all online games. The section **Who Plays MMOs** ascertains whether the stereotype of gamers as socially inept men is accurate, and following this, **MMO Game Play and Player Choices** provides an explanation of how players create characters to interact with the gaming world. Included in this is an attempt to pinpoint why players choose various attributes for their character (e.g., gender and level of attractiveness) and the consequences these have on the player and others they meet when progressing through the game. After this, descriptions are provided of the various aspects of **Game Progression** such as the formation of small and large groups or communities. Players must make friends and interact with others if they are to succeed with the harder challenges that the game provides, and the positive and negative consequences arising from these interactions are discussed. The review then examines players' **Motivations to Play MMOs**, that is, what the internal and external factors are that drive players to log into the game. Some of these motivational factors are thought to be the "driving force" behind gaming addiction, and this, and the problems surrounding diagnosis, are discussed here. The section on **MMOs as Teaching and Learning Environments** explores the potential for online games to be used as teaching and learning tools and provides examples of how this has been attempted. The following section contains **Suggestions for Researchers** that should be considered before using MMOs to study human behavior, followed by the Conclusion to this review.

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A Brief History of MMOs

The emergence during the 1970s of two new social fantasy game genres would later influence the development of MMOs—multi-user domains (MUDs) and table-top role-playing games (RPGs). Both types of games required player cooperation to achieve success in missions. However, whereas MUDs were computer-based persistent worlds in which players used text-based commands to explore a game world, RPGs had a physical table-top existence in which players threw dice to determine the outcomes of moving small figures around a player-drawn map. In both games, players created characters with attributes and skills to help them fight together through dungeons filled with dangerous beasts to acquire magical items.

As the years passed, game graphics became more sophisticated, while the Internet was becoming more accessible to the general population, and it was inevitable that the two would converge to create the games known as MMOs. Early MMOs had thousands of players; however, their popularity rapidly spread worldwide with the availability of games such as Asheron's Call (AC) and EverQuest (EQ) in the late 1990s and early 2000s. Today, the subscribership of MMOs has rocketed with World of Warcraft (WoW) having the highest player subscription ever recorded with 11.5 million players as of November 2008 (Blizzard Entertainment, 2008).

Definition of MMOs

Many acronyms (such as MMORPG and MMOG) and definitions exist that describe online games; however, for simplicity's sake this review will use MMO. *Massively* refers to the fact that millions of people play online games; *multiplayer* identifies the fact that people play simultaneously in the same online world, not in an individual copy of it; and *online* indicates that the game can be played only with an Internet connection. MMOs often include *role-playing* (RP) as part of their description. RP has many meanings (Williams, Kennedy, & Moore, in press) that will be covered later on in this review, but at its simplest refers to players who interact with the gaming world and other players by using "avatars" (hereon described as *characters*), more or less customizable agents whose appearance and abilities need bear no relation to the person creating them (Chan & Vorderer, 2006).

Characteristics of MMOs

An MMO is a video game in which thousands of players can interact with each other in real-time, in fantasy-based settings. They can be purchased in shops or downloaded from official game sites and then installed on personal computers. An Internet connection is needed to play, and many MMO developers require players to pay a monthly subscription of the order of approximately US\$15 or [euro]10. MMOs vary in terms of content and challenges and are set in a variety of worlds from medieval fantasy to postapocalyptic landscapes and science fiction universes. In general, whatever the setting of the game, all MMOs share six technical and design characteristics that collectively distinguish them from other types of games—*persistence*, *physicality*, *avatar-mediated play*, *vertical game play*, *perpetuity*, and *social interaction* (Chan & Vorderer, 2006). *Persistence* refers to the fact that

players and player-based communities exist and evolve even when a player is not playing the game ("logged on"), and as a result the game world may have changed, sometimes dramatically, between the time a player logged off and logs back on again. *Physicality* means that the game instantiates a more-or-less realistic and consistent set of physical rules, so for example a player's character will die when falling from a great height. The player's character, or avatar, allows for *avatar-mediated play*, in which the player uses his or her character to interact with the game world and other players. Character design is further discussed below. *Vertical game play* and *perpetuity* refer to the fact that MMOs have no discernible marker, indicating that the game has been beaten. This is unlike other games, for example, those requiring a single player, in which after completing a series of goals, the game will finish. In MMOs, even after achieving the highest level of power, players may still remain in the game world to complete more challenges, such as accumulating wealth or participating in the social communities that they have become part of. *Social interaction* forms an essential role in an individual's game play, in which various communication networks are formed via a series of specialized chat channels. Communication is not compulsory, and players can choose to solo the game; however, social interaction in MMOs provides an opportunity to communicate that transcends physical limitations (Filiciak, 2003).

Who Plays MMOs?

Gaming has often been perceived as an adolescent man's pastime (e.g., Sakamoto, 1994), and the common misconception of the gamer stereotype was of young, pale, socially inept men (Williams, 2003). Early research exploring male and female adolescents' attitudes toward and experiences with games, however, revealed another picture. Although young men perceived game play as a more positive experience than did women (M. A. Barnett, Vitaglione, Harper, Quackenbush, Steadman, & Valdez, 1997), they also reported differences in the types of games they preferred to play. Both men and women stated that "challenge" was an important characteristic of game play (Myers, 1990); however, whereas men also enjoyed feeling powerful within a game, women preferred games that made them laugh (Mehrabian & Wixen, 1986). An MMO will contain many aspects of game play that can be found in a variety of other game genres—for example, challenge and humor, in addition to social contact with thousands of other players—so could MMOs break the gamer stereotype mold that has existed for so long? Or do they continue to be a specialist sample who are set apart from the rest of the nongaming human race?

Much of the research suggests that MMO gamers encompass many factors that do not fit into the stereotype. For example, some studies have found that online gamers are both adults and adolescents, ages between 12 and 70 years (e.g., Griffiths, Davies, & Chappell, 2004) and between 12 and 65 years (e.g., Williams, Yee, & Caplan, 2008). Another study (J. Barnett, Coulson, & Foreman, 2009) reported an even wider age range of 12 to 83 years of age. With regard to gamers being predominantly men, this was so in some cases; however, in one study the prevalence of gender depended on the age of the player. For example, Griffiths et al. (2004) found more women in their adult group (20.4%, ages 20 to 70 years), than in their adolescent sample (6.8%, ages between 12 and 19 years). Of additional interest, Williams et al. (2008) found that although men (80.80%) dominated the preva-

lence of women (19.20%) with regard to gender distribution, women did report playing more often than did men (29.31 and 25.03 hours per week, respectively).

Another aspect of the gamer stereotype is that of being pale skinned; however, another recent concern is that game playing is a main cause of obesity because of the inactivity of the player over a long period of time. In an effort to change this sedentary lifestyle, the U.K. government launched the Change4Life advertising campaign that attempted to encourage people away from games in order to participate in more active pastimes. It is impossible to say that there is a direct link between video game play and ill health; however, recent research (Wack & Tantleff-Dunn, 2009) found that despite the fact that some reported playing games between 9 and 35 hours a week, there was no detrimental effect on their physical health. Additionally, Williams et al. (2008) found that a sample of 7000 EverQuest 2 (EQ2) players were not pale but were physically healthier, had a lower body mass index, and engaged in more vigorous exercise than did the majority of the U.S. population (Ogden, Fryar, Carroll, & Flegal, 2004, Center for the Digital Future, 2007, respectively, in the work of Williams et al., 2008).

Stereotypes of players sitting in darkened rooms and avoiding all social contact are common, although gamers will play to avoid boredom or loneliness (e.g., M. A. Barnett et al., 1997). It was mentioned at the beginning of this section that MMOs have a social component that allows them to communicate with thousands of other players from across the world. Regardless of whether players sit in darkened rooms playing MMOs, it is almost certain that they will be communicating with others. Recent research found that MMO gamers enjoy the social aspect of game play, whether it be to seek social support (J. Barnett et al., 2009) or generally socialize with other players (Williams et al., 2008; communication within MMOs will be discussed later on in the review). Further research also breaks the “socially inept” mold of the gamer stereotype. Yee (2006b) found that the majority of his online gamer sample had successful careers and families, and respondents identified themselves as coming from a variety of backgrounds such as “teenagers, college students, early adult professionals, middle-aged homemakers, as well as retirees” (p. 193). Inability to choose an appropriate emotional response to a given scenario might also be perceived as a factor of social ineptitude and could potentially set gamers apart from nongamers. J. Barnett et al. (2009) compared how nongamers and MMO gamers would react to a series of hypothetical real-life potential anger-causing provocations such as “You are talking to someone and they are not listening to you” (taken from the Novaco Provocation Inventory; Novaco, 2003). Results showed that the majority of both gamers and nongamers chose constructive (being assertive) rather than destructive responses (aggression).

The stereotype of gamers being young, pale, and socially inept needs considerable revision. This is not to say that the stereotype does not exist in some form or another, but the demographics discussed here and in other studies do show that the complete opposite is also true. Thus, it is possible to conclude that gamers are not a specialized sample and are not much different from the general population. The next section will explore MMO game play and the choices players make when, for example, creating a character (an online representation of themselves) to play. Although these choices may initially seem inconsequential, they do provide indications of how choices and

social interactions during the initial stages of game play can imitate aspects of real-world choices in terms of social roles and perceptions.

MMO Game Play and Player Choices

MMOs provide players with many choices, and these are experienced as soon as game play begins (choosing a character), through to the harder aspects of the game (deciding which abilities to use to defeat an enemy). This section begins with an explanation of the character creation procedure and the factors a player may consider when deciding how their character will look. This will be discussed in relation to how choices made during character creation can vary according to age and gender, and additionally, how they are, or want to be, perceived by other players within the game world. Additionally, with the anonymity afforded by MMOs, it is interesting to see whether players would ‘gender-bend’ and experiment with different identities. Do these choices have an influence on how they are perceived within the game world?

Character Creation—A Virtual Representation of the Self?

Prior to discussing the factors that players consider when choosing a character to play, it is important to understand the process of creating one. Before entering the game world, MMOs provide players with a character-creation screen that allows them to create and personalize an avatar, or game character, which they may choose to play for the duration of the game (see Screenshot 1 - Character Creation). In addition to choosing the sex of their character, they can typically choose a class (e.g., melee, spell caster, or jedi)—which will affect the sorts of skills and abilities they will have—a race or faction (night elf, orc, or wookiee), and a name. Some MMOs also provide options for hair color, clothing, facial markings, and professions. Additionally, a player can choose to fight for a particular faction; warring factions are commonplace in MMOs, and choosing a particular faction might mean being at war with other factions, with little or no ability to communicate across them.

MMOs are for the most part anonymous environments for play and thus can provide players with many opportunities to experiment with different online identities. For example, a player’s female character seen in-game does not necessarily mean that the real person behind the character is female, and vice versa. Recent studies have explored whether players do take advantage of this anonymity, or do they comply with social norms? Ducheneaut, Yee, Nickell, and Moore (2006) found that male players who chose healing roles, or other classes that wore light armor, were more likely to “gender-bend” (p. 296) and play female characters than to choose a male combat character who wore heavier, bulkier armour. Companion and Sambrook (2008) found that choice of class depended on gender-based differences for which women reported a preference for classes that specialized in life-giving abilities because they were viewed as positive character types that signify the rejection of violence. The desire to nurture others suggested by these classes (e.g., medic) was not a deciding factor. Men, however, preferred ranged-combat classes (e.g., archer), possibly because they appear to be physically strong. Ducheneaut et al. (2006) speculate that this is most likely due to the player base

consisting of players who were used to playing male-dominated action games.

Some research has explored how players make choices during character creation that depend on how pretty or how ugly the character is (Ducheneaut et al., 2006) and found that the majority of players chose the aesthetically pleasing races that appeared to represent “good” (e.g., tall and attractive elves) rather than “evil”-looking green-skinned orcs and similar “monster” races. These divergences in player choice and behavior suggest “identity tourism” (Nakamura, 2001), in which, despite being immersed in a virtual world, players clearly favor sexier-looking characters over the less pretty ones. Beauty appears to be just as important in the game world in which “real world stereotypes come to shape the demographics of fantasy worlds” (Ducheneaut et al., 2006, p. 296).

There is also some evidence to suggest that younger players may choose characters that are stronger and more intelligent representations of themselves ([i]circ]Smahel, Blinka, & Ledaby, 2008). Wolfendale (2006, cited by Šmahel et al., 2008) described this as an attachment between the player and his or her character, for which, although the character is not real, the player still has feelings. For example, when the character dies, the player feels sad. Players also report feeling both pride and shame toward their characters; however, the questionnaire items were not explicit enough to examine exactly why this was so. However, it does tentatively suggest that younger players may be experiencing a lack of self-esteem and a wish to change their appearance and psychological make-up.

Whereas real-world outward appearances can be changed simply and for little cost—for example, hairstyles and makeovers—other more costly changes such as gender reassignment surgery or liposuction can cost thousands of dollars (Yee & Bailenson, 2007). In MMOs, however, players can change their character’s appearance by selecting options at little to no cost and, as in the case of the younger players, can create a look that they perceive is an ideal representation of how they wish to be in the real world. Again, the anonymity of MMOs allows for this; however, players can choose to be whoever they want, questions remain as to whether this affects their behaviour and how they are perceived by other players. Yee and Bailenson (2007) explored how MMO characters created by players affected both a player’s behavior and how they are perceived by others. Three main findings emerged. First, players who create attractive characters are more likely to reveal personal information to strangers compared to those players with unattractive characters. Second, players who create tall characters behave more aggressively when negotiating with other players, compared to those who play shorter characters. Third, players with shorter characters are more likely to accept unfair negotiation propositions. These results suggest that both attractiveness and height have an impact on how a player perceives others, and in turn how they are perceived by others. These player choices and behaviors propose that “far from projecting a balanced view of gender and race instead perpetuates the domination of certain canons of moral and beauty” (Ducheneaut et al., 2006, p. 297). If players with tall and attractive avatars become more confident in real-world situations, then research exploring character creation and identity has important implications for therapy. Many MMOs provide only young, slim, and attractive character choices; therefore, if thousands of players with these types of characters interact with each other, this might make players in a virtual environment

more confident, friendly, and cooperative (Yee & Bailenson, 2007).

Further studies are needed to explore the choices that influence character and class creation. It is clear that both are influenced by gender and age; however, a deeper understanding may provide additional information about a player’s emotional investment within the game and the psychological relationship between the virtual self and the real self.

Types of Game Play

MMOs offer players the choice of participating in many different types of game play, and these are determined by choosing a realm in which they will most likely spend the rest of their time playing. Although this may initially seem unimportant, it does provide players with opportunities to continue experimenting with their virtual selves. This section describes the types of realms from which a player can choose, the types of game play they provide, and whether choice of realm has an influence on the player’s behavior. To accommodate millions of players, game developers create numerous realms (also known as *servers* or *shards*) that each run a copy of the game, with each realm containing several thousand players and constituting an independent, self-contained copy of the game world or universe. Direct communication between players across realms is typically not possible.

For example, *player versus player* (PvP) realms allow players of opposing factions to attack each other on sight, and PvP servers offer no protection from the opposing faction, and any player encountered is considered fair game. They are also more likely to quest in groups to reduce the likelihood of being killed by groups of players of the opposing faction (Ducheneaut et al., 2006). Although many players report that they enjoy the surprise elements of PvP servers and will often engage in full-scale battles with the opposing faction, there is a small body of players who take PvP too far. Known as *griefers*, these players enjoy participating in anti-social behaviours that disrupt the enjoyment of the game for players on the receiving end (e.g. bullying) (Foo & Koivisto, 2004), and a news report by Pham (2002) suggests that the number of players affected by griefers is very high. Research on griefing is still in its infancy; however, Foo and Koivisto (2004) explained that players may grieve for many reasons, such as feeling bored, or they may feel that griefing others helps to alleviate a bad mood. Additionally, successfully killing another player’s character may provide a sense of being powerful or a sense of identity with other PvPers. A player of the opposing faction will be seen as the enemy and in this sense, attacking that player may provide a sense of role-play which enhances the sense of being immersed in the game world.

When a player has been “griefed” or killed, they can resurrect at the graveyard and either continue questing or retaliate. If the player decides to continue questing, he or she runs the risk of being attacked again by the same, or a different, player. If the warring players are of a similar level of power, the fight can be considered fair; however, this is not always the case. For example, if the griefer has more powerful armor than the greefee, then the fight will be over in seconds. Some griefers will kill other, less-powerful players, wait for them to resurrect, then kill them again (known as *corpse camping*), which although frustrating, provides griepees with a number of options. For example, they can choose to move

their character to another realm or use more creative methods such as using limited communication methods to reach a truce. Some warring factions have even been known to help each other complete quests (J. Barnett et al., 2009).

Players in *normal* (PvE: players vs. environment) realms are not able to attack players from other factions except under certain circumstances. This means that players can safely explore the game environment (referred to as ‘levelling’) without fear of surprise attacks from the opposing factions. PvP is an option that has to be manually switched on by the player unless they enter the opposing faction’s cities, where PvP will be switched on automatically. Players may choose PvE realms if they enjoy immersing themselves in the various computer-generated challenges that MMOs have to offer.

Both PvP and PvE realms can be further subdivided to accommodate role-play (RP- see Screenshot 2 - Role-Play). Players who participate in RP enjoy learning about the game’s lore in order to develop ideas and storylines about how their character’s personality, beliefs, and history fit into the game’s societies and those that RPer create. Specific rules for these realms are more or less enforced to maintain the high level of immersion provided by RP. For example, communication between players is generally required to be in-character (IC) in most public chat channels (limiting talk to the game’s lore and not the latest sports results). Players who ignore the rules and interrupt RP with out-of-character (OOC) chat will anger the RP player community, because the deep level of immersion is broken. Although a rare practice, RP is of some importance to the players who participate, because it can “add color to an experience, as an exercise in personal growth, for coping, creativity, or for learning-centric goals” (Williams et al., 2010, p. 2). The authors explain that RP cannot exist with a strong magic circle (Huizinga, 1949), a barrier of sorts, that separates the virtual world from the real world; however, others believe (Castronova, 2005) that the barrier is more porous, and players transfer some of their behaviors and beliefs from the real world into the virtual world. Even if this is the case, MMOs provide a safe haven within which players can experiment with new behaviors and beliefs without fear of being judged by real-world peers and family (Sutton-Smith, 1998, cited by Williams et al., 2010).

Again, anonymity appears to be a factor that influences motivation to RP. Williams et al. (2010) found that players’ practice reaped many useful benefits both in-game and in the real world, for example, by either fulfilling a creative outlet or escaping from their real-world persona and behaving as their true selves. Primary reasons for RPing were *immersion* (in which players constructed character stories and escaped from real-life identity) and *socializing* (making friends and developing relationships in and out of the game). Players also reported that RP played a constructive role outside of the game by enhancing creativity and imagination (writing emotionally expressive stories), building both practical (increasing typing proficiency) and social skills (communicating in a different language, organizing in-game RP events), and also helping players to cope with health issues by providing relief from everyday stressors.

RPer, then, are a “small, vibrant, and unique class of game players” who are “often playing their own game, largely dependent from the other players and the larger world they populate” (Williams et al., 2010, p. 37), suggesting that RPer should be parsed out of data

sets and analyzed separately. Additionally, RPer may not place as much importance on progressing through the game in comparison with other players who are less likely to RP. However, all players may at some point choose to journey through the MMO environment and embrace the varying challenges the game has to offer.

Game Progression

Progression involves the act of moving forward toward a goal; however, in the case of MMOs there are literally hundreds of goals a player can strive toward. For example, players can complete thousands of quests, acquire superior armor, vanquish numerous evil foes, and explore vast landscapes, while socializing with many new friends along the journey. Socializing is perhaps the most important aspect of MMOs, and positive social skills (e.g. behaving in a friendly and helpful way to other players) are a necessity if the player wishes to either participate in communities or complete the harder challenges that the game has to offer. Ducheneaut and Moore (2004) described this as “increasing their social capital within the game’s society” (p. 2). This section begins by describing the various tools that are available to the players that allow them to increase their social capital. As with real-world scenarios, positive social capital can assist with making friends, and negative behavior toward others can have deleterious consequences. This section will explore in detail whether these social capital norms are transferred to MMO game play, after a short description of MMO game play.

MMO Game Play

After creating a character, new players begin their virtual life in a “starter area” that is designed to slowly introduce them, via a series of tutorials, to the many aspects of game play. For example, players are familiarized with the user interface (UI- see Screenshot 3 - Interface/Questing) so that they can interact with the game’s environment and other players. When examining the UI, players will see a map showing their location within the game world, together with icons that display their character’s vital statistics, and bars that contain buttons allowing the player to activate their character’s abilities. A combination of mouse and keyboard allows movement, combat, the creation of items, interaction with other players, manipulation of game world objects, buying and selling, and interaction with nonplayer characters (NPCs: characters controlled by the game’s mechanics). Players are also directed toward the game’s main communication tools: chat channels, with which they can communicate with other players to share knowledge or just chat. MMOs may have many different chat channels, each one serving a specific purpose. For example, when players form a group, a chat channel may be automatically created that only group members can use.

A player’s character will usually start the game with very simple skills and abilities. Progressing through the game—by accomplishing tasks or quests for NPCs, killing enemies (players or computer-generated creatures), or performing other various activities—leads to the character becoming more powerful. Increases in power and ability typically occur at certain points, a process known as *levelling up*. A significant amount of time will be spent levelling and progressing through the game’s various challenges, and at some point the player may reach the “level cap” meaning

there are no higher levels which can be attained. As will be seen later, this does not in any sense mean the game is over.

Although this may initially seem tedious, developers encourage progression in the game by regularly rewarding the player, and this aspect of game design has been likened to Skinner's (1938) behavior principles of reward for commitment. During the early stages of leveling up, rewards can be frequent, and players can expect to acquire new armor, skills, and abilities very quickly. As levels increase, however, the process of attaining the consequent level increases; however, rewards are still easily achievable by participating in other aspects of game play, such as leveling a profession (a trade skill with which players can harvest in-game resources and create useful items). Ducheneaut et al. (2006) found that players leveled more quickly just before reaching an even-numbered level (Levels 2, 4, 6, 48, 60, etc.), when it is common for NPCs to offer players class quests that, upon completion, reward superior armor or other useful items. For example, traversing a character from one area to another in an MMO can take up a large amount of play time. In *World of Warcraft* (WoW), players will level quickly so that they can acquire their first mount at Level 20 for a small fee, and a second faster mount at Level 40, both of which allow them to travel around the game world more quickly.

Seeking Like-Minded Adventurers

As was explained earlier, socialization, or building positive social capital with other players, is crucial if players wish to make friends and join groups of players to defeat the harder challenges that the MMO provides. Players who do not make the effort to increase their social capital may not be invited back to groups, and in addition, their behavior may be reported to other friends as a warning, and in this way, it is easy for a player to face a kind of virtual ostracism.

MMOs have a number of in-game tools that allow players to seek out others. Messages can be typed in chat channels, or players may advertise that they are "looking for group" (LFG) for certain tasks or quests, and spontaneous groups of players may form in this fashion. Chat channels may also be used to seek others purely for questing company and conversation and to learn about the mechanics of the game. MMO game manuals regularly provide little information with regard to playing the game, which leaves the player seeking information from players online. Regularly grouping and socializing with others will enable a player to learn more about the game's mechanics via "situated learning" (Ducheneaut & Moore, 2005, p. 92) in four ways. First, players can use the chat channels for *in-game in-context discussion* by asking questions and receiving immediate responses from others. Second, additional MMO resources outside of the game, such as forums and fansites, enable players to hold *out-game, out-of-context* discussions. Third, using *observation*, players can watch others use their spells and abilities to see how they may be useful when accomplishing a task, and fourth, by *in situ teaching*, players will take the time to show others how to perform aspects of their class efficiently. The authors continue to say that that provides an ideal starting point for those players who wish to become a well-respected and experienced member of the game's community. These skills are also invaluable when the player begins to form his or her own groups of players. When grouping with other players, good social communication skills are a necessity, not only for building trust relationships with

other players but also for successfully overcoming the harder challenges of the game.

Creating a good impression and performing a role well increases the likelihood that a player will be added to a *friends list* (a UI tool in which players add names of people that they enjoyed grouping with) and will be asked to return to help with other group work. A recent study (J. Barnett et al., 2009) asked 292 MMO players to give examples of encounters in-game that made them angry, and 50% of them stated that rude and impolite players were the cause of many of their frustrations. Impolite players who refuse to work as a team will often find themselves on a player's *ignore list*, meaning they are unable to communicate any further with that player. It does seem, then, that as with real-world scenarios, positive social capital is crucial for making friends, whereas behaving negatively has deleterious consequences for the perpetrator. The same social rules may also apply to groups formed in-game.

Organizing Groups of Players

Before the formation of groups is discussed, this section briefly describes the types of challenging encounters that groups of players can participate in. After this, the discussion of positive and negative social capital behavior in groups examines whether the same norms exist as those discussed in the previous section.

A key element in most MMOs is the concept of an *instance*. This is a part of the virtual world (a dungeon, an abandoned spaceship, or a village), which when entered by a group of players, creates a copy of itself that only contains those players. This means that the group is free to attempt the challenges that the instance presents without the help or hindrance of other players outside the group. Instances play an important role in MMOs because they create the opportunity for every player to experience the greatest challenges and reap the greatest rewards that the game has to offer at their level of experience. If there was only one dragon, or one Death Star, then once this was killed or destroyed, other groups would not be able to repeat the achievement. By creating on-demand copies of the toughest and most rewarding parts of the game, all players can in principle be a hero. Participating in instance runs, however, is not only about mindlessly slaying computer-generated creatures, and by following three simple social rules, players should ensure successful teamwork and great rewards (Ducheneaut & Moore, 2005). It is also about learning to work effectively as a team. First, players need to be capable of *self-organization* and find a balanced group of people, each performing a different role, if they are to survive the instance. A typical group requires players to fulfill a number of roles, which we summarize as KIP for *kill, irritate, and preserve*. Players fulfilling kill roles are there to deal out damage to computer-generated opponents and focus on damage output. The job of irritators is to attract and keep the attention of opponents while the kill players deal out the damage. Finally, players who preserve keep the rest of the group alive. A typical instance group needs an appropriate balance of all three roles in order to stand a realistic chance of success. When forming a group, the MMO provides a tool with which players can send potential group members a group invite, and it is considered polite to ask the player first before the invite is sent. Inviting players out of the blue, or sending them repeated unsolicited invites ("spamming"), are likely to anger players who will more than likely add the offenders to their ignore

list (J. Barnett et al., 2009). Second, *instrumental coordination* involves assigning each group member a role that should be performed to the best of their ability. For example, those who specialize in healing should keep group members alive while in battle. Players who have just joined the game may still be learning their class skills, so joining groups will provide them with an opportunity to practice and gather advice from more knowledgeable players. Players who refuse to listen and fail to work as part of the team will cause the group to fail their task and anger their teammates and run the risk of being ignored (J. Barnett et al., 2009). Third, *sociability* describes the importance of forming friendships and acting sociably with other players. Ducheneaut and Moore (2005) suggested that using appropriate humor, participating in “small talk,” and interacting positively with other group members will help to solidify the group’s structure.

These three rules are necessary for successful group work, not only for completing an instance and reaping the rewards but also to enable players to develop positive reputations with others and increase the likelihood that they will receive invitations to future group instances and large player-formed communities known as *guilds*.

Persistent Player Groups in MMOs

Just as people will form large real-world communities to share common interests, the same kinds of groups are formed in MMOs. Again, the same types of positive societal norms are expected from players. These groups—variously known as guilds, units, corporations, or any number of other terms (hereinafter *guilds*)—are generally managed by a leader, along with a number of designated officers who attempt to ensure the smooth running of the guild. Some guilds may be organized in ways similar to those of real-world businesses. If so, why would a player who may work all day want to join a guild, or does guild membership offer positive benefits to the player? Before this question can be answered, it is important to understand the social structure of guilds.

Guilds have a management structure (designated *leader* and *officers*) to organize members and guild events (see Screenshot 4 - Guild Group). A player may join and leave several guilds until he or she find one that feels like “home.” For example, an older player may not feel comfortable in a guild with adolescents and instead prefer to play with others of a similar age group. If he decides that he would like to join a particular guild, it is usual practice to complete an application form (which is not dissimilar to a real-world job application form), in addition to being interviewed by the guild leader or officer (via in-game chat channels, voice chat software, or guild forums), before an acceptance or rejection decision is made. A guild that focuses mainly on team work would expect their applicants to complete a thoughtful and well-detailed application that shows that they have good social skills, can play their character to the best of their ability, and work as part of a team. Carelessly completed applications will be rejected because they show a lack of effort, and for guilds who receive lots of applications, this is a waste of time for the guild membership recruiter (J. Barnett et al., 2009).

Organizational theory suggests that establishing a clear mission statement can contribute toward the success of real-world businesses (Barnard, 1938, cited by Williams et al., 2006). Similarly, many guild leaders will establish a mission statement for their

guild. For example, an RP guild’s mission statement may claim to improve the quality of RP on their realm, and non-RPers will normally be allowed membership. As with real-world businesses, mission statements encourage members to perform guild-related tasks more efficiently, in comparison with less organized guilds. Maintaining member cohesion and encouraging positive social communication are important for a guild’s collective well-being, and as with forming smaller groups, social capital is needed in order to gain respect and friends. Once accepted into the guild, the new player’s behavior is monitored (e.g. by guild officers) to ensure that they are behaving within the rules of the guild (these are usually available on the guild’s website (see Screenshot 5 - Guild Rules)). Those who do not adhere to the guild’s rules and show disregard for other members are often removed from the guild’s community, because they do not contribute toward the guild’s overall well-being (J. Barnett et al., 2009; Williams et al., 2006).

To return to the question at the beginning of this section, if guilds are organized and maintained in ways similar to those of real-world businesses, then why would millions of players want to have guild memberships? Psychological research suggests that people choose to join groups because they want to feel a sense of belonging, share information, achieve goals, and receive rewards (Watson & Johnson, 1972, cited by Ridings & Gefen, 2004). Furthermore, Baumeister and Leary (1995) explained that belonging to a group has a positive effect on well-being, in comparison with isolation, which has the opposite effect. These factors can aid an understanding of why, despite experiencing real-world stressors, players still feel the need to join in-game supervised communities.

A recent study (Williams et al., 2006) explored the types of guilds that are formed in World of Warcraft and the impact that they have on a player’s quality of life in-game and in the real world. Four main types emerged that reflected different play styles, or common interests, namely, *social*, *PvP*, *raid*, and *role playing*. Social guilds are usually created by players who want to maintain contact with, for example, other family members who live far away. Completing the harder-to-achieve goals set by the game—for example, raiding—were considered a secondary aim. Taylor (2006) noted in his research of EverQuest (EQ) players that it was common to find players who had real-world ties with other players. In particular, he found that on some occasions when one family member began to play, then others would soon follow, which he describes as the *domino effect*. Interestingly, he also discovered that real-world family roles could, in some cases, be reversed when the family played together. One player described himself as the youngest of his family and therefore did not have as much power in real-world activities in comparison with his parents. In EQ, however, his character was more powerful than were his family’s characters, and he could therefore wield some kind of power over them when they teased him in-game.

Many players enjoy the PvP aspect of MMOs, and guilds will be created that primarily focus on fighting against the other faction, either in the game’s environment (on PvP-designated servers) or via specially created PvP battlegrounds. Williams et al. (2006) liken this behavior to real-world team work in which, for example, a group of sports enthusiasts may visit a local sports center or park to “battle” against each other or another team. In both circumstances, each player has his or her own individual style of play that

complements the team and rewards such as powerful armor that are available for those who forge ahead to victory.

Raiding guilds (see Screenshot 6 - Raid Boss: Kologarn) are perhaps the most glamorous guilds in MMOs (Williams et al., 2006), where players will want to conquer the harder aspects of the game (e.g. NPCs who require complicated tactics to defeat - known as raid 'bosses'). Each raiding event usually takes a few hours over several evenings a week to complete, and success depends on the raid team having a good leader, excellent team coordination, and positive communication from each raid member. The rewards for success are high, and players will acquire, in addition to the sense of achievement, more aesthetic rewards such as rare and powerful armor. There are occasions, however, when raid members fail to work as part of a team. J. Barnett et al. (2009) found that the most common causes of anger in MMOs stemmed from raids in which players, for example, did not pay attention, or made mistakes and blamed others. In such circumstances, the offending players are often removed from a guild's membership.

Those who enjoy RP may create guilds in which members can interact with other players and the game's environment as if they truly existed in the game world. RP guilds may be created around specific themes on the basis of the game's lore. For example, militia-themed guilds may assist guard NPCs with protecting the city boundaries from the opposing faction. Members of RP guilds are expected to stay IC at all times, although specific chat channels may be created that allow out-of-character (OOC) talk. In this way, an RPer player can still seek others with like-minded RP interests; however, the addition of a non-RP channel allows members to get to know each other on a more personal basis.

Guild aims are not mutually exclusive. For example, RP guilds may also enjoy raiding and PvP, and vice versa (Williams et al., 2006). Guilds are run like businesses because they need structure to survive, and through this structure, players receive the benefits of joining groups such as feeling a sense of belonging, sharing information, achieving goals, and receiving rewards, in addition to social support. A small number of players in this study (Williams et al., 2006) grouped together to complete challenges or played with friends they knew in real-life as a means to maintaining contact. Other players who began the game on their own described how guilds enabled them to form friendships with people from differing backgrounds, via a common interest in the game. Guilds formed online also permeate the barrier between MMOs and the real world. Members of a guild arrange real-life events at which they meet in person. Indeed, when one popular MMO shut down (Uru, Ages of Myst, Ubi Soft Entertainment), many players engaged in what has become known as the *Uru* Diaspora (Pearce, 2006), in which player groups formed in the game moved into other MMOs, bringing elements of *Uru*'s story, atmosphere, and more mundane features such as its architectural style, to new MMO worlds. This additionally emphasizes that friends made while playing were considered just as important as were real-world friends, in terms of sharing personal information and seeking social support. Furthermore, Williams et al., (2006) found that players described their in-game bonds as a mixture of tight-knit friendships and virtual strangers, with whom conversations varied from deep discussions to humor, conversations not dissimilar to those held in public places outside of the home and workplace (Oldenburg, 1997). In this respect, MMOs act as a

"third place," described as a virtual bar similar to that in the television show *Cheers* (Williams et al., 2006), where people meet to tell jokes, let off steam, and relax after work. However, leading large-scale attacks to defeat the harder challenges of the game is very much like work and not always relaxing for the guild's raid leader.

Team Leadership in MMOs

Video games are often perceived as objects of fun; however, much of MMO play requires, in some part, a huge amount of organization and communication between players. Team work in-game often mirrors that of real-world organisations in which a designated leader will assign tasks to individual members, with the team as a whole working together to successfully achieve a goal. There are some differences between MMO and real-world team leading. For example, raid teams rely on text-based chat (some use voice-activated software) to explain tactics, and lack of proper face-to-face interaction means that team leaders must work additionally hard to gain trust from their members. A leader must also assess different ways in which to kill an enemy if previous attempts have failed, reassign tasks if needed, listen to other raid members' ideas and suggestions, and provide unremitting motivation to the team until the task is completed. With their similarities to real-world team work, is it possible that team leaders in MMOs possess skills that can be easily transferred into real-world team-based activities?

The International Business Machines (IBM) Corporation recently commissioned the Seriosity report (Reeves et al., 2007) that examined whether MMO players' leadership qualities mirrored those used in real-world business situations, using the Sloan Leadership Model (SLM; Ancona, Malone, Orlikowski, & Senge, 2007). The SLM contains four factors that define effective leadership, namely, *sensemaking* (assessing ambiguous environments using different frameworks), *inventing* (organizing group tasks, problem solving, and implementing new ideas), *relating* (listening to others and building relationships), and *visioning* (inspiring people to motivate themselves toward future goals). Extensive interviews with MMO guild leaders revealed that all SLM factors relating to real-world businesses were also apparent in MMO-related leadership events. Space restricts a full description of the entire results; however, two interesting results were found. First, the *relating* factor emphasized the fact that effective guild leaders usually have to rely on text-based chat to build trust and maintain good relationships with raid members, in comparison with real-world teams working together face to face. The second result showed the real-world and in-game differences for risk taking. Whereas real-world team scenarios may not allow much room for error (e.g., there may be financial constraints), MMO team leaders have more opportunities to try out new strategies more often for little cost (although additional constraints such as time may be a limiting factor). The results of the report led the researchers to conclude that "good leaders are good leaders, regardless of context" (Reeves et al., 2007, p. 10;) and suggest that MMOs are an ideal place to develop leadership skills needed for real-world employment:

It's not a stretch to think resumes that include detailed gaming experience will be landing on the desks of Fortune 500 executives in

the very near future. Those hiring managers would do well to look closely at that experience, and not disregard it as mere hobby. After all, that gamer may just be your next CEO. (IBM, 2007, p. 32)

Conclusions generated from the report (Reeves et al., 2007) influenced IBM to adopt knowledge that they had learned from MMO leadership and apply it to their own real-world business environments.

Motivation to Play MMOs

Recent studies have suggested that players may invest considerable amounts of time playing MMOs. For example, Yee (2006c) found that gamers played on average 22.72 hours per week, with 8% of that sample playing for more than 40 hours per week, while 60.9% played for 10 hours at a time. Clearly, many players are investing as much, if not more, time in MMO game play as they would with a real-world job, and it is important to understand why this is the case. Extensive game-play sessions suggest that aspects of MMOs may provide some basic human needs; for example, past research has proposed that individuals may seek forms of entertainment that maintain positive, and lessen negative, moods (Zillman, 1988) or that act as a distractor from negative moods (Dillman-Carpentier et al., 2008, cited by Ferguson & Rueda, in press). An understanding of the link between mood and media may provide an understanding as to why a minority of players become "addicted" to MMOs. This is first explored by examining motivation to play.

After examining player experiences across a selection of MMOs, Yee (2006a) found three primary player motivations. First, the *achievement* motivation identified players who enjoyed advancing through the game, becoming powerful, competing with and provoking (griefing) others, and gaining an understanding of the game's mechanics. Second, the *social* motivation indicated that players enjoyed socializing and helping others, seeking and providing support, forming relationships, and playing as part of a team. Third, players who were motivated by *immersion* enjoyed discovering new areas and items within the game, role playing, customizing their characters, and escaping from real-world stress.

The same game may have different consequences for different players (Yee, 2006a). The reward structure inherent in MMOs was discussed earlier in this review; those players who thrive on receiving rewards may continue playing to feel a constant sense of achievement. Players who enjoy the social side of the community may share or listen to problems with friends they meet in-game, whereas immersion suggests that players may want to be alone in the game and not share any personal details. A further important point to note is that these three achievements are not mutually exclusive, and motivation to play may change depending on the mood of the player. Although it is currently unclear how motivation varies as a function of mood, there is a growing body of research that reinforces Zillman's (1988) theory and thus suggests that both violent games and MMO game play may provide therapeutic benefits. A recent study (Ferguson & Rueda, in press) examined the effects of violent gaming on mood state and offered players the choice of a violent or nonviolent video game or no game. Participants did not feel aggressive after game play, regardless of violent gaming history and choice of game. More interest-

ingly, they reported decreases in negative mood and felt less hostile and depressed.

More recently, J. Barnett et al. (2009) examined where these effects varied as a function of various individual differences when playing World of Warcraft. After recording players' state mood pre- and postgame play (minimum of 2 hours), there was a significant reduction in negative mood and a significant increase in positive mood after players logged out of the game, regardless of the player's personality, age, gender role, sex, and player motivation. This effect was particularly noticeable among players who reported high levels of neuroticism and low levels of agreeableness, conscientiousness, and openness to experience. These studies lend some credence toward the theories proposed by Zillman (1988) and Dillman-Carpentier et al. (2008); however, most important, they suggest that games, regardless of their genre, have useful implications as virtual therapeutic spaces. Although it is currently unclear exactly how this would happen, it is a possibility that using MMOs in conjunction with a traditional therapeutic package could increase the quality of client engagement. For example, receiving therapy via an MMO may be preferable for clients who are resistant to face-to-face treatment (Coyle, Doherty, Matthews, & Sharry, 2007).

Game-play figures reported by Yee (2006c) suggest that extensive game play is an indicator of mood management, but a growing body of research has warned that this may also be a predictor of MMO "addiction." Griffiths (2005) argued that excessive game play and addictive game play are different (although in some cases not mutually exclusive). He further explained that "the difference between healthy excessive enthusiasms and addictions are that healthy excessive enthusiasms add to a person's life whereas addictions take away from it" (Griffiths, 2009, p. 2). Therefore, the context in which the extensive gaming occurs should be accounted for in addition to whether it fits Griffiths' six core criteria for addictive behavior (Griffiths, 2005). These are *salience* (when gaming dominates thinking and behavior even when the player is not online), *mood modification* (the player experiences euphoria or a "buzz" or a feeling of escape when playing), *tolerance* (increased game play is required to achieve the buzz or escape), *withdrawal symptoms* (players feel irritable or anxious when not playing), *conflict* (real-world responsibilities are neglected, and the player feels a loss of control), and *relapse* (despite attempts to not log on, the player returns to the game).

This leads to the question of how gaming addiction can be treated. The Chinese government requested that game developers insert a fatigue monitor in the regionalized versions of games. After players have played for a certain time, their character will either have their rewards system turned off (losing experience points instead of gaining them), or the game will stop altogether. This system, however, assumes that all MMO gamers are addicted and does not address the individual motivations to play games (Chinese ministries schedule anti-addiction game system, 2007). In addition to this, many gamers will have more than one account, so after being forced to stop playing one character, they can easily log on to another and continue playing (Hsu, Wen, & Wu, 2009).

Other therapeutic approaches have adopted a more individual-differences approach to treat gaming addiction. First, many treatment centers have been set up that specifically treat gaming addiction or incorporate it into their current treatment plan. For example, a center in Beijing has adopted a military-style treatment

plan that is spread over 3 months and in which the emphasis is on building confidence and addressing underlying psychological problems. Similarly, the Smith and Jones Institute in Amsterdam, The Netherlands, addresses the psychological needs of each individual and helps them to focus on developing a career, healthy relationships, and spiritual growth, while attending to the more practical sides of recovery by providing financial and nutritional advice.

MMO addiction has been likened to a nonfinancial form of gambling, and in this respect, researchers and therapists have used gambling-based questionnaires (Griffiths & Hunt, 1998) and therapies (e.g., Griffiths, 2008) to treat players. Up until recently, a lack of standardized questionnaires exploring gaming addiction meant that although studies used questionnaires incorporating the six core criteria mentioned above, they were mainly created to explore other addictions such as that to exercise (Hussain & Griffiths, 2008) or Internet use (Charlton & Danforth, 2007). Other studies (e.g., Chou & Ting, 2003) have created their own questionnaires by borrowing items from other research and from the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association, 1994); however, only one item was created for each of the six core criteria. More recently, Lemmens, Valkenburg, and Peter (2009) developed and validated an online gaming addiction questionnaire containing 21 items that measured seven core addiction criteria. An additional *problems* criterion was added to represent neglect of real-world responsibilities, while *conflict* was changed from Griffiths' suggestion to examine the extent that arguments and lies occur between the player and significant others.

Yee (2002) discussed Dodes (2002) theory of addiction, which posits that addiction is more psychological than physical where addictive behavior develops in an attempt to restore well-being and control. Furthermore, rather than the "object" (such as cigarettes, alcohol, or MMO) being addictive, it is rather the person who perceives that object as addictive. Hence, Yee explained addiction as having two sides: "underlying frustrations and motivations that push you, and objects or activities with the matching profile that pull you in" (Yee, 2002, p. 8). Therefore, MMOs must contain some gaming mechanic that attracts a player's motivation to play, depending on the psychological need that is matched by that motivation. For example, Yee's (2002) study of EverQuest (EQ) players examined the psychological motivations to play, the outlet the MMO provided for that motivation, and the factors that attracted the player to log on to the game. For example, players who had low esteem logged on to the game to feel competent and powerful and thus feel a sense of achievement. Similarly, those who were experiencing stress in the real world would play EQ to escape from those stressors by immersing themselves in the fantasy world. Returning to Dodes, Yee explained that often the player's psychological pressure is not immediately apparent in comparison with the physical addiction side (the game); hence it is easy to blame the object as opposed to exploring the psychological needs of the player. Taking the game away from the player may only worsen the problem, because now he or she has no outlet with which to address his or her psychological need.

Further research (Chou & Ting, 2003) has posited that it is the flow experience (Csíkszentmihályi, 1990) that is the predictor of addictive behavior—becoming absorbed in an activity while remaining unaware of the amount of time passing by. This study,

however, raises two concerns. First, Chou and Ting's (2003) questionnaire (discussed earlier) contains only 10 items relating to addiction, but 28 items relating to flow, suggesting that the imbalance of items may have influenced the outcome of the results. Future research could readdress this issue by including an equal number of items for each factor that would more accurately explore how the flow experience contributes toward online gaming addiction. Second, the experience of flow is a factor of extended game play, and as Griffiths (2009) stated, although this can be a contributing factor, extensive game play by itself cannot explain gaming addiction. On a more positive note, the experience of flow has been explored as a factor required for learning and storing information. As a conclusion to this discussion, further research could usefully attempt to ascertain whether there is a common conceptual framework that unites the addictive and therapeutic effects of video game play. Such a framework could be integrated with notions of personality types as previously discussed.

MMOs as Teaching and Learning Environments

Foreman (2003) suggested that MMOs have the potential to be "the learning environments of the future" (cited by Delwiche, 2006, p. 14). Past research has suggested that knowledge learned from playing games can be transferred to real-world scenarios. For example, a recent review (Akili, 2007) of non-MMO games found that game play contributed to real-world learning and increased levels of visual attention (Greenfield, deWinstanley, Kilpatrick, & Kaye, 1994), and critical thinking and problem solving (Rieber, 1996) skills. If this is the case, then how do games contribute to learning? Malone and Lepper (1987) suggested that games motivate learning in four ways. Varying levels of *challenges* in games deter boredom, whereas *fantasy* elements provide an immersive and engaging atmosphere. *Curiosity* provides the stimulus to explore the game world, and giving the player *control* over game play enables autonomy to roam the game world at leisure. In addition, MMOs provide an ideal opportunity for situated learning (Lave & Wenger, 1991, cited by Delwiche, 2006) to occur, in which players learn by participating in social communities. This suggests that MMOs are an important tool for learning and education, a new area of research to which we now turn.

Learning a second language involves the rehearsal of real-life experiences that, in turn, requires successful social interaction or role-playing. These experiences are often hard to replicate, and motivation to learn may dissipate. WoW is available to play in many different languages, and a player who opts to buy the German version of the game will find that interaction with quest givers, game-world objects, NPCs, and other players will be in German. Capitalizing on this, Bryant (2006) used WoW to teach his English-speaking students German, by encouraging them to complete quests and to cooperate with each other in a German-speaking realm.

Developing a character in an MMO requires completing quests to level up and acquiring new and more powerful equipment and artifacts. However, a basic understanding of the character's abilities is also needed to ensure that the right type of equipment is chosen. A practice adopted by many players is that of "theorycrafting," an attempt to understand the underlying (typically mathematical) basis of a character's abilities in order to maximize, for example, damage output. It is clear from demographical research

that many young adolescents enjoy playing MMOs (e.g., Griffiths et al., 2004), and so a group of researchers (Gillspie, Sheehy, & Brown, 2009) used WoW to teach mathematics to at-risk students. They are provided with simple theorycrafting tasks such as working out the differences in damage per second between two weapons and analyzing how these differences vary according to their character's abilities. The project is still in its infancy and has therefore not developed a body of research that has established the level of its success. However, the project should be followed closely because it could provide invaluable insights into how MMOs can contribute toward traditional learning and teaching methods.

Other, perhaps less intentional, methods of learning via MMOs have been observed in another recent study (J. Barnett et al., 2009). In WoW, players can choose to take up a profession, for example, blacksmithing, with which they will need to mine ore and acquire other resources to create new and more powerful armor. Different types of ore are needed depending on the player's professional skill level, and sometimes the mixing of two types of ore is needed to create a more powerful ore. After talking to young adolescents, J. Barnett et al. (2009) found that some had inadvertently gained a basic understanding of metallurgy from in-game activities.

A school science test included what two substances make bronze: copper and tin. Learning blacksmithing in WoW taught me this. My friend and I play the game and were the only two in the class to get the answer right. (young man, age 14; Barnett et al., 2009, p. 17 (see Screenshot 7 - Blacksmithing interface))

It is clear from these examples that MMOs facilitate some kind of learning process, perhaps because playing the game is more exciting than is attending school lessons. Allaire (2009) explained that students may fail at school because they find reading literature dull or may struggle when asked to write a composition about something they have no interest in because they cannot relate to it. The immersive nature and wide selection of activities provided in MMOs act as inspirational catalysts that inspire students to learn. In particular, continuous engagement is enhanced because players can control their learning environment while attempting the game's challenges (Peng, 2004). In this respect, MMOs should be seen not only as games but also as rich learning environments in which a combination of game play and social interaction is necessary to progress (Filiciak, 2003).

Suggestions for Researchers

Prior to embarking on human behavior studies in MMOs, there are four important methodological issues that researchers should be aware of (see King, Delfabbro, & Griffiths, 2009, for a comprehensive review). First, gamers can be defensive and untrusting of research because they perceive the researcher as not understanding the gaming culture. In this respect, researchers should be mindful to take the time to play the MMO they wish to study, which will give them some common ground when discussing research projects with those they wish to study. Second, when playing the MMO the researcher should take the time to blend into his or her surroundings and be mindful that players value their anonymity in the game world as in the real world. Unwanted intrusions made by researchers will not increase their social capital but instead give them a bad reputation within the player commu-

nity. Third, rewards from participating in laboratory research usually consist of cash payments or credit toward a qualification (i.e., extra credit). Gamers could be offered gift tokens to buy games or credit toward their MMO subscription. Williams et al. (2008) offered each of their participants a rare and unique in-game item, which they stated proved to be invaluable when collecting data. Finally, when preparing reports, ensure that both sides of the story are covered. The media too often portray games as hazardous to health, to the detriment of the many positive influences that games can provide. It is up to researchers to address such biased reporting, which in some cases has resulted in a publication bias (Ferguson, 2007). For example, some journals may publish only those articles that "confirm" that games are the cause of aggressive behavior, thus producing a public "moral panic" (Ferguson, 2007).

As a final note, though MMOs should not be interpreted as a substitute for more traditional research methods (Delwiche, 2006), "[w]e should not be afraid to experiment. Experimentation, like play itself, is ripe with possibility" (Delwiche, 2006, p. 169).

Conclusion

The studies described in this review clarify the potential opportunities afforded by MMOs to examine human social behavior in five ways. First, research has shown that as with real-world scenarios, adhering to a set of social skills is necessary to progress, not only in terms of friendships but also as a team (Ducheneaut & Moore, 2005). Second, further exploration regarding choices of character identity and how this affects in-game behavior provide opportunities for further examination of self-portrayal both within and out of the game (Yee & Bailenson, 2007). Third, the social motivation inherent in these games warrants an examination of the reasons why people seek out online communities, in comparison with those in the real world (Williams et al., 2006). Fourth, player motivation research has identified the importance of examining why people play MMOs, as specific aspects of game play have different meanings for different people (Yee, 2006a). Fifth, MMOs provide an ideal opportunity to develop and test theoretical models in addition to examining the potential for MMOs to be used as therapeutic (J. Barnett et al., 2009; Ferguson & Rueda, in press) and learning tools (e.g., Delwiche, 2006).

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