

Sink or Swim? Learning and Social Capital in Massively Multiplayer Online Games.

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Abstract

Massively multiplayer online games (MMOGs) present participants with complex and multifaceted worlds complete with their own language, rule structures and conceptions of success or failure. How do players adapt and learn to survive in this environment? What are the long-term implications of various learning strategies for social development within the game? This paper seeks to answer these questions through a self-reported survey of 541 players from the popular MMOG *EVE Online*. The survey responses were drawn from three distinct fan communities. Analysis of participant responses revealed that while joining in-game training organizations as a student did not significantly affect social capital development, the decision to act as a mentor to newer players did. In addition, findings reinforced previous research about importance of voice communication and permeability of the in-game/outside game barrier with respect to social relationships. These findings offer insights into the relationship between commercial MMOGs and the social process of learning within computer mediated environments.

Keywords: MMOG, Social Capital, *EVE Online*, Learning.

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Massively Multiplayer Online Games (MMOGs) come in a variety of shapes and sizes, from the gigantic *World of Warcraft*, with its carefully scaled leveling system, to smaller but tougher to learn examples (Ducheneaut, Yee, Nickell, & Moore, 2006a). One of the most notoriously difficult MMOGs is CCP Game's *Eve Online*. As one game reviewer stated early in the game's life, "*Eve Online* is by far, one of the most difficult MMOs to learn that I have played, and I've played'em all (well, almost all of them)" (Doyle, 2006). These challenges are particularly daunting for new players entering the game world, many of whom become victim to the game's hostile artificial intelligence and piracy by more advanced players. A large portion of these new players drop out or quit playing before investing a significant amount of time or money into the game, a process known as "churn" (Mulligan & Patrovsky, 2003). Those who persevere can be broadly characterized into two broad types. Some new players take advantage of in-game learning opportunities, benefiting directly from the experience of more seasoned players and developing their own character's skills with the protection and aid of these mentors (Kyong Jin Shim, Kuo-Wei Hsu, & Srivastava, 2011). While other players strike off on their own, learning through trial and error, through game tutorials and guides or resources offered by the contingent of fan sites that exist outside the game world (Shen, Monge, & Williams, 2011).

Regardless of the approach taken, new players are compelled to form networks in order to survive within the game world. Developers have taken to promoting this process because it gives the game "stickiness" by turning it into a venue for interpersonal association between friends who prompt each other to continue to play (Ducheneaut et al., 2006a). These incentives are written into the structure of the game world and function as a series of rules for players

(Lessig, 2006). Examples include, forcing players to pick a specialized set of abilities with distinct strengths and weaknesses, forcing them to find others with different abilities to fulfill niche roles, or presenting challenges to players that cannot be overcome by an individual.

Faced with these obstacles, players are compelled to form both formal and informal organizations to tackle these issues. This places new players at a distinct disadvantage as they carry the “liability of newness” (Freeman, Carroll, & Hannan, 1983). Without guidance, they lack the experience necessary to ascertain how they fit within the complex system of interdependencies created by the game developer (Gee, 2003; Shen et al., 2011, p. 11). One approach is to learn by doing through a process of trial and error. New players often form “pick-up groups” or PUGs, temporary associations centered around the achievement of a specific goal (M. Chen, 2011, p. 43). This frequent group formation leads to the characterization of new players as “promiscuous” in their network, creating large quantities of weak ties by learning through these associations (Shen et al., 2011, p. 27). However, in many games there is an alternative path open for new players – training. In stark contrast to the trial and error approach with its multitude of temporary groups and weak ties, training inducts new players into a stable and established organization and introduces them to more experienced advisers. For the purposes of this examination, training can take the form of either classes, advice, demonstration, or the supervised execution of tasks within the game by groups of new players commanded by a seasoned veteran or one-on-one instruction (“Eve University,” 2012). With respect to the connections formed between players, training potentially reduces the need for new players to engage in promiscuous group formation by fulfilling the need for cooperation demanded by the game rules. The central research questions of this examination are: What are the effects of

mentoring on network formation among MMOGs as shown through the resulting social capital development? Do these outcomes change given variations in play style and intensity?

Literature Review

Networks and Social Capital Generation

Social capital has a long intellectual history and has been defined and redefined repeatedly (Adler & Kwon, 2002). Broadly speaking, social capital refers to the characteristics of social structures that facilitate the actions of individuals within these structures. Putnam (1995) argues that social capital represents the “features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (1995, p. 67). An important aspect of this definition is the role that networks play in forming social capital. A highly networked group allows for the establishment of trust and norms of reciprocity, which in turn generates social capital.

The mechanism by which these networks translate connections between individuals into social capital is a matter of some debate, with two major schools of thought (Gargiulo & Benassi, 2000). Coleman argues that network density and closure is the critical factor in determining social capital output, as these forms have two key advantages, they allow for greater information flow between the various members and allow for sanctions against defectors, making trust easier (Coleman, 1988, p. S104).

An alternative viewpoint put forward by Burt (1995), argues that networks that successfully generate social capital are characterized by gaps in the network, which insulate parts of the network “like an insulator in an electric circuit” (Burt, 1995, p. 18). When an entrepreneurial member of the network forms a connection across the structural hole, they become a broker.

These individuals can then gather new, non-redundant information and control the flow of data between groups (Burt, 2001, p. 36). The result is an increase in social capital within the network and more efficient operation.

It is important to note that these two perspectives on the generation of social capital are not necessarily mutually exclusive. As Burt states “brokerage across structural holes is the source of added value, closure can be critical for realizing the value buried in the structural holes” (Burt, 2001, p. 52). In an attempt to capture this multifaceted nature of social capital, Putnam builds off the work of Gittel and Videll (1998) who split the term into two constituent parts – bridging and bonding social capital. Bridging social capital aims to quantify the outward looking aspects of networks that “encompass people across social cleavages” or in other words over structural holes (R. Putnam, 2000, pp. 22–23). Bonding social capital reflects the inward looking reinforcement of networks and likewise corresponds with Coleman’s network closure perspective. This distinction has proved useful for scholars studying online networks as it captures the multifaceted nature of relationships within virtual spaces (Ellison, Steinfield, & Lampe, 2007; Williams, 2006).

Social Capital and MMOGs

MMOG scholars have made use of this rich heritage within the literature on social capital and networks to explore elements of social interaction within games. These extensions of the existing literature are made possible by the fact that players frequently enter into formal associations with other players within the game in what is known as a guild. (C.-H. Chen, Sun, & Hsieh, 2008). These guilds clearly fit the network form because they use “flexible, dynamic communication linkages to connect multiple organizations into new entities” (Monge & Contractor, 2003, p. 448,

as cited in Williams et al., 2006, p. 357). Working from this base, scholars have identified a number of factors that influence form and function of in-game networks and the social capital they generate.

For the purposes of this examination, a critical section of this literature classifies how players form networks within an MMOG. As Jakobsson and Taylor (2003) note, within MMOGs “friends are the ultimate exploit” (2003, p. 88). In other words, MMOGs privilege the formation of social networks by creating challenges that players cannot overcome on their own. How players go about forming groups that can be used to overcome these obstacles is a matter of some debate. Johnson, Xu, Zhao, Ducheneaut, Yee, Tita, and Hui (2009) argue that guilds attempt to form as diverse networks as are possible in order to include a variety of skills into the organization and prepare for all contingencies through a process they refer to as “team building” (Johnson et al., 2009, p. 6). From the other perspective Ahmad, Borbora, Shenm Srivastva and Williams (2011) argue that the formation of guilds can instead be explained through “homophily”, with groups recruiting members who are like them (2011). Other scholars have noted that in specific cases, offline social connections such as friends and family can carry over and influence patterns of network formation online and the fact that lower level players often engage in temporary alliances or pickup groups (Jakobsson & Taylor, 2003; Kolo & Baur, 2004). The relevant conclusion that can be drawn is that MMOGs are sites for the formation and maintenance of formal and informal networks among players, although the mechanics of this process are still unclear.

The Liability of Newness in MMOGs

For new players this process of network formation is particularly important due to their relative disadvantages within the game world. These handicaps take two forms, a lack of knowledge about the various tricks and exploits within the game, and a lack of in-game power to survive within the hostile environment presented to them (M. Chen, 2011). Network formation offers both a learning opportunity and the potential safety of strength in numbers. New players tend to join a number of in-game guilds early on, jumping from group to group until they find one that meets their needs and skill level (Shen et al., 2011). Similarly, participating in pickup groups or informal associations generates connections to previously unknown players of a similar skill level (M. Chen, 2011). As new players move from group to group, they gather new information and examples of various niches within the game role which they can possibly fill. Most MMOGs have a variety of roles to suit various play styles, from peaceful traders moving lucrative goods around the game world to powerful forces in combat (Ducheneaut et al., 2006a). By moving between a number of groups, players can benefit from a wider range of compatriots who provide non-redundant information and examples about these various roles. This process also has the potential to give new players access to this valuable data and gain experience. Additionally, as new players move between groups, they close structural holes within the broader network of players within the game and potentially generate bridging social capital.

However, this pattern is not universal. The presence of training guilds offers a stark alternative for new players and dramatically alters the logic of network formation. This organization solves the problem of non-redundant information for new players by aggregating a number of experts into a single area. New players within a training guild therefore do not have to range as widely for non-redundant information as it is all provided in house (“Eve University,”

2012). Since players are restricted within the vast majority of MMOGs from joining more than one in-game organization, benefiting from this expertise entails that students stay within the training guild and violate the usual promiscuous approach that characterizes the trial and error pattern. The focus shifts towards facilitating the effective transmission of this information to students and the development a closed network. Instruction is made effective when students trust their teachers and teachers trust their students. The ability of bonding social capital to bring a group together and facilitate the establishment of trust and reciprocity is an essential part of the learning process (Coleman, 1988). Therefore, in order to acquire information, new players within training organizations may have a significantly altered logic of network formation when compared to their counterparts who are not engaged in these activities. Instead of seeking as many examples and groups as possible in order to obtain non-redundant information, these players are constrained by their status as a member of the training guild and have an incentive to form connections with their teachers and classmates as an alternative route to knowledge. These arguments lead to the following hypotheses.

H₁: Players of massively multiplayer online games who join mentoring organizations will have lower levels of bridging social capital than non-mentored.

H₂: Players in the process of being mentored will show higher levels of bonding social capital than non-mentored players.

It is important to remember that the process of training involves more than one party. Instructors are also potentially influenced by their time spent training new players. For most advanced players, their newer counterparts generally represent an annoyance or potential prey. Instructors who choose to spend their time teaching players are placed in a role similar to Burt's

brokers. Each new player brought into the training guild represents an isolated part of the broader in-game network. Through the process of instruction, they are brought up to speed by their teacher and linked with other new players through that individual. By closing the structural holes that isolate new players, the instructors potentially generate bridging social capital (Burt, 1995).

Therefore:

H₃: Players who act as instructors will have higher levels of bridging social capital than their counterparts.

While these hypotheses focus on the effects of training and in-game learning, it is important to note that scholars have identified other factors that may potentially affect the development of social capital within MMOGs. This examination therefore offers an opportunity to revisit these conclusions with training status as a new element of the model.

Contributions from Game Studies

As shown earlier, scholars have argued that MMOGs serve as sites for network formation and the generation of social capital (Steinkuehler & Williams, 2006; D. Williams, 2006), but in addition to this general conclusion, researchers have also identified a number of factors that influence and affect the rate and type of social capital development. First among these is the time spent playing the game. Time affects social capital in a number of ways. The most obvious of these interactions springs out of the fact that developing any relationship takes time. Therefore, more time spent within a MMOG gives players more chances to develop a sense of community within the game (Shen & Williams, 2011). However, there is another factor that influences the role of time in relation to social capital development; the relationship between time and player “level.” Level is a quantification of the power of any given player within a MMOG. Higher level

players are more powerful, have more abilities and can tackle greater challenges. As players spend more time in the game world and level up, the difficulty of the game also increases. This increased difficulty incentivizes the formation of relationships between players in order to form teams and tackle these challenges (Williams et al., 2006). Often the extreme level of difficulty presented by high level challenges necessitates extensive organization and a detailed knowledge of every participant's role and responsibilities within the larger organization. This leads to more cohesive groups and a potential increase in bonding social capital (Williams et al., 2006).

Therefore:

H₄: Players who have engaged in longer periods of high intensity play will have higher levels of bridging and bonding social capital.

This hypothesis also serves as a test for an alternative perspective on the relationship between time and social capital formation. Focusing specifically on games, some commentators are often skeptical of the potential for in-game networks to generate social capital. Ducheneaut, Yee, Nickell, & Moore (2006b) argue that interactions within MMOGs are not truly social, but instead represent individuals who are “alone together” with other players serving as an audience or bystanders for the performative action of playing the game, rather than serving as associates (2006b, p. 415). On a broader note, Nie notes that Internet use detracts from face-to-face socialization and interpersonal interaction, damaging individual's social networks (Nie, 2001; Nie, Hillygus, & Erbring, 2002). Therefore, assessing the relationship between time and social capital generation within MMOGs also puts these theories to a (limited) test.

One of the elements that skeptical authors point to as a basis for the argument that MMOG play hurts social capital is the mediated nature of online communication (Nie, 2001).

Interpersonal communication consists of both the content that is being exchanged and a series of cues and tells originating from body language and other subtle signs (Goffman, 1959). Mediating communication through a computer or another electronic mechanism excludes many of these signals, making communication less effective and opening up room for misunderstanding. So text chat loses the nuance of voice tone and the information translated through expression and body language (Veenen, 2011). Voice communication does slightly better but still excludes the latter two factors. As network formation is dependent on effective communication between the various parties, the form of communication chosen by players may influence the development of bridging and bonding social capital (Williams, Caplan, & Xiong, 2007). Therefore:

H₅: Players who frequently engage in voice based communication while playing an MMOG will have higher levels of bridging social capital.

H₆: Players who frequently play MMOGs in an area that facilitates unmediated contact between players will have higher levels of bonding social capital.

Voice based communication is specifically linked to bridging social capital because it represents a tool for players who are separated by geography or other barriers to engage in rich interaction with each other. Given the diverse player base of most MMOGs, frequent voice communication brings players into symbolically rich dialog with individuals who they normally would not interact with (Ratan, Chung, Shen, Williams, & Poole, 2010, p. 100). Repeated interactions therefore provide the basis for diverse network formation and operate as a precursor to the development of bridging social capital.

Face-to-face communication among players is made possible through the use of Internet cafes and the possibility of co-play. These encounters are geographically constrained by travel

time and expense, making face-to-face communication while playing a more community centered activity. Therefore, connections and networks formed between players through face-to-face communication while playing an MMOG are more likely to be of the bonding subtype, as they are formed within a preexisting community.

The presence of face-to-face community within MMOGs is a reminder that these games do not represent a distinct and separate social realm. Social relationships formed outside the game-world can be imported into the game as friends log on and play together (Jakobsson & Taylor, 2003; Kolo & Baur, 2004). Similarly, individuals who meet within the game can become close friends and compatriots outside of the virtual environment. It is important to take into account the play style of respondents (as specific social patterns such as having friends or family members who share an interest in online games) can alter social capital formation by providing the advantage of trusted and reliable friend(s) within the game world without the investment of significant time or energy into the formation of in-game networks (Jakobsson & Taylor, 2003). This “importation” of offline social capital means that these players have a preexisting stock of social capital which they bring with them into the game world. Since social capital is generative due to the self reinforcing nature of its production (R. D. Putnam, Leonardi, & Nanetti, 1994, p. 177) it therefore holds that:

H₇: Players who frequently play MMOGs with friends from outside of the game world will have higher levels of bonding social capital.

Each of these seven hypotheses play an important role in both testing the main research question of this paper. As stated within the literature review MMOGs have been conceptualized as a potentially rich area for the development of social capital. However in order for players to

engage in this area they need to learn the rules of the game, to sink or swim, within a new virtual environment. These formative experiences serve as the seeds for the broader player networks which act as the root of social capital generation. Examining differences between players who are involved in the mentoring process and those who are not therefore investigates a possible factor which influences or shapes this development of social capital through the game as well as illuminating the social outcomes of the learning challenge faced by all gamers entering into a new environment such as *EVE*. In introducing this new factor to the process of social capital development the status of existing influencers such as communication and preexisting social connections need to also be reassessed in order to determine how they interact and mesh with the process of learning to play *EVE* and mastering how to "swim" through the turbulent waters of the game world.

Method

To test these hypotheses, a survey of *EVE Online* players was undertaken. *EVE* was released in 2003 and takes place in a science fiction setting that is placed far in the future (*EVE Online*, 2010). Players assume the part of a freelance pilot, this freedom and the position of players as the commanders of technically sophisticated spaceships makes *EVE* an extremely complex game with a steep learning curve. Its non-intuitive nature means that learning through trial and error or mentorship are critical elements in player adaption to the new environment, ensuring that the patterns which this examination seeks to test are present.

Additionally, it is important to note *EVE*'s unique server structure. In order to handle the vast quantities of data needed to run a successful MMOG, many game companies divide their players up into "realms" based upon geographic location (Pittman & Gauthier Dickey, 2007).

EVE Online is different in that the vast majority of players are located within the same realm (*EVE Online*, 2010), providing a more diverse population to draw a sample from.

Participant Recruitment

Participants were drawn from three organizations related to *EVE*, each facilitating a different style of engagement and learning within the game world, Battle Clinic, /r/*EVE* and EVE University.

EVE University is an organized education program for players new to the game. It offers a wealth of resources ranging from free in-game items, classes (both recorded and live), simulations of in-game events, an extensive wiki and a forum (“Eve University,” 2012). New players apply to join the university and are free to choose what resources they make use of. Administration is carried out by a team of volunteers who work with a broader class of experienced mentors to offer a range of options for participants.

In contrast to EVE University, Battle Clinic is a third-party service that offers statistics and combat information for players and a forum for conversation about the game. Using information gathered through *EVE*’s application programming interface (API), players can track the latest incidents within the game world, discover strategies to aid them in their actions and improve their knowledge of advanced topics within *EVE* .

/r/*EVE* is a discussion board on the popular social news website Reddit. Unlike the previous websites /r/*EVE* is not explicitly dedicated to the provision of data about how to survive within the game. Instead, it represents a broad mix of complaints, fan art, friendly advice and discussion. This general levity provides a counterpoint to the more information based discussion on BattleClinic and Eve University.

In summary, the three venues for this study represent a broad cross section of the various aspects of social interaction within *EVE*. Battle Clinic provides information base for those engaged in trial and error learning, Eve University offers a more structured mentorship based approach and */r/EVE* caters to a broad range of users who may not utilize either of the two aforementioned sites.

Participant recruitment was carried out in each site through a similar process. First moderators or other officials at each venue were contacted and informed of the objectives and nature of this exercise. With approval from the respective administrations, a post was placed in the general discussion sections of Eve University and Battle Clinic and on the general information bar of */r/EVE*. These topics featured a general invitation to join the survey and provided a site for dialog between the respondents and the primary investigator. Before information was gathered, potential participants were given a mandatory informed consent form that explained the general aims and purpose of the survey as well as their rights and responsibilities as participants. If consent was given, the survey was then administered with data collected anonymously from all participants.

Participants

A total of 541 participants completed the survey and agreed to submit their results for analysis. The sample gathered through the three recruitment venues was overwhelmingly comprised of young males (96.1% male, $M_{age} = 27.4$ years, range 15-74 years). Due to the English language only nature of the survey, the majority of participants originated from countries where English is an official language, with 54.1% of participants from the United States, with the United Kingdom and Canada both contributing 6.1% of the sample and Australia 5.5%. The

remaining 28.2% of the sample was split among 30 other countries. With regards to education 24% of players were in the process of achieving post-secondary education while 25% had a Bachelors degree. For full demographic statistics, please refer to the appendix.

Measures

Dependent Variables. This examination features two dependent variables, bridging and bonding social capital. Each variable is measured with a multi-question assessment derived from the *Internet Social Capital Scales* (ISCS) (Williams, 2006). These scales consist of ten questions apiece and aim to assess bridging and bonding social capital within online or offline communities. Each question featured responses arrayed along a five point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). For the purposes of this examination, a modified version of the online scale was used, featuring reverse coding of two questions within the bonding subscale (questions three and eight). Both were aggregated into two indexes by generating a mean score for each participant based on their responses to the ten questions in each scale.

Both scales were found to exhibit high reliability when tested via Cronbach's alpha (bonding $\alpha = .87$, bridging $\alpha = .88$). Missing values from the dependent variable were filled in using hot deck imputation with a deck consisting of the participants' age, gender, education, and communication patterns within the game. Given the public nature of the survey, roughly one hundred users logged on, but entered no or extremely little data (under five questions), making imputation impossible. These participants were therefore dropped from the dataset bringing the final N to 581.

Independent Variables

A variety of independent variables are included in this analysis, speaking broadly they fall into three broad categories, play style, learning strategy and demographic controls.

Play Style. Hypotheses four, five, six and seven, aim to assess the relationship between how players engage with the game world and social capital generation. Specifically, these hypotheses focus on time spent in game, communication with other players and co-play respectively.

Time spent within game is assessed through a combination of variables that gauge both duration and intensity. The former represents how long a participant has played *EVE Online*, as represented in months, while the latter is assessed through a question asking how often the participant has played *EVE Online* on average per week over the last three months. It is important to separate these two questions in order to recognize different play styles available to participants. As an example, a low intensity long duration play style fits the “weekend warrior” trope in which a player engages with the game world briefly each week, but over an extended period of time. Alternatively, new players may find the game world engrossing and novel and play for many hours a week, even though they have only been participating in the game for a short time. Taking into account these varied styles participants were asked to provide the length of their *EVE Online* subscription as an indicator of their duration of play and the average hours a week spent playing *EVE* as an indicator of intensity.

With regard to communication, *EVE Online* presents a number of different modes of interaction to players. The most basic is text chat and the in-game email system. Many players supplement this functionality with Voice over Internet Protocol (VOIP) or face-to-face conversation. To assess how participants communicated with other players within the game,

players were asked three questions: “When playing *EVE Online* how often do you use any of the following to communicate with other players: In game text chat/email, Voice Chat programs such as Mumble and Ventrillo, Face-to-Face Communication with other players.” For each category, participants were prompted to report how often they used the stated communication tool on a five point Likert scale ranging from 1-(*Never*) to 5 (*Always*).

The frequency of co-play is assessed in a similar manner as communication methods. In addition to face-to-face communication, which is assessed through the aforementioned questions, participants were also asked how often they played with family members, friends from outside *EVE* and spouses or significant others. Responses were again given on a five point Likert scale ranging from 1-(*Never*) to 5 (*Always*).

Learning Strategy. These independent variables relate to H1 through H3 and attempt to determine what approach to in-game learning participants took and to provide a point of comparison between these strategies. Participants were asked if they had ever been a member of an in-game guild whose *primary* purpose was to train new players. This draws upon the sharp distinction between training guilds within *EVE* and other player associations.¹ According to participant feedback, there was only one instance of confusion in which a player was not sure if they were in a training guild or not. The potential response options for participants were 1- (*Yes-current member*) 2- (*Yes-former member*) and 3- (*No*) which were subsequently dummy coded into three separate variables, Current Member and Alumni or Non-participant. If options one or two were selected, players were then asked about the duration of their membership within the training guild (in weeks) and two questions about their role within the guild. Observation of

¹ While the in-game language of *EVE* refers to these groups as "corporations" and this language was used on the survey instrument for the purposes of this examination and to minimize confusion the more common term "guild" is used within the context of this report.

these in-game groups suggests that there are four possible roles: student, teacher (leading large groups of new players in instructional activities), mentor (one-on-one guidance), and administrator. To account for changes in roles depending on situational demands, participants also were presented with a multiple response question featuring the same categories and instructed to select all the roles they fulfilled during their time in the guild. These roles were then dummy coded to form the variables Student, Teacher, Mentor and Administrator. In all cases of dummy coding the two values present are 1-(*Member of group/role*) and 0-(*Non-member*).

In addition to these categorical questions, participants who identified themselves as having participated in a training guild were also asked to identify the duration of their membership in weeks. This total was then divided by the total length of their career within EVE to generate a ratio of time in training to time spent playing the game in total.

Results

All hypotheses were examined through a set of two linear regressions on both of the dependent variables with $\alpha = 0.05$. Variables were entered in a single model in order to maintain type one error rates. As a whole the bonding social capital model explained a significant proportion of the total variance, Adjusted $R^2 = .078$ $F(22,565) = 3.175$ $p < .05$. The bridging social capital model was also a significant predictor of variance, Adjusted $R^2 = .098$ $F(22,565) = 3.777$ $p < .05$. F.

Analysis suggests that it is prudent to fail to reject the null with regards to hypotheses one, two, four and six. However, hypotheses three, five and seven are supported. A full list of coefficients and their related statistics can be found in the appendix.

Hypotheses one and two aimed to examine the affects of training on students. Hypothesis one stated that players of massively multiplayer online games who join mentoring organizations will have lower levels of bridging social capital than non-mentored. This hypothesis was not supported by the analysis, with $\beta = .011$ $t(562) = .100$ $p > .05$. Similarly hypothesis two postulated players in the process of being mentored will show higher levels of bonding social capital than non-mentored players. This hypothesis was also not supported $\beta = .005$, $t(562) = .046$, $p > .05$.

Hypothesis three examined the opposite side of the training processes, and focused on those leading the training process. It stated that players who act as instructors will have higher levels of bridging social capital than their counterparts. This hypothesis was supported by the analysis $\beta = .100$, $t(562) = 2.035$, $p < .05$.

Hypothesis four attempted to assess the role of time and intensity of play in the development of social capital. It stated that players who have engaged in longer periods of high intensity play will have higher levels of bridging and bonding social capital. Analysis indicates that the length of a players subscription to *EVE* had no significant effect on bridging social capital $\beta = .100$, $t(562) = 2.035$, $p > .05$ or bonding social capital: $\beta = -.042$, $t(562) = -.905$, $p > .05$.

However, it is interesting note that while intensity of play did not predict bridging social capital: $\beta = .013$, $t(562) = .302$, $p > .05$, there was a significant negative relationship between this

variable and bonding social capital $\beta = -.094$, $t(562) = -2.251$, $p < .05$, which runs contrary to the hypothesis.

Hypotheses five and six focused on the influence of communication patterns on the development of social capital. Hypothesis five stated: Players who frequently engage in voice based communication while playing an MMOG will have higher levels of bridging social capital. Hypothesis six argued: players who frequently play MMOGs in an area that facilitates unmediated contact between players will have higher levels of bonding social capital. Analysis produced mixed results for this set of hypotheses, with hypothesis five being supported: $\beta = .136$, $t(56) = 3.212$, $p < .05$ but hypothesis 6 not supported: $\beta = .021$, $t(562) = .431$, $p > .05$.

Finally hypothesis seven addressed the interconnected nature of the game world with social reality by postulating that players who frequently play MMOGs with friends from outside of the game world will have higher levels of bonding social capital. This hypothesis was supported with co-play serving as a significant predictor of bonding social capital: $\beta = .200$, $t(562) = 4.165$, $p < .05$.

Discussion

A self-reported survey of three different communities populated by *EVE Online* players was gathered with participants providing information about their traits, play style, learning strategy within game and levels of social capital. This information was then used to determine how variations in learning and play styles of MMOG players affect the development of social capital. Findings indicated that status as a student within a training guild had no significant effect on social capital development, as did play intensity and face-to-face communication while

playing. In contrast to these findings, players who acted as mentors for new players did report significantly higher levels of bridging social capital, as did users of voice chat. Similarly, those who play *EVE* with friends from outside the game world appear to have higher levels of bonding social capital.

Limitations and Advantages

Before examining the theoretical implications of these findings, it is important to note that these conclusions are limited by several characteristics of this study. First and foremost is the fact that participants were drawn from only one game, *EVE Online*. While this enabled the accumulation of a larger sample size with common characteristics, it also calls into question the generalizability of these results, especially given how different *EVE* is from other MMOGs.

Additionally, sampling was carried out through forums and fan sites, presenting the possibility for selection bias as these websites cater to players who are already engaged with the game world and willing to take the time and energy to participate in discussions (Williams & Xiong, 2009).

The division of the learning process for two players into two possible paths may also be problematic given the complexity of *EVE* and it is possible that there are alternative or hybrid mechanisms for learning which are not reflected in the measures. One participant commented that some in-game guilds keep lower level sub-groups, which operate as “farm teams” for new players to demonstrate and develop their skills before moving up to the main group. These alternative forms are not addressed within the study and may confuse the results.

Another important note pertains to this study’s dependent variables (bridging and bonding social capital) as they provide both an advantage and a disadvantage. With regard to the former, social capital is a richly studied field among scholars examining games, which situates

this paper as a contribution to broader types of research (Williams, 2006). However, this research topic may have also affected the results due to characteristics of *EVE Online*. Specifically, in 2010, a popular scam used the pretense of being an academic study of trust to steal money from players (“EVE Insider” 2010). This has led to a high degree of skepticism among players toward academic studies examining trust or social capital and may have affected the response rate and honesty of participants.

Despite these restrictions this study also has some important advantages. It is the first quantitative study of social capital in relation to *EVE Online*, a major MMOG, pushing the boundaries of the research beyond the “swords and sorcery” sub-genre of games such as *World of Warcraft* and *Everquest II* which has dominated examinations so far (Chen, 2011; Ducheneaut et al., 2006b; Williams et al., 2006). Additionally, the cross group comparison and collaboration with multiple distinct and independent in-game communities generates a within game comparative effect which increases the usefulness of the results. Finally, the demonstration that mentoring plays a role in predicting the development of social capital introduces a new variable into the literature, which should enhance the explanatory power of future models.

Theoretical Implications

With these caveats in mind, a few conclusions can be tentatively extracted from the findings. Analysis indicates that the process of being trained to play an MMOG does not significantly alter the development of social capital. Students and those being trained did not show significantly different levels of either type of social capital from those who took a trial and error approach to the game. A possible explanation for this lack of variation between the two learning strategies maybe that joining a training guild within the game does not dramatically alter

the incentive to form a wide ranging social network early in the game in order to gather experience from multiple sources. Instead, the process may be partially internalized within the training guild as new players interact with a wide and rapidly shifting variety of compatriots within the organization and throughout their training process. This suggests that the differences between trained players and those who learned on their own are not significant in the long term process of developing social capital.

However, the same cannot be said for those involved on the opposite side of the training process. Mentors engaged in one-on-one training with new players demonstrated significantly higher levels of bridging social capital than their counterparts who never participated in a training guild. This suggests that mentors are fulfilling a brokerage role within the broader network of *EVE Online* players. By instructing students in a one-on-one setting, mentors seem to be able to generate a tie between themselves and their student. Taking on multiple students generates a brokerage situation where the mentor has the ability to gather information from, and mediate between, diverse groups of individuals who would otherwise have no connection to each other (Burt, 1995). This role stands in contrast to teachers who manage large classes in which the students are capable of communication and networking with each other through a shared identity as classmates that is independent of the teachers' intervention.

Bridging social capital was also influenced by the frequency of communication between players. However, both text and voice communication had a significant effect, demonstrating that social capital is less dependent on the form of communication than on the quantity thereof. These findings run contrary to previous research that shows that voice chat enhances relations with others online but text messaging has little effect (Ratan et al., 2010, p. 104). With these results it appears that voice chat helps build bridges between players as opposed to promoting

network closure within guilds. Although this may be a result of the diverse nature of EVE Online due to its unified server structure, which means players are potentially more likely to encounter individuals different from themselves to form bridges with in casual encounters.

With regard to bonding social capital, offline interactions that are subsequently imported into the game world appears to be an important predictor. Players, who engaged with the game world alongside their friends, demonstrated significantly higher levels of bonding than their compatriots. This reinforces previous research into the permeability of the boundary between MMOGs and the offline world. Social relations appear to be able to translate between the online and offline realms, with participants who played *EVE* with friends benefiting from significantly higher quantities of bonding social capital, further supporting the perspective the MMOGs are extensions of social interaction as opposed to distinct and isolated zones (Consalvo, 2009; Jakobsson & Taylor, 2003).

It is also interesting to note that there is a significant relationship between the number of hours played a week and decreases in bonding social capital. This finding confirms previous research examining different games which demonstrates a negative relationship between the time spent in game and generalized trust as well as a positive correlation with loneliness (Shen & Williams, 2011). However various personality aspects and other exogenous variables have been shown as mediating variables which complicate the relationship between time online and various personal and psychological factors so this correlation should be interpreted with caution (Shen & Williams, 2011).

In addition to hours/week playing *EVE*, one online interaction pattern did exhibit a significant influence on bonding social capital. Players who spent a higher proportion of their time

within a training guild experienced a statistically significant drop in bonding social capital. This is most likely due to membership attrition and link decay among these long-standing members (Shen et al., 2011). The original cohort of players with whom they entered begin to move on or quit the game, severing ties between them and the player remaining in the training guild. The close ties needed to generate bonding social capital are therefore shattered. Furthermore, the regeneration of these social capital stocks through the formation of new connections is hampered by the instrumental nature of training guilds, with players leaving once they learn how to play the game as opposed to remaining as part of a broader community. This network decay makes these long-standing members isolated and therefore damages their social capital accumulation.

Repercussions for Social Capital Theory. With regard to social capital theory, these results indicate that social capital generation within online games appears to follow a brokerage as opposed to a bonding network closure pattern. When examining the significant predictors of bridging and bonding social capital the latter appears to be predicted by variables that are at least partially dependent on factors that do not hinge on the formation of networks within the game world. As an example, co-play with friends appears to have a strong relationship with bonding social capital, but this reflects the importation of preexisting relationships into the game world, as opposed to the generation of new connections (Jakobsson & Taylor, 2003). Similarly, hours a week spent in game has a negative relationship with social capital, potentially due to the displacement of offline interactions, but intervening variables not included in this examination make firm conclusions difficult with regards to this correlation (Shen & Williams, 2011). The only purely online interaction pattern that proved significant was the ratio of training to playtime, and the mechanism behind this combination can be plausibly attributed to the effects of

persistent network decay, as opposed to the active formation of networks. Taken as a whole, this suggests that network closure and the resulting bonding social capital is not a major component of the social networks formed between players within online games.

In contrast to the results for bonding social capital the major predictors for bridging social capital all relate to choices centered on online interaction. Whether it is to use voice chat, text communication or to serve as a mentor for new players each of these variables captures an element of network formation within the game, as opposed to structures imported from outside of it. Voice and text chat represent the fundamental mechanism for in-game association and the formation of social networks, while mentoring can be seen as an archetypal brokerage role. This suggests that in relation to purely in-game social networks the brokerage logic put forward by Burt represents a better portrayal of the structures which end up producing social capital.

Finally, these results demonstrate the social dynamics of learning within MMOGs. Through the process of training new players and teaching them to survive within the complex and challenging world of *EVE Online* mentors gain valuable connections and integration into social networks which would previously be closed off to them. This demonstrates the potential positive repercussions of training through virtual environments, but further work is needed to determine if this examinations findings are generalizable.

Lessons for Game Developers

As mentioned at the start of this examination, churn remains a major issue for game developers (Mulligan & Patrovsky, 2003). Players who sink, who fail to utilize the game as a social space and discontinue their involvement with the online environment pose a major issue for those involved in the creation of these areas as they represent lost revenue and deplete the overall quality of the game. MMOGs depend on having a robust community of players who can

interact and generate the amusing social experiences which make this genre so appealing and popular (Ducheneaut et al., 2006a). Without people *EVE* would simply be empty space and a broken economy, therefore learning how players play the game and what type of teaching structures promote the most robust connections among players represents an important goal. The results presented above demonstrate that there are substantive differences between learning to play on your own and taking part in a training organization. Specifically, mentors gather social bridge structural holes and connecting new players to each other, integrating them into a broader in game network which exerts a statistically significant influence on their stocks of bridging social capital when compared to other players while controlling for mitigating factors such as communication use, time and co-playing. This is not to suggest that formalized training is a panacea, lower stocks of bonding social capital among those with a high ration of time spent inside training organizations over time spent playing suggests that sticking around in these organizations as they cycle players through the system may lead to network decay and disintegration. However, these conclusions are tentative, further research is needed to illuminate the exact relationship between learning to play a MMOG, network formation and social capital.

Future Research

These results have demonstrated that in-game mentoring serves as a significant predictor of bridging social capital as well as presenting new information about the relationship between social capital theory and MMOGs. A critical next step is to directly examine the social networks whose traces and aftereffects have been examined by this endeavor. Scholars working with other virtual worlds have gathered data directly from the game through the use of server logs (Ratan et al., 2010; Williams et al., 2006). This approach has been used with regards to *EVE Online* as well, although in an attempt to address different research questions (Feng, Brandt, & Saha,

2007). The next step for this research is to combine the group-based within game comparative nature of this research with these more robust data sources in order to directly map out student's and mentor's social networks throughout the training process and contrast them with their counterparts who have adopted an alternative learning strategy. This approach has the additional advantage of providing a basis for comparison across games using a variety of server logs in order to see if the trends uncovered in this research are unique to *EVE Online* or more broadly applicable.

A second potentially fruitful direction for research is to dive deeper into the *EVE Online* community through the application of more mixed or qualitative methods in order to generate a greater understanding of this game world and the complex relationships it fosters. This paper was produced with the collaboration of three distinct and popular *EVE* related communities over a five month negotiation process and the findings were subsequently presented back to these groups. Throughout this process, the author played and interacted with the general community in order to understand the dynamics at work within the game world. This has helped demonstrate the value of research to these communities and should blaze a trail for future examination at a more nuanced level in order to provide a deeper context and understanding in which this research and future findings can be situated and understood.

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Appendix

Table 1
Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation
Age	.00	74.00	27.4010	9.09126
Gender	0 (Male)	1 (Female)	.03	.183
Some High School	.00	1.00	.0482	.21436
High School Degree	.00	1.00	.1566	.36376
Some Post Secondary	.00	1.00	.2444	.43010
Associate or Technical Degree	.00	1.00	.1566	.36376
Bachelor's Degree	.00	1.00	.2444	.43010
Graduate or Professional Degree.	.00	1.00	.1446	.35198
Length of EVE Career (Months)	.00	143.00	25.3830	23.16521
Hours a Week playing EVE	.50	80.00	16.5897	13.33809
VOIP use	1	5	3.91	1.114
Text/Mail	1	5	4.33	.847
Face to Face Communication	1	5	1.61	.923
Coplay with friend	1	5	2.40	1.396
Coplay with Romantic partner	1	5	1.24	.742
Coplay with relative	1	5	1.23	.712
Student	0	1	.50	.500
Teacher (leading large classes)	0	1	.09	.281
Mentor (one on one instruction)	0	1	.16	.365
Administrator	0	1	.10	.300
Bonding Social Capital	1.00	5.00	3.7188	.74448
Bridging Social Capital	1.30	5.00	3.9537	.62989
Current Member of Training Corp	.00	1.00	.3787	.48547
Alumni	.00	1.00	.1670	.37326
No Training	.00	1.00	.4544	.49834
Ratio Weeks Training/Weeks Played	.00	1.00	.2609	.35834

N=581

Table 2

Predictors of Bridging and Bonding Social Capital

Variable	Bonding Social Capital			Bridging Social Capital		
	Standardized	t	Sig.	Standardized	t	Sig.
	Coefficients			Coefficients		
	Beta			Beta		
(Constant)		8.304	.000*		9.466	.000*
Age	.088	1.741	.082	.001	.024	.981
Gender	-.013	-.291	.771	.048	1.106	.269
High School Graduate ^a	.099	1.323	.187	-.073	-.986	.325
Some Post Secondary	.108	1.248	.213	-.062	-.723	.470
Associate or Technical Degree	.201	2.552	.011*	-.040	-.512	.609
Bachelor's Degree	.163	1.837	.067	-.145	-1.660	.097
Graduate or Professional Degree	.119	1.534	.126	-.100	-1.301	.194
VOIP use	.028	.648	.517	.136	3.212	.001*
Text/Mail	.078	1.738	.083	.203	4.585	.000*
Face to Face Communication	.021	.431	.666	.064	1.345	.179
Coplay with friend	.200	4.165	.000*	.057	1.209	.227
Coplay with Romantic partner	.027	.591	.555	-.033	-.732	.464
Coplay with relative	.044	1.041	.298	.043	1.027	.305
Age	.088	1.741	.082	.001	.024	.981
Gender	-.013	-.291	.771	.048	1.106	.269
Duration of time spent on EVE	-.042	-.905	.366	.039	.862	.389
Hours a week playing Eve	-.094	-2.251	.025*	.013	.302	.763
Student	.005	.046	.963	.011	.100	.921
Teacher (leading large classes)	.041	.859	.391	.045	.935	.350
Mentor (one on one instruction)	.036	.715	.475	.100	2.035	.042*
Administrator	.053	1.097	.273	-.052	-1.080	.281
Alumni ^b	-.092	-1.748	.081	-.042	-.803	.423
No Training	-.107	-.856	.392	-.004	-.035	.972
TrainRatio	-.158	-2.401	.017*	.040	.619	.536

*p<0.05

Bonding- Adjusted $R^2 = .078$ Bridging- Adjusted $R^2 = .098$

^a Dummy coded with "Less than a High School Degree" as the base category

^b Dummy coded with "Currently in Training" as the base category

N=581
