Characteristics of Mentoring Relationships in Online Video Games

A Senior Honors Thesis

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Abstract

In both daily life and the online world of Massively Multiplayer Online Role Playing Games (MMORPGs), mentoring relationships play a key role in participants' social development. To improve mentoring programs, understanding the kinds of people who become mentors and how many mentees they ultimately choose to take on is crucial. In this study, I explore mentoring relationships between players in Sony's popular *EverQuest II* MMORPG. Collaboration provides the quickest path to success in MMORPGs; in-game mechanisms such as mentoring and guilds (i.e. organized groups of players who regularly play together) support this notion. Using unobtrusively collected server-side game log data, I found that guild members, higher-level players, self-identified role-players, and females are more likely to be mentors. Guild members (especially guild leaders) and higher-level players are also more likely to mentor more people in the long run.

Characteristics of Mentoring Relationships in Online Video Games

Introduction

Mentoring is a collaboration and training mechanism designed to benefit both well-versed mentors as well as their budding protégés/mentees. Mentoring has also been described as "a planned pairing of a more experienced person with a lesser skilled individual for the purpose of achieving mutually agreed upon outcomes" (Dorsey & Baker, 2004). These outcomes vary by context: building a future generation of organization leaders may be the desired outcome of mentoring within a corporate hierarchy. In video games, socializing and having fun together in a "productive" experience-gaining context may very well be the desired outcome of mentoring for both mentors and mentees.

Developing social relationships (including but not limited to mentoring relationships) is an integral part of the online world of Massively Multiplayer Online Role Playing Games (MMORPGs). In this video game genre that developed a massive player base in the last two decades with the popularization of the internet, millions of players role-play as virtual characters with specific "classes" (including fighter, priest, mage, and scout) which each have their own class-specific skills to defeat opponents and support allies. These characters explore an online virtual world complete with monsters, computer-generated non-player characters (NPCs), and other characters controlled in real-time by players worldwide. To the outsider, the end goal of MMORPGs may just seem to be to reach the highest level and collect the best set of equipment or "gear" available, but the strong social component of these games adds another layer of complexity to the gameplay experience. Mentoring relationships provide an avenue into exploring the social relationships within these virtual worlds.

In this study, I focus on player-to-player mentoring relationships in Sony's popular *EverQuest II* game. By nature of *EverQuest II*'s design, teamwork is critical to gameplay success; mechanisms built into the game such as guilds and mentoring support this notion.

An important example of group affiliations in *EverQuest II* are guilds: the game's primary organizational groups which players can be identified by. Many player relationships are commonly cultivated in this MMORPG environment through guild membership, as players in a guild tend to spend a significant chunk of time playing with their fellow guild members.

In *EverQuest II*, mentoring of lower-leveled players by more experienced players indicates a friendly and at least somewhat developed social relationship between the mentor and mentee. A higher-level player could easily do something more economically profitable that rewards him more experience and in-game currency than mentoring another character ten levels below his level and fighting (relatively) weak monsters with this mentee. Although the game designers included benefits to both mentor and mentee in the form of an experience bonus for the mentee and being able to earn experience and semi-rare items from lower-level monsters that the mentor would traditionally not be able to get any experience or items from at his higher level, the non-social incentives for a player to mentor others are still pretty bleak. However, social incentives, such as training a new generation of guild members to one day take over the reins of leadership in the guild, can further incentivize players to become mentors.

In my honors thesis I explore the nature of in-game mentoring relationships in *EverQuest II*. Using the context of the virtual world of *EverQuest II*, I hope to bring in some insight on the dynamics of online mentoring relationships in MMORPGs which should be of interest to players, game designers, educators, and those looking to improve the design of their mentoring and advising programs.

I will start with a literature review of virtual worlds, collaboration in MMORPGs, group membership in *EverQuest II*, and mentoring relationships both in general and within MMORPGs. I will follow with my proposed research questions and eight proposed hypotheses. Then I will present information and contextual details on the data used in this study. I will continue with a description of my methodology of data analysis and the results of my study. To conclude, I will offer some limitations of this study and potential future directions for this research.

Literature Review

Virtual Worlds

Scholars have acknowledged the scientific research potential of studying online virtual worlds – given the vast amounts of unobtrusively-collected data available and the many parallels shared by these virtual worlds and the real world (Bainbridge, 2007). Many researchers have subsequently studied the virtual worlds of MMORPGs and MMOGs in the last two decades as these online game genres grew widely popular. For example, researchers have explored the economy of a virtual world and found several patterns of supply and demand as well as GDP and price levels that are shared with real-world economies (Castronova, Williams, Shen, Ratan, Xiong, Huang, & Keegan, 2009). With virtually every interaction and transaction in the virtual world automatically logged at our disposal and the generally easy-to-define constraints of a video game environment, the virtual world provides us a great deal of measurability and insight regarding the actions and choices players take.

Furthermore, online communities do not have to concern themselves with the potential limiting factor of shared physical location as much as their offline counterparts. As Wellman & Gulia (1999) put it, “Global connectivity de-emphasizes the importance of locality for

community." Participants in virtual worlds have a plethora of potential social connections they can make with other people in the online community, as the online setting drastically reduces the importance of shared geographic location in order to sustain relationships. In the virtual world of MMORPGs, even new players are exposed to many other players who are logged in at the same time on their game server; regular gameplay actions such as exploring in-game zones and reading chat channel activity allow players to come across many of their peers.

Collaboration in MMORPGs

Socialization is built into the gameplay objectives of many MMORPGs; the social component lies at the heart of the MMORPG experience. Jakobsson & Taylor (2003) described, "The [MMORPG] is designed in a way that makes cooperation essential for achieving success, a concept that has been central in role-playing games since the days when they were played with rulebooks, pen and paper." Taylor (2006) also noted about the experience of high-level players in *EverQuest*, "At the high-end game participation in groups and collectives generally becomes the only way to gain experience and advance." In addition, with four archetypes of character classes in *EverQuest II* (fighter, scout, priest, and mage), players were more likely to form combat teams with players of character class archetypes different from their own (Zhu, Huang, & Contractor, 2013) – which corresponds well with *EverQuest II*'s gameplay design that rewards groups of diverse classes and abilities.

Moreover, researchers have shown that the social aspect of MMORPGs has created opportunities for strong friendships and emotional relationships to form (Cole & Griffiths, 2007; Nardi & Harris, 2006). Some people have even dated players they met in the game or moved across the country to be with the close friends they made through the game (Escoriaza, 2008; Cole & Griffiths, 2007). Brad McQuaid, codesigner of *EverQuest* (the precursor of *EverQuest II*)

commented, “By creating an environment often too challenging for a solo player, people are compelled to group and even to form large guilds and alliances. All of this builds community, and it all keeps players coming back for more and more.” Socialization and collaboration are central to success in MMORPGs, and this emphasizes the importance of social relationships within these games.

Group Membership in *EverQuest II*

As mentioned earlier, group membership is a key component of player relationships in *EverQuest II*. “Group by choice, not by necessity. Both group and solo play styles are well-supported by the content and the mechanics. Every class has the means to kill monsters solo, and every class has a useful role in a group,” reads the first page of *EverQuest II*’s beginner guide on their official wiki (“Installation,” n.d.). However, as previously noted, the game design rewards teamwork – especially at higher levels.

Guilds in particular play an important role in *EverQuest II*’s gameplay. Guilds are the most prevalent and prominent officially-sanctioned organizations within the game and generally display an array of important social dynamics in MMORPGs (Williams, Ducheneaut, Xiong, Zhang, Yee, & Nickell, 2006). Taylor’s (2006) description of groups and guilds in *EverQuest* also holds true for *EverQuest II*: “The game is particularly notable for the ways it supports collectives. Groups… are formal collections in which people, once joined together, can monitor each other, use a private chat channel, and all gain experience points based on teamwork. At the guild level people are now able to bring up a tool that allows them to see all the members of their association and where they are in the world. All guild members share a “tag” on their name identifying their guild affiliation. Guilds also have automatic private-chat channels and can set ‘messages of the day’ – broadcast messages that all guild members see when logging in.” Given

all of these shared interactions, typical players will often self-identify with their guild affiliation and bond closely with fellow guild members.

Players and *EverQuest II* staff echo the importance of guilds, as seen in this excerpt of a blog post featured in the news by Sony on *EverQuest II*'s home page: "[*EverQuest II*] values guilds — a lot of the things you do benefit a guild you're in, people in guilds of a certain level get better mounts [(i.e. in-game transportation vehicles)] or cheaper ones, or can buy things the unguilded cannot; it is better to be in a guild, even if nobody talks, than to be guildless, and it for sure deters the random guild invites.

"But a great guild is a wonderful thing. It's a social game, after all, and being in a guild opens up more of the game and also lets you build wonderful groups for running instances or dungeon crawls without having to play the LFG [Looking For Group] Lotto" (Tipa, 2007). With the importance of social relationships and group memberships in mind, how then do players choose which people they mentor in the game?

Mentoring Relationships

Mentoring is a process designed to benefit both the more-experienced mentor as well as her budding protégé/mentee. Some have also described mentoring as "a planned pairing of a more experienced person with a lesser skilled individual for the purpose of achieving mutually agreed upon outcomes" (Dorsey & Baker, 2004). Usually, an organizational outcome of mentoring is a gain in human capital – the knowledge and skills imparted by the mentor to the mentee (Wilson & Elman, 1990).

Mentoring is thus viable in a multitude of contexts, and it has appropriately also been studied in several contexts: including in the business world and in graduate training programs'

advisor-advisee relations (Schlosser, Lyons, Talleyrand, Kim, & Johnson, 2010; Williams, Levine, Malhotra, & Holtzheimer, 2004).

Of particular note is the fostering of mentorship by institutions (Williams et al., 2004). The institutions in the context of this paper are guilds in *EverQuest II*, and I will explore the impact of guilds on mentorship relations.

Kram (1986) also pointed out that some people actively seek out a mentor whereas others may prefer to work without the help of a mentor. Similarly, some experienced people may be more inclined to become a mentor than others. Given this, I explore individual level differences between people who become mentors and the people who never mentor others in this study.

Mentoring in *EverQuest II*

According to Bagley & Shaffer (2015), mentoring via online chat can be as effective as mentoring face-to-face in appropriately structured contexts. In this sense, mentoring in the 3D virtual game world of *EverQuest II* through a combination of actions, gestures, and chat can be rather effective. However, the concept of mentoring takes on a slightly different definition in the world of *EverQuest II*.

In *EverQuest II*, players can only mentor one person at any given time and must be in the same location as their mentee. While mentoring, the higher-level character has their level temporarily reduced to match that of his lower-level mentee. When higher-level players mentor down to their mentee's level to help the mentee in combat or with her quests, they also gain a small portion of experience every time their mentee gains experience. In this way, mentors can play in lower-level zones they have already surpassed and be able to gain experience as a mentor that they would not be able to alone. Thus, players with a great difference in their levels seem to be best-suited to *EverQuest II*'s flavor of mentoring (Shen, Monge, & Williams, 2014). Mentors

however do not benefit as much from this mentor experience gain as they would if they were playing with a similar-level group of players in a level-appropriate zone. Most of the tangible benefits of this in-game mentoring relationship belong to the mentees – who gain a 10% experience bonus when playing with a mentor.

This type of mentoring experience is similar to those of other MMORPGs. Looking at the game *ToonTown*, Dickey (2007) describes its "goodwill quests" which are comparable to mentoring instances in *EverQuest II*: "More advanced players are sometimes required to assist lower-level players in completing a quest. This provides scaffolding to beginning players and helps initiate them into the gameplay environment… In goodwill quests, players may articulate their experiences while assisting lower-level players. In turn players may model, scaffold, and coach lower-level players." *EverQuest II* also provides these scaffolding opportunities in its mentoring relationships as mentors and mentees work together to accomplish some tasks.

The first paper that has focused on mentoring relationships specifically in *EverQuest II* created a network model of mentoring - with a particular interest in mentor-mentee dyadic network measures such as closeness centrality, structural holes, and clustering coefficients (Ahmad, Huffaker, Wang, Treem, Kumar, Poole, & Srivastava, 2010). According to their findings, although mentoring activities made up a small percentage of the total set of activities players engaged in for most players in *EverQuest II*, players allocated a wide range of proportions of their in-game time to mentoring. Interestingly enough, many former mentees eventually also mentored other players (Ahmad et al., 2010). Like I do in this paper, Ahmad et al.'s conference paper (2010) explored the number of mentees a mentor takes on, the average level difference between a mentor and all of his mentees, and mentoring relationships within the same guild.

In this study however, I will be looking at mentoring relationships at the character level, as the majority of the current literature does not explore mentoring relationships within MMORPGs in great detail. To the best of my knowledge, this joins Ahmad et al.'s study (2010) as one of the first several papers exploring the social characteristics of mentoring relationships in MMORPGs.

Research Questions

My analysis of mentoring relationships in *EverQuest II* will be guided by the following questions:

1. What intangible value does the mentoring relationship provide to mentors? What influences players to become mentors?
2. Why do some people choose to mentor other players while others do not?
3. Since mentors can only mentor one person at a time, what determines the ultimate number of mentees a mentor chooses to take on over the course of his/her in-game career?
4. Do institutions (i.e. guilds) foster mentorships?

The typical downward nature of a mentoring relationship suggests that higher-leveled players should be more likely to mentor other players than lower-leveled players, as mentoring in the context of *EverQuest II* only seems to be beneficial when a mentor is at least several levels higher than their mentee.

H1: Higher-level characters are more likely to be a mentor than lower-level characters.

Also, since higher-level characters have played the game for a longer period of time, and thus had more time to potentially mentor other people (among other in-game activities), I predict

that higher-level characters will also have accumulated more mentees than lower-level characters.

H2: Higher-level characters are more likely to have more mentees than lower-level characters.

Additionally, since the characteristics of video game characters can momentarily become part of a player's own self-perception (Klimmt, Hefner, & Vorderer, 2009), it seems plausible that players may often act in ways that match how they perceive their in-game characters/avatars. Following this line of thinking, since priests in the MMORPG genre are known as support characters who are highly desired in groups but cannot easily kill monsters on their own, it seems reasonable that players who chose to play as priests would want to help and support other characters. Ideally, this would also extend to helping lower-level players through mentoring – given the selfless nature of a priest (as the word is commonly known – not as the class archetype). It follows that the brave fighter class archetype, who is expected to keep the group out of harm's way and serve as the monsters' punching bag so that other group members can focus on dealing damage to said monsters, would be perceived as a valiant and chivalrous protector. In addition, the scout class archetype (e.g. the predator, assassin, ranger, rogue, and brigand classes) tends to be represented as dark and brooding recluses, so I hypothesize that scouts tend to keep to themselves and are least likely to mentor others. Finally, mage class archetypes are similar to scouts in that their role in a group is to quickly deal damage on the sidelines, but mages are surrounded by an aura of mystique and scholarly wizardry rather than loneliness and death. Based on these theories of self-perception, I propose the following hypotheses:

H3: Characters of the priest class archetype are most likely to mentor other characters – followed by characters of fighter, mage, and scout class archetypes in that order.

H4: Characters of the priest class archetype are most likely to mentor the most mentees, followed by characters of fighter, mage, and scout class archetypes in that order.

Furthermore, I predict that participation in a guild and the corresponding degree of guild participation will positively influence a character's likelihood to be a mentor. Guilds are designed to provide players a sense of community and camaraderie within their guild. Hence, it would make sense that guild members would want to help and mentor their lower-level fellow guild members.

H5: Characters in a guild are more likely to mentor others than characters with no guild affiliation.

H6: Guild members are more likely to mentor more people than characters not in a guild.

Moreover, guild leaders have the most responsibility and commitment to their guilds, so they should have the most incentive to support and mentor their guild members.

H7: Guild leaders are more likely to be a mentor than non-guild leaders.

H8: Guild leaders are more likely to mentor more people than non-guild leaders.

Data

The data used for this study was provided by Sony Online Entertainment – which I accessed from a PostgreSQL relational database on a remote server supported and managed by the Virtual Worlds Exploratorium research team. To prepare the data for my analysis, I used Structured Query Language (SQL) to select and extract relevant data. The data include players' in-game actions, interactions, and transactions along with their demographic information and

their characters' information (Williams, Contractor, Poole, Srivastava, & Cai, 2011) – making up more than 1TB of data.

Sample

For this study, I conducted data analysis using data aggregated from server-side logs provided and collected unobtrusively by Sony Online Entertainment for their Massively Multiplayer Online Role Playing Game (MMORPG), *EverQuest II*, from January 2006 to September 2006. *EverQuest II* was one of the most popular MMORPGs in the Western hemisphere during this time period with about 500,000 subscribers and 25 game servers. Players could create multiple characters across multiple servers, but each character could only exist in the single server it was either created in or moved to (which is cost-prohibitive). Thus, each server could be considered its own virtual world.

The data collected were from one of *EverQuest II*'s game servers, Guk, which is a "Player versus Environment" (PvE) server: the standard, default server type for MMORPGs. This server type differentiates from "Player versus Player" (PvP) servers where players can attack each other outside of mutually accepted duels. PvE servers also differ from "Role Playing" (RP) servers - where players interested in serious roleplay are encouraged to join.

In this study, I focus on experience-gain logs associated with a mentor-mentee relationship. This mentoring relationship is indicated by the reason for the experience gain, as the mentee receives a 10% experience boost by playing alongside a mentor, and the mentor gains a small portion of experience as a mentor whenever his mentee gains experience. Here I use a nine-month sample of mentoring events from January 1, 2006 to September 11, 2006 to conduct my analysis.

To reduce data processing time, I selected a sample of all 1,177 characters who were active and gained experience between September 5, 2006 to September 11, 2006 in the Zek (The Orcish Wastes) game zone. The reason for this timeframe was because character-specific cross-sectional data was collected on September 4th, and the first instance of experience gain in September occurred on September 5th. In this way, this sample ensures that all characters are active and have up-to-date character-specific information.

Since *EverQuest II* is a virtual world where players play within a 3D landscape, I decided to focus on a particular in-game geographic zone, Zek, to further reduce my sample. The Zek zone is a level 30-43 region in *EverQuest II*, a mid-level zone (given that the max level in the game was 70 at the time of data collection) that does not suffer the same complications of a beginners' zone and those of an end-game boss-level zone. As a mid-level zone in an easily accessible region, limiting my sample to Zek should capture relatively standard gameplay within *EverQuest II*.

All mentoring events associated with these 1,177 characters were then collected from experience logs – ranging from January 1 to September 11, 2006. Finally, character-level information such as character level, class archetype, and guild membership were matched with each of the 1,177 characters in my sample.

A potential ethical issue of lack of anonymity came up due to the nature of the data. Participants were not sufficiently anonymized in this dataset: Many people can be linked back to the data through their characters' usernames and monikers, as individuals may reuse the same moniker across different areas of the internet and may disclose their *EverQuest II* character name(s) in online discussions or forum signatures. To counter this lack of anonymity, I left out character names from this study.

Measures

I developed several variables to measure the attributes of player characters and five variables to measure a mentor character's mentoring statistics.

- Level of experience/power in the game: *Character level* (implemented as dummy variables: *Level below 21*, *Level 21-30*, *Level 31-40*, *Level 41-50*, *Level 51-60*, *Level 61-69*, and *Level 70*) measures a character's level in *EverQuest II*. Since the Zek zone is primarily designed for level 30 to level 40 characters, I created dummy variables indicating which level tier a character is in - with level 31 to level 40 characters (*Level 31-40*) as the base for my regression. Additionally, the level cap (i.e. max possible character level in the game) was raised to level 70 (from level 60) with the introduction of *Everquest II*'s "Kingdom of Sky" expansion pack on February 21, 2006 ("EverQuest II: Kingdom of Sky (PC)," n.d.). Leveling becomes exponentially more difficult at the highest levels, and players who reach the level cap cannot further advance their character level, so this "elite" group of level 70 characters is regarded as a special level tier of their own (*Level 70*).
- Character's gender: *Female* indicates whether a character is female or not (i.e. male). All characters must be assigned a gender when they are created.
- Guild membership: *In a guild* indicates if a character belongs to a guild.
- Rank in organization: Guild rank measures the social standing of a character within their guild. A guild rank of 0 indicates a guild leader (*Guild leader*). The role and function of every other guild rank varies per guild since they can be fully customized.
- Self-identified role-player: *Self-identified role-player* indicates if a character self-identifies as a roleplaying character.

- History of being a mentor: *Is a mentor* indicates if a character has ever mentored another player.
- History of being a mentee: *Is a mentee* indicates if a character has ever been mentored by another player.
- Character class archetypes: Four dummy variables, *Fighter class archetype, Priest class archetype, Mage class archetype,* and *Scout class archetype,* indicate a character's class archetype in *EverQuest II*. Since fighters were the most prevalent class archetype in my sample, *Fighter class archetype* was used as the base for my regression analysis.
- Average level difference between the mentor and mentee: measured as *Levels above mentee*, as this information is specific to each individual mentor character.
- Total hours spent mentoring: measured as *Total mentor hours*.
- Total number of mentees: *Total mentees* measures the total count of characters a player has ever mentored over the course of his gameplay. Since the distribution of this measure was heavily skewed to the right, I also observed the natural log of this measure: *ln(Total mentees)*.
- Average hours spent mentoring: *Average mentor hours per mentee* takes the total hours spent mentoring and averages this over the number of mentees the mentor had.
- Diversity of time spent with mentees: The standard deviation of distinct hours spent with each mentee (*Std dev of hours per mentee*) was used as a measure of diversity of the total hours a player spent with each of his mentees. This measure only applies to characters who had at least two mentees.

Table 1. Statistics of characters and mentoring events per character

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Character level	1,177	47.41	15.51	4	70
Female	1,177	0.350		0	1
In a guild	1,177	0.858		0	1
Guild leader	1,177	0.116		0	1
Self-identified role-player	1,177	0.123		0	1
Is a mentor	1,177	0.675		0	1
Is a mentee	1,177	0.799		0	1
Level below 21	1,177	0.0204		0	1
Level 21-30	1,177	0.120		0	1
Level 31-40	1,177	0.262		0	1
Level 41-50	1,177	0.195		0	1
Level 51-60	1,177	0.129		0	1
Level 61-69	1,177	0.105		0	1
Level 70	1,177	0.170		0	1
Fighter class archetype	1,177	0.287		0	1
Priest class archetype	1,177	0.226		0	1
Mage class archetype	1,177	0.280		0	1
Scout class archetype	1,177	0.207		0	1
Levels above mentee	794	11.78	7.570	1	41.76
Total mentor hours	794	21.30	35.27	1	405
Total mentees	794	7.630	8.711	1	85
Average mentor hours per mentee	794	2.498	2.557	1	43.83
ln(Total mentees)	794	1.547	0.991	0	4.443
Std dev of hours per mentee	794	1.938	3.971	0	63.58

Method

Heckman Regression Model with Sample Selection

Heckman (1979) received a Nobel Prize for developing a technique, now known as the Heckman selection model, which addressed the problem of sample selection bias. Heckman approached this as an omitted variables problem - where an estimate of the omitted variable would solve the problem of selection bias. In the context of Heckman's example, the model focused on the context of a wage equation. However, Heckman (1977) stipulated that a woman's

participation in the workforce (the selection equation here) depended on variables such as if she had children, and thus regression results on the wage equation demonstrated self-selection bias because they would report that *all* women with children earned lower wages. Using Heckman's technique controlling for sample selection bias, the wage regression results would only predict if *working* women with children earned lower wages or not.

Here, instead of looking at a wage equation and a selection equation that determines if a woman will enter the workforce (and thus earn a wage), I study an equation determining the total number of mentees a character chooses to take on over the course of gameplay and a selection equation that determines if a character will be a mentor.

Since I believed that guild membership and character level would affect whether or not a player would ever mentor another player, my selection equation incorporates these measures. Guild membership is indicated by the *In a guild* measure. Character level is operationalized here as *Higher level than zone*, where a value of 1 indicates the character is over level 43 (the highest level the Zek zone's "Deathfist Citadel" dungeon is recommended for), and a value of 0 indicates the character is level 43 or under (i.e. at an appropriate level to benefit from the zone). My hypothesis was that players who had a character level above the overall level of the zone my sample was sourced from would be more likely to be mentors to players within the zone's recommended level 30-43 range.

Results

On the whole, guild members, females, higher-level players, and self-identified role-players are more likely to be mentors. Guild members (especially guild leaders) and higher-level players are also more likely to mentor more people in the long run. On the other hand, the class archetypes that players chose for their characters (i.e. fighter, priest, mage, or scout) did not seem

to be statistically significant in predicting whether a character would be a mentor nor in predicting the total number of mentees a mentor would have.

Heckman Regression Model Results

In a total of 1,177 characters in my sample, 794 of them were a mentor at some point in their gameplay, and 383 had never mentored another character in *EverQuest II*. The selection equation looks at all 1,177 characters, but the overall equation looks only at the 794 who were a mentor at some point and thus had at least one mentee over the course of their gameplay.

Based on the Heckman regression results, it looks like the higher the player's level, more mentees the player will take on during their gameplay (*H2*). This result is somewhat trivial, as higher level players have spent more time playing the game than lower level players and thus have had more time to mentor other players. Guild membership and leadership are also positively correlated with the number of mentees a mentor would have - which supports *H6* and *H8*. Regarding class archetypes, there were not enough significant results to prove nor disprove *H4*. Mage-class characters however tend to take on less mentees that fighter-class characters. Significantly, as the average level difference between the mentor and mentee increases, the mentor's mentee count increases. This supports the notion that the incentive to actively mentor others in *EverQuest II* is in part determined by the level difference between the potential mentor and mentee(s). For the selection equation, having a higher level than the zone's level recommendation and being in a guild are highly predictive of whether a character would be a mentor or not.

However, since the Heckman model assumes that the error terms of both equations are correlated, it seems that the Heckman model is not appropriate for this analysis. Rho estimates the correlation between the two equations' error terms. The likelihood ratio statistic is distributed

chi-squared with one degree of freedom, and it indicates this correlation between errors is not significant ($p = 0.2986$). This means the two equations, the first predicting *ln(Total mentees)* and the second predicting *Is a mentor*, may likely be independent. Therefore, I used a logistic regression model to predict whether a character would ever mentor another character and a separate zero-truncated negative binomial regression model below to estimate a mentor's total number of mentees over his in-game career.

Table 2. Heckman selection model predicting *ln(Total mentees)* for a character

EQUATION	VARIABLES	(2) Heckman selection model regression
ln(Total mentees)	*Level below 21*	-0.894
		(0.615)
794 uncensored observations.	*Level 21-30*	-0.163
		(0.134)
383 censored observations.		
	Level 41-50	0.702**
		(0.119)
	Level 51-60	0.702**
		(0.141)
	Level 61-69	0.939**
		(0.150)
	Level 70	0.779**
		(0.146)
	Priest class archetype	-0.0597
		(0.0887)
	Mage class archetype	-0.263**
		(0.0837)
	Scout class archetype	-0.106
		(0.0926)
	Female	-0.0138
		(0.0671)
	In a guild	0.607**
		(0.173)
	Guild leader	0.197*
		(0.0928)
	Self-identified role-player	0.0692
		(0.0939)
	Levels above mentee	0.0200**
		(0.00451)
	Constant	0.101
		(0.311)
select	*Higher level than zone*	0.890**
		(0.0822)
	In a guild	0.825**
		(0.114)
	Constant	-0.668**
		(0.106)
atanh(correlation between error terms of both equations)	Constant	0.450
		(0.281)
ln(sigma)	Constant	-0.0874
		(0.0541)
	Observations	1,177

Notes: Standard errors in parentheses. ** p<0.01 and * p<0.05.
LR test of indep. eqns. (rho = 0): chi2(1) = 1.08 Prob > chi2 = 0.2986

Logistic Regression Model Predicting whether a Character Is a Mentor

This logistic model predicts whether a character would be a mentor or not. There is evidence that supports the impact of guilds on fostering community. Guild membership significantly increases the likelihood of a character becoming a mentor - which supports *H5*. However, being a guild leader does not seem to affect the likelihood of being a mentor, and this provides evidence against *H7*.

In addition, being in a higher level tier (i.e. having a higher-level character) makes characters more likely to be a mentor (*H1*). This may be simply due to the fact that higher-level players have spent more time in the game overall, so they had more opportunities on the whole to mentor others and potentially pick up at least one mentee. Conversely, lower-level characters are less likely to be a mentor.

The correlation between character class archetype and the likelihood of being a mentor is unclear though - which provides evidence against *H3*. Although scout classes seem to be the least likely class archetype to become a mentor (as hypothesized), the effect of class archetype on becoming a mentor does not seem to be clearly delineated.

Also, being a self-identified role-player is positively associated with the probability of being a mentor. This is an unexpected yet interesting finding, as I had not expected self-identified role-playing status to significantly affect a character's likelihood to become a mentor. However, this result seems to make sense; role-players tend to be very friendly, collaborative, and talkative.

Interestingly, female characters are somewhat more likely to be a mentor than male characters are (at an alpha level of 10% not shown in Table 3). Since character gender and player gender are highly correlated - with one survey study finding that only 15.5% of overall players

(in a sample of 4,920 *EverQuest II* players) selected an opposite-gender avatar (Huh, Williams, & Bainbridge, 2010), we can say that female players are somewhat more likely to be mentors than male players are.

Table 3. Logistic model predicting whether a character would ever mentor another character

VARIABLES	(3) Logistic Regression Odds Ratio
Is a mentor	
Level below 21	0.117**
	(0.0897)
Level 21-30	0.701
	(0.150)
Level 41-50	2.225**
	(0.430)
Level 51-60	7.527**
	(2.269)
Level 61-69	7.324**
	(2.514)
Level 70	2.305**
	(0.536)
Priest class archetype	0.843
	(0.174)
Mage class archetype	0.844
	(0.160)
Scout class archetype	0.657*
	(0.134)
Female	1.308
	(0.199)
In a guild	3.544**
	(0.719)
Guild leader	1.194
	(0.299)
Self-identified role-player	2.896**
	(0.928)
Constant	0.400**
	(0.0931)
Pseudo R^2	0.1891
Observations	1,177

Standard errors in parentheses
** p<0.01 and * p<0.05

Zero-truncated Negative Binomial Regression Model Predicting a Mentor's Mentee Count

Here I tried again to predict a mentor's total mentee count. In contrast to the Heckman model, the zero-truncated negative binomial regression model here only looks at the 794 characters who had a total mentee count (i.e. characters who had ever been mentors).

Level was again a significant predictor for how many mentees a mentor would take on - supporting *H2*. However, this positive trend with level changes direction at the level cap, as level 70 characters are less likely to take on more mentees than level 61 to level 69 characters are. Perhaps having the tenacity to reach the level cap may necessitate prioritization on personal leveling over helping lower-level characters; this remains unclear. Again, the average level difference between a mentor and all her mentees (averaged over number of mentoring instances) is highly predictive of how many mentees a mentor takes on over her course of gameplay. This also hints at a relationship between the potential mentor and mentee's level difference and the incentive to mentor.

Guild members are significantly more likely to take on more mentees (supporting *H6*). Furthermore, guild leaders are also more likely to mentor more people (supporting *H8*). *H4* about the relationship between class archetype and total number of mentees remains unclear, but it seems that mage classes are likely to take on less mentees than fighter-class characters. Self-identifying as a role-playing character did not seem to be important in predicting a mentor's number of mentees.

Table 4. Zero-truncated negative binomial model predicting a character's mentee count

EQUATION	VARIABLES	(4) Zero-Truncated Negative Binomial Regression
Total mentees	*Level below 21*	-17.66
		(3,096)
	Level 21-30	-0.327
		(0.185)
	Level 41-50	0.717**
		(0.122)
	Level 51-60	0.841**
		(0.129)
	Level 61-69	0.944**
		(0.138)
	Level 70	0.866**
		(0.135)
	Priest class archetype	-0.146
		(0.106)
	Mage class archetype	-0.322**
		(0.102)
	Scout class archetype	-0.213
		(0.111)
	Female	-0.0120
		(0.0808)
	In a guild	0.469**
		(0.167)
	Guild leader	0.271*
		(0.108)
	Self-identified role-player	-0.0307
		(0.109)
	Levels above mentee	0.0312**
		(0.00594)
	Constant	0.500**
		(0.194)
ln(alpha)	Constant	-0.115
		(0.0944)
	Pseudo R^2	0.0449
	Observations	794

Standard errors in parentheses
** p<0.01 and * p<0.05

Conclusion

As these results show, participation in organized guilds and character level are highly related to a character's propensity to become a mentor and to take on more mentees. Of note is the significantly positive impact of being in a guild on the likelihood of being a mentor as well as on the total number of mentees a character has. Being a guild leader is positively associated with the total number of mentees a character has, although being a guild leader does not seem to influence likelihood to become a mentor as much as being in a guild does. Not much can be said regarding a character's class archetype on the likelihood of being a mentor or mentoring more people (*H3* and *H4*), as the results are inconclusive.

Practical Applications

Given that membership in guilds is significantly positively associated with the likelihood of becoming a mentor and also mentoring more people overall, leveraging existing social organizations and networks seems to offer great value for designing mentoring programs. Guild leaders in particular were found to take on more mentees than non-guild leaders – which suggests that organizational power and responsibility are positively associated with the total number of apprentices a mentor takes on in the long run.

Also, although level of experience is correlated with likelihood of being a mentor and having more mentees, this does not preclude less-experienced members of a group from mentoring others. This simply suggests that as time passes, people will accumulate more mentees. Therefore, if you feel you have something to offer to a potential mentee, the findings of this study should not discourage you from mentoring.

Limitations

Virtual worlds researchers caution that generalizing conclusions from the analysis of data passively collected in virtual worlds should be approached carefully. Williams (2010) suggested that "mapping" from virtual worlds data to realms present in the real world requires checking to see that "behaviors in one space are consistent with behaviors in another." Williams mentioned two necessary conditions to establish mapping: validity and generalizability.

As I studied mentorship relations in *EverQuest II*, an initial guiding research question to test for validity was: *What is the significance of "mentoring" relationships in EverQuest II, and how does this help our understanding of mentoring relationships in the real world?* To address the issue of generalizability, I took the social architecture of *EverQuest II* into account, as the unique design of each MMORPG affects player behaviors exhibited in the game (Lessig, 1999). The design of the game environment and group structures in the world of MMORPGs (for example, goals/"quests" and mentoring relationships specified by the game) significantly impacts how players interact with each other (Ash, 2010).

However, in this paper, I have not provided sufficient evidence to be able to conclusively map the concept of "mentoring" from the virtual world of *EverQuest II* to the real world. The game has its own set of rules and procedures for mentoring, whereas mentoring is typically more informal in an offline context. For future research, if a link between social interactions within predefined game mechanisms and social interactions within the real world can be made, this could significantly increase the practical implications of this study and its predecessors that also studied the virtual world of online games.

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