Experience Points for Learning: Student Perceptions of Game Mechanics for the Classroom

Joey J. Lee, Sam Ahn, Emma Zhiyu Liao
Teachers College Columbia University, Box 08, 525 W 120 St., New York NY 10027
Email: jl3471@columbia.edu, sja2122@tc.columbia.edu, zl2288@tc.columbia.edu

Abstract: The use of game mechanics to foster engagement in the real-world has been gaining popularity in many fields, including education (Lee & Hammer, 2011). An innovative learning approach was designed for a graduate level course that used some of the most common game features such as experience points, levels, missions, quests, achievement badges, leaderboards, and playable action cards. In this Design-Based Research study, student perceptions of the effects of game mechanics implemented within the classroom on learning and behavior are presented. Implications for educators are also discussed.

Introduction: Game Mechanics for Education

Game mechanics and elements are increasingly being used in the real world to motivate positive behaviors and increase engagement in a relatively new strategy sometimes described as *gamification*, (e.g., Lee & Hammer, 2011), *motivation design*, or *gameful thinking* (McGonigal, 2011). Game-like thinking and techniques can be applied to formal learning contexts (e.g., Sheldon, 2011) as a way to promote higher engagement, self-directed learning, and a mastery orientation. This seems to be a useful strategy to address student issues of passivity, negative attitudes toward school, and high anxiety that stems from a performance orientation (Bridgeland, Dilulio, & Morison, 2006; Ames, 1992).

While there is much enthusiasm about a "gamified" approach to education, very few studies exist that explore the impact and perceptions of game mechanics when applied to the classroom and how to succeed in adopting more game-like pedagogy. In this paper, the impacts of various game mechanics in the classroom are explored. Findings from a formative assessment are presented, including student perceptions of the impact of game mechanics on their learning. Some implications for educators conclude the paper.

Game Mechanics for the Classroom: Methodology

A unique class using game-based mechanics to explore potential impact on learning, perceptions toward classwork, behavior, and motivation was designed for an elective graduate level course on the theory and practice of game design for education, building upon ideas from Sheldon (2011). Twenty graduate students (seven male, thirteen female), of which only five identified themselves as "gamers," enrolled in the course in Fall 2011. In previous years, the course consisted of a traditional syllabus: a student's final grade consisted of completing weekly assignments from reading textbooks, writing papers, and presenting major iterative individual and group design projects.

In the gamified classroom, everyone began the course with zero "experience points" (XP). Students could earn experience points and level up (Figure 1) by crafting (writing papers), battling monsters (in-class assignments and tasks), mission or task (Table 1): *crafting* (papers), *in-class monsters* (in-class assignments), and completing *missions* (required and optional). Once a certain level was reached, students earned the corresponding letter grade. Students were also placed into guilds (groups) of four, which was used for group missions and various activities.

Grade	F	D	D+	C-	C	C+	B-	B	B+	A-	A
Level	1	2	3	4	5	6	7	8	9	10	11
Experience Points (XP)	0-1000	1000-2000	2000-3000	3000-4000	4000-4500	4500-5000	5000-5500	5500-6000	6000-6500	6500-7000	Over 7000

***Figure 1*: Experience Points, Levels and corresponding grades.**

Elements common in popular games were also incorporated into the classroom, including: optional *missions* and *quests*; *collection mechanics* and obtaining virtual currency and other scarce or useful items;

the ability to earn and use *power-ups* (actions) strategically; setting goals and making *meaningful choices*; competing for recognition or top scores on *leaderboards*; and earning and displaying *achievement badges* for accomplishments; team-based collaboration/competition and peer encouragement and support.

Crafting	Battling Monsters	Quests
Avatar assignment – up to 500 XP	In-class Individual Activity – up to 500 XP	Iterative Design Project – up to 2000 XP
Game Play Analysis – up to 500 XP	In-class Group Activity – up to 500 XP	Lightning Design Challenge – up to 1000 XP
Writing Paper – up to 500 XP	Attendance & Participation – up to 500 XP	5 minute optional presentation – up to 500 XP

***Table 1*: Examples of Quests and Experience Points (XP) breakdown.**

A custom-designed course website with social networking features served as both as a course management system (with readings, files, online discussions, etc.) and a central hub to track gameplay (e.g., a space where students could see recent achievements earned, student progress, optional mission opportunities, challenges, etc.). A *leaderboard* that displayed the top ten players (those with the most experience points) was regularly updated on the front page of the website for the first half of the semester and a graph plotting total experience points for all twenty students anonymously was used for the latter half of the semester.

Students earned *achievement badges* for making significant contributions and accomplishments. For example, four students were given a *Star Designer!* badge for earning the top number of class votes during group presentations of a design project. Students were also given *Action Cards*, which served as in-class "power-ups" or items that they could use at any time. Depending on the rules specified on the Action Cards, these could be given to themselves or others. For instance, students were given a small number of *Like!* Cards (Figure 2), designed to promote community building and encouragement among peers within the class. When a student 'liked' another person's work or behavior and believed he or she deserves recognition, the student wrote a rationale on the card and gave it directly to the recipient, who in turn turned this in to the instructor.

***Figure 2*: 'Like!' Action Card.**

Various strategies were used as an attempt to promote a mastery orientation. Rather than emphasizing performance, *making failure acceptable,* was adopted as a game-like principle; students were given the opportunity to redo certain assignments if they were not satisfied with their grade. Similar to Sheldon's techniques (2011), optional missions were created to encourage further study, deeper participation and self-directed learning. Optional missions available included five minute *Powerpoint* presentations on relevant topics aimed to enhance the course; online discussions and challenges on the course website; proposing new missions to be implemented in class, and participation in relevant research projects outside of class.

Data Collection

At the beginning, middle and end of the semester, students were asked their perceptions of using game mechanics in the classroom. Using a *Design-Based Research* approach (DBRC, 2003), a mixed-methods study was conducted. An anonymous survey consisting of 7-point Likert scale items and eleven open-ended questions was given in the eighth week of class; a focus group session was held during the twelfth week, and a open response reflection essay was given the final week of class. Anonymity was preserved for the survey in order to solicit honest responses. Thematic analysis was conducted on the qualitative data. Interactions on the course website were also analyzed. Several themes emerged, as will be discussed below.

Results

Theme #1: Game Mechanics Perceived as Beneficial for Learning

At first, nearly all twenty students were excited about the idea of using game mechanics for the classroom, as many students used words like “interesting,” “refreshing” and “exciting” to describe the class. After eight weeks in the gamified classroom, students were surveyed on their perceptions of all the game mechanics being used.

All twenty students indicated in their mid-semester survey responses that adding game mechanics to the classroom was beneficial for their learning. Some students reported that the use of game mechanics had a major impact on one’s mindset and behavior, especially compared to traditional courses. For example, one student reported that the classroom culture encouraged learning beyond the minimum requirements set by the teacher and to take risks:

> "Traditional grading systems have become quite stale for me. I tend to do just enough to obtain the automatic 'A' we all start with and that's it. With this class, I constantly find myself searching for ways to learn and earn experience points (XP's)...I find it a refreshing departure from what I've done in school prior to this, which honestly hasn't always been that challenging or rewarded extra effort, creativity or risk." (Leslie).

Several other responses were similar, citing greater motivation to do work or to cultivate a creative, playful mindset toward learning. Responses included the following:

> “The use of game elements is quite motivating.”; “I am starting to see how it can DEFINITELY be of use in a classroom setting.” (*emphasis in original*); “It definitely motivates me...also keeps me engaged.”; “Visualizing the course as a game itself is inherently something that appeals to me, especially as a gamer.”; “It is a lot more motivating than other courses. It makes you really strive to do the little stuff. In other courses you only try to do really well on large assignments..the [game] elements make the classroom dynamic.”

> “It seemed like an approach to coursework that I hadn’t encountered before, and I was really interested to see how it would play out.”; “I’ve never seen it in action. The premise behind it is amazing.”; “My experience in class was very positive and stimulating. The gamification of the classroom, in all its aspects, was totally new to me, and extremely refreshing.”

Perceptions of individual game features and their effectiveness for learning were explored using a seven-point Likert scale. The results are shown in *Table 2* below.

Game Mechanics and Elements	Very bad for learning	Bad for learning	A little bad for learning	Neutral	A little good for learning	Good for learning	Very good for learning	N	Mean	*SD*
Achievement badges	0	0	0	3	7	6	4	20	5.55	1.00
Action cards (e.g. "Like!")	0	0	1	3	5	4	7	20	5.65	1.27
Experience Points grading	0	0	1	3	4	5	7	20	5.70	1.26
Leaderboards	0	1	4	6	2	6	1	20	4.55	1.39
Making failure more acceptable	0	0	0	1	1	2	16	20	6.65	0.81
Optional Missions (e.g. presentations)	0	0	0	0	2	7	11	20	6.45	0.69
Optional Posts on Website	0	0	0	0	3	7	10	20	6.35	0.75
Propose your own missions	0	1	0	0	0	10	9	20	6.25	1.12
Scarce resources (e.g. obtaining cards)	0	0	1	5	7	3	4	20	5.20	1.20
Guild (team) based competition	0	0	1	2	3	6	8	20	5.90	1.21

***Table 2*: Perceptions of game mechanics in the classroom.**

In general, game features were largely seen as good for learning, with *making failure acceptable* (*M* = 6.65*, SD* = 0.81), o*ptional missions (M* = 6.45*, SD* = 0.69*)*, *proposing your own missions (M* = 6.25*, SD* = 1.12*)*, and *guild-based competition (M* = 5.90*, SD* = 1.21) viewed most favorably.

Theme #2: Leaderboard polarizing: viewed as positive for some, negative for others

The game mechanic that received the lowest average rating (*M* = 4.55*, SD* = 1.39*)* was the use of leaderboards, a popular element in many social games to foster competition by showing the current top scorers in a game. Initially, the course website had listed the top ten scorers (those with the most experience points) and their corresponding level. Interestingly, its presence was highly motivating for those who were on it, yet highly demoralizing for those who were not. Students on the leaderboard expressed that being on the leaderboard encouraged them to work harder to maintain this status:

> "It is [important]. However, when I wasn't on it, I didn't feel as motivated by it. Now that I am, I want to stay there."
>
> "Yeah I like to keep myself in the top tier. It keeps me track and no other class does it. It makes me work harder."
>
> "I find it is making me try a bit harder to stay 'on top' to be truthful. I wish more classes used this method."

However, those who were not on the leaderboard expressed negativity toward it, in some cases describing a sense of discouragement or a desire to give up:

> "When I was not on the leaderboard I was tempted to give up and not even try to make it back on!"
>
> "It makes me feel inadequate. I feel that I am putting in much effort...[yet] I am lagging so far behind. … It is discouraging. It makes me want to give up rather than work harder, though I'm trying to fight that feeling."
>
> "I think making it so explicit how each member of the class is doing relative to each other is generally counterproductive. We want people to learn because they want to master something or get better at it, not so they can feel superior to their classmates."

Theme #3: Action Cards promote peer encouragement and collaboration

Action Cards, including *Like!, Creativity, and Challenge* cards, were perceived to be an excellent way to provide encouragement and recognition to others and to encourage desired interactions and behaviors: e.g., prosocial helping behaviors, higher quality work, creative ideas and contributions, etc. In total, students handed out over 57 Action Cards to peers. When asked about the value of *Action Cards* as a limited resource that could be given from student to student, nearly all students praised them highly and discussed their beneficial effects:

> "[The Like! card] encourages intrinsic motivation. [It] encourages peers to validate each other...Not only one individual's opinion matters; students, not only teachers, can also contribute to others' grades...I love the Like card. I like that our XP success can be a collaborative effort, and we can do something to help propel our fellow students up that XP ladder. And ultimately, I think acknowledging others' achievements has an even bigger payoff than the more tangible XP."
>
> "[Action cards are a] great way to encourage participation and classroom community! I enjoy complimenting others, so this is a fun way to do that! Also, encourages class participants to be more thoughtful in their work and responses, [leading to] better quality overall!"
>
> "I like it because it helps give me a reason to talk to others. I am shy."
>
> "I do like the 'Like!' card. I received one and it made me feel like I was a part of something and that I had the respect of my course mates."

Theme #4: Autonomy and students taking greater ownership over their learning
The game principle of *making failure acceptable*, including the opportunity to redo and improve assignments upon receiving feedback, was viewed as valuable for learning and developing skills. Five students (of the eight students who scored the equivalent of 80 percent or lower on a major individual assignment) took advantage of this opportunity, resubmitting improved versions of their papers.

When students were given the opportunity to make meaningful choices and explore relevant topics more deeply on their own, students enjoyed and took advantage of this. Optional missions such as five-minute presentations on any relevant topic of their choice (pending instructor approval) were completed by fourteen students, resulting in a wide variety of high quality presentations including research findings on games and literacy, a survey of teachers' uses of games in the classroom, and even a performance of an original song about the challenges of game design.

Throughout the semester, students were given the opportunity to think metacognitively about their learning processes; students were allowed to propose mission ideas and other game elements to be implemented for the class. Providing students with optional ways to proceed in the course—and thereby greater ownership over their learning—was perceived to be valuable:

> "The optional missions and chances to advance are nice...It is motivating. It...doesn't put a cap on things. There are always optional extra credit quests...I absolutely love the ability to do optional quests to gain extra XP."

> "I like the variety of optional ways that students can further contribute to the learning community, and I think that would be especially useful in all of my classes."

> "The course...[tries] to provide many variations to students for getting grades, not just focusing on fixed assignments that were stated on the syllabus."

Theme #5: Students Still Viewed Gamified Classroom Through a Traditional Lens
Despite efforts to promote a mastery orientation and remove the focus on grades as a performance indicator, about a third of the students eventually translated the game format into a traditional classroom mentality. For instance, a few students explained:

> "Whether you start from 100 or you start from 0, experience points are still grades. People still concern themselves with grades rather than actually doing quests. The point of a quest within a game, is it doesn't matter if you pass it with 1 hp or full hp, you still complete it."

> "The leaderboard and XP were sticking points for me. I saw that it made some of my classmates stressed out, because it put more of a focus on grades for them, and others became downright aggressive, wanting to win. Both of those reactions turned me off, and I think they were a direct reaction to the point-based structure of the class."

Discussion
Students largely felt that the entire experience of a gamified classroom was interesting and innovative. Importantly, several optional missions were completed due to enjoyment of the course and class material even though many of the students had already accumulated more well over 8,000 experience points (well beyond the highest possible level and an A+ grade). Twelve students (60%) also got involved in related activities beyond the class, participating in weekly research meetings to further explore the concepts learned in class.

At its best, gamification has much upside and potential in classrooms, especially in terms of making learning more enjoyable, more self-directed and generating autonomy and collaboration. However, if not designed carefully, side effects and detrimental consequences may occur. Foremost, those designing an in-class gamification experience should promote a mastery orientation and a sense of autonomy before distributing experience points or achievement badges. Optional missions and making failure acceptable were perceived to be valuable and useful for accomplishing this goal. At the end of the semester, students indicated that they wanted more choices and a wider range of missions at the outset to provide greater autonomy.

On the other hand, some game mechanics did not really work. Some students felt that the game layer was simply covering up a traditional classroom experience. Gamification cannot feel manipulative or a superficial covering for traditional school, or else students will lose motivation to learn for the sake of

learning. In addition, game mechanics that led to greater competition, exacerbated by a leaderboard, was not beneficial, as some students expressed increased anxiety and those who fell behind felt a sense of despair. However, students believed a leaderboard could still be beneficial as an opt-in feature, or as a way to display progress on other metrics besides relative classroom performance, such as recent personal improvement, achievement badges or collaborative accomplishments (e.g. most Like! cards for prosocial behavior). The ability to set goals at the beginning of the semester and to see how well one is reaching those goals may be a valuable feedback to provide a self-directed learner. One student proposed the idea of providing “tracks” and "quests" to organize and structure missions, putting them in the context of working towards some larger goal, like becoming an expert on some facet of the subject matter being taught. Class readings could provide general knowledge of the subject and missions could be utilizing that information to explore deeply into some personal interest. One student proposed the idea of unlocking privileges (e.g. the ability to design a new assignment or the opportunity to mentor other students) and new available content, which would add to a mastery orientation. These new ideas and modifications warrant future study to determine their effectiveness in getting students more engaged with intrinsically motivating learning tasks.

There are a number of limitations to this study. Although only small portion of the students identified themselves as gamers (25%), the class was a graduate level game design course, possibly leading to more innovative, game-like approaches to learning by the enrolled students. Students were already motivated as graduate students; further study is needed to see how game mechanics would fare in other courses with different demographics (e.g. urban youth). Another limitation of the study is due to its nature as design research: the generalizability of the findings is limited because of ongoing adjustments made to the design, complexity involved in implementation and confounds in identifying contributors to success.

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Crap Detection and Information Literacy in the Online Affinity Space of World of Warcraft

Crystle Martin, University of Wisconsin-Madison, crystle.martin@gmail.com

Abstract: Information is ubiquitous in today's digital world, and the creation and application of a personal "crap detector" (Hemingway in Manning, 1965; Rheingold, 2011) is imperative to be effective in the information universe. The knowledge communities for online video games offer a place for studying informal and interest-driven learning, as well as the development and use of crap detectors. This study explores the information literacy practices that take place in the c*onstellation of information*, which is the in-game and out-of-game information resources, of the massively multiplayer online (MMO) game *World of Warcraft* (*WoW*). The study builds a picture of the information literacy practices from the individual to the community and offers a new perspective on how information literacy can be employed to create a better-educated populace.

Introduction

There is a vast and ever growing web of information available to people with unfettered Internet access. The types of information available are almost innumerable from the local to the global, from the simple to the complex, and everything in between. The information available requires vetting and evaluating to determine validity and applicability for a given situation, this process has been labeled information literacy by some and crap detection by others. Historically, information very often seemed like isolated and static bits found in news paper or journal articles, but today the Internet allows information to be seen and experienced in its connected state. Collaborative and collective activities in interest-driven environments, like those surrounding an online game, are commonplace (Black, 2008; Steinkuehler & Duncan, 2009; Williams, 2006) and present information in a way that shows its connectedness and mutability. The interest-driven nature of these spaces allows for the study of authentic activities that are undertaken by participants within the space as need arises rather than imposed from the outside. Many of the activities engaged in are problems that need to be solved by finding information, which requires information literacy abilities (AASL, 1998; ACRL, 2000; Bundy, 2001). Previous definitions of information literacy focus on traditional forms and settings, like finding information in library resources. They do not take into consideration that information literacy in collaborative spaces does not look like an individual journey undertaken taken by one person but instead uses the collaborative interaction and collective intelligence of a group (Martin & Steinkuehler, 2010). For this paper information literacy is defined as "the intellectual process of recognizing the need for information to solve a problem or issue regardless of setting while working through a process that provides information which fulfils the given need to the satisfaction of the seeker" (Martin, in progress). This definition is flexible enough to apply to many situations involving the application of information literacy practices.

The participants in MMOs and other online interest-driven knowledge communities create a vast amount of resources pertaining to their activity or interest. The conglomeration of resources for one of these spaces, in *WoW*'s case all the in-game and out-of-game resources and methods of communication, which I have termed the constellation of information (Martin, 2011), building on Steinkuehler's (2007) constellation of literacies. Through this study I will explore and describe information literacy in the collaborative online spaces of *WoW*'s constellation of information by examining the research question: What are the forms of information literacy practices engaged by participants in by an online affinity space? Specifically:

SubRQ 1. How do players indentify themselves as situated within the constellation of information available around their affinity space?
SubRQ 2. How do the forms of information literacy found in *WoW* and its resources compare to previous information literacy research?
SubRQ 3. How are information literacy practices used by the community to manage major changes in information?
SubRQ 4. How accurate is the community when using collective intelligence to answer information literacy questions?

Methods

This mixed methods study consists of several data collection and analysis methods; all data is related to *WOW* and comes from in-game, out-of-game, and player sources laid out in Table 1. The data collection sources and methods include information horizon maps, structured interviews, chat logs collected through the GLS Casual Learning Lab, and forum posts collected just before the release of the game expansion pack called *Cataclysm*.

Research Question	Data	Analytic Metric
SubRQ 1 Players perception of information literacy in context	Information Horizon Maps & Structured Interviews	Analysis of Maps and structured interviews, using method based on Sonnenwald (1999)
SubRQ2 Comparison of information literacy practices to previous research	Chatlogs coded with an earlier scheme (Martin & Steinkuehler, 2010)	Data will be coded with analytical framework detailed in the analysis section below
SubRQ 3 Information literacy practices during major information change	Forum posts from just before Cataclysm release	Coded using analytic framework
SubRQ 4 Degree of accuracy of information when using collective intelligence of community	Chatlog and forum posts	Compare to Wikis to check degree of accuracy information given in real time

Table 1: **Alignment of Research Questions, Data, and Analytic Metric**

Information horizon maps are a visualization of a player's conception of how they are connected to the information resources in the constellation of information of their game. The participant is asked to draw a map or picture of how they are connected with resources that they use for information within the constellation of information, which can include wikis, forums, websites, people, etc. The participant is then asked to describe the information horizon map including what order or in what situations they would use each source. Figure 1 is an example of an information horizon map from a participant in the study.

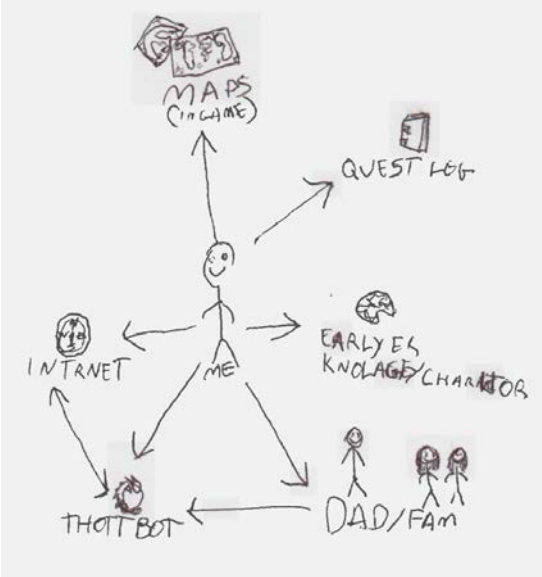

Figure 1**: Information Horizon Map for John, who is 14.**

The chatlogs were collected from *WoW* using the text command "/chatlog" will record chat on all channels to which the players have access. These chat logs were collected during lifeguarding

sessions over eight months of data collection in an afterschool lab of adolescent males (Steinkuehler & King, 2009). All chat channels from these chat logs will be considered in analysis because all parties agreed to be recorded or the chat is from public channels. The reason for inclusion of these previously collected chat logs is because they have been coded for information literacy practices previously and analyzed in Martin and Steinkuehler (2010) to create a framework for information literacy. The inclusion of this data will allow for comparative analysis, which will be described in the next section.

Forum posts have been collected for this study, as well. The *WoW* forum of Reddit, located at http://www.reddit.com/r/WoW/, was chosen for the data collection because the posts are voted on by those who participate and therefore questions chosen as worthwhile by the participants in the community come to the top of the list. It attracts a wide range of participants in both experience and skill. The forum posts were collected over a period of two weeks using purposive sampling. The range of time coincided with the period just before the release of the *WoW* expansion pack *Cataclysm*. This time period was chosen because the affinity space's participant created information resources were on the verge of becoming obsolete due to the upcoming major changes to the game. During this time period the participants were in the process of triaging what was going to change and how. Capturing this data gives a perspective on what the rebuilding process of information resources for an established community looks like.

Data Analysis and Findings

The overall analytic framework for this study is being referred to as analytic description. Analytic description[1] is a mixed methods analysis that illustrates transforming qualitative data into numbers and coupling that with qualitative description. The transformation of qualitative data into numeric form has been referred to by Chi (1997) as quantifying qualitative analysis. Analytic description is a quantifying of qualitative data; the processes use methods like counting codes to create numeric values, which can be used to create percentages or graphs and charts. The numbers are just descriptions of the qualitative data used to represent the data in a more understandable way, and are usually used to give a more broad scale view of the qualitative data set. For some parts of this study analysis is ongoing, in those situations initial findings are presented.

Information Horizon Maps

Analysis of information horizon maps was carried out to look for patterns across participants maps. Of course, each information horizon map was unique. Each participant located himself, all participants were adolescent males, on the map and then drew the information horizon around this location, or in any orientation he saw fit. To analyze the maps, a matrix was created (Sonnenwald, 2005). The matrix consisted of the participants functioning as the columns and the information resources the participants include in their maps as the rows. The identification and inclusion of all information resources was important for the analysis. Then the matrix was populated by numbers denoting the order in which the participant would use the sources on their individual map. If necessary, categories could be created to handle types of individual resources. For example, a category named forums could be created and include all mentions of forums instead of including the individual forum names.

Resource	Noel	Nick	Neil	Aidan	Brandon	Roger	John	Walton	# Students
Knowledge Compendium	1	2	1	3	1	3	2	1	8
Forums		2				4			2
Corporate Site		2							1
Guild Websites			2						1
General Search		1			2	1	3		4
Speculation Sites	4								1
Guides	2								1
Opinion Sites	3								1
Chat						5			1
In-Person				2		2	1		3
Strategy Guide		4							1
links from preferred sites		3							1
In-game resources				1			4		2
blog								3	1
Youtube								2	1

***Table 2*: Aggregated resources by participant (pseudonyms have been used)**

A master map was constructed from the table. The master map is a conglomeration of the resources and the connections between them, and can be seen in figure 2.

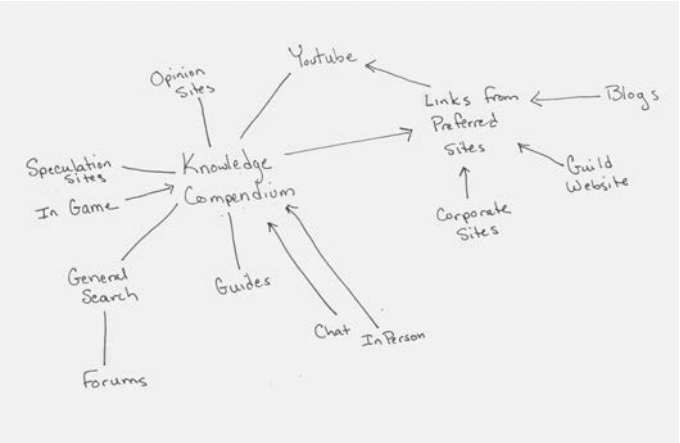

Figure 2: **The master map of the information horizon maps**

The participant is, of course, connected to all of these resources but is not included visually on the map because it creates visual clutter. As can be seen in the master map and the aggregated resources table, knowledge compendiums, like wikis, are the resource that the participants in this group turned to most frequently and were the only group of resources that every single participant drew in their map. As can be seen by table 2 half of the participants listed this as their first information resource consulted. Viewing people as information resources varied from participant to participant, with some considering other people as a source to find needed information. The younger participants were more likely to ask family or friends when they were stuck and needed information, whereas, the older participants varied and usually asked other people only after trying to find the information themselves. Neil, who is an expert player, specifically mentions the fact that he only uses his own guild as a last resort for finding information because he does not like to interact with people directly and prefers asynchronous sources in which he can feel more removed. These variations in asking for information as opposed to finding it oneself show a variations in identity, just as in the example of Neil, he identifies as a very independent player and therefore tries to avoid making his information needs known to others.

Coding

Coding was a major component of the data analysis. Both a priori and emergent coding were undertaken within the data set (Saldana, 2009; Chi, 1997). Turn of talk was the chosen unit of analysis for both the forum and the chatlog data. NVIVO was used as the qualitative analysis software. The coding scheme was developed based on a framework developed from previous research (Author, in progress). This framework was developed through an analysis of existing information literacy definitions, to build a larger model that covered the information literacy process. The non-linear interconnectedness of the framework is based on my past work (Martin & Steinkuehler, 2010) that demonstrated that the process of information literacy varies depending on the situation and a linear model does not address this. This framework produced an a priori coding scheme of ten codes. The codes and their definitions can be seen in table 3.

Code	Definition
Recognize information need	To recognize needed information for a particular problem
Identify information needed	To identity information and resources that are necessary to fulfill the information need
Construct strategy	To construct a strategy in order to locate and access needed information to fulfill the information need
Determine extent of need	To determine the extent of information needed to fulfill the information need
Organize Information	To organize retrieved resources and information for later use
Disseminate information	To disseminate information to others who have an information need or as a way of sharing results of the information literacy process
Construct New Concepts	To apply prior and new information to construct new concepts or understanding
Evaluate information and source	To evaluate information both for its applicability to fulfill the information need and the reliability of the source itself
Access needed information	To access needed information
Use information effectively	To use information effectively to fulfill the information need

Table 3: **A Priori Codes**

This coding scheme is being used to code chat logs gathered in the afterschool lab. The reason for applying this coding scheme is to allow for cross comparison between two information literacy frameworks. The data was originally coded using a framework based on the Catts & Lau (2008) definition of information literacy used by Martin & Steinkuehler (2010) in their article *Collective information literacy in massively multiplayer online games.* The coding scheme applied by Martin & Steinkuehler can be seen in table 4. The purpose in recoding this data is to allow for a comparative analysis between the two sets of codes. Intercoder reliability is at 99% for 10% of the total data corpus. So far in this analysis disseminate information and recognize information need are highly used codes, just as seeking information and disseminating information were in the Martin and Steinkuehler study.

Hatha: What exactly are the daily quests? –Recognize Information Need
Deathndoum: quests u do evrey day at lvl 70 for gold – Disseminate Information
Hatha: Mkay.
Hatha: Just gold? –Recognize Information Need
Deathndoum: mhm – Disseminate Information
Hatha: Nice

A new code, casual information, was also necessary as coding has progressed. This code captures interactions of being players that do not require in depth information seeking and problem solving. Moments like asking another player what are they doing that night in the game, or asking another player about day to day out of game things (e.g., is it snowing where you live?). Although these are questions and they do require information to answer them they do not have the substance of an actual information need. So far the 'code organize' information has not been coded at all, which was expected and the code will be removed from future iterations of the coding scheme if this remains true.

Code	Definition
Seeking Info	To locate relevant information for the task at hand.
Evaluating Info	To evaluate the reliability and credibility of different information resources.
Interpreting Info	To identify significant information from less significant information, determine or infer its meaning, and draw appropriate and meaningful conclusions from it.
Synthesizing Info	To combine information from multiple resources into a coherent whole.
Disseminating Info	To seek out and use appropriate distribution channels for one's own info production.

Table 4: **Coding scheme from Martin & Steinkuehler (2010)**

The collected forum posts are another part of the data that is being coded with the analytic framework discussed above. Emergent coding is utilized here because of the context in which the forum posts were captured. So far in the analysis of the forum posts disseminate information and recognize information need are both prominent codes. However, evaluate information and source is also a very frequent code, in the context of forum posts this manifests itself through those participating in the discussion evaluating the information provided by previous participants. In this data set the emergent code, unrequested information, has been employed to track situations where information that is outside the scope of the question is named as such by others in the conversation. An example of this would be a person asking a question as to whether Affliction or Destruction is the best spec for a Warlock. The question garnered a variety of answers, which are coded for Disseminate Information, including this one:

> For leveling, go with affliction to start with; once you hit thirty and can dual spec, you can pick up destro. I went with demon for the off-spec, because I found the utility of being able to easily solo elites with metamorphosis useful while leveling through BC (the 10% spellpower buff was also nice.) You've mentioned that you'd prefer not to go that route, but you should do well as afflic/destro. Just use afflic to quest and go destro to wreck elites in instances.

However with the helpful answers there were also people who kept suggesting Demonology despite the fact that the person asking the question said that he was not interested in Demonology. This was unwanted information and the person who had originally asked the question repeatedly said to those offering Demonology as the best option that he was not interested in this path. However, after one person gave a very detailed and specific reason why they preferred Demonology the person who posed the question showed interest and asked for further explanation. The asynchronous nature of forums offers a different communication pattern than that of synchronous in-game chat.

Collective Intelligence Analysis

Analysis of the effectiveness of collective intelligence was conducted on the forum posts. The forum threads were coded for the type of statement that each post was. The codes include Answer, Incorrect Answer, Acknowledgement, Agreement, Subversive, Superfluous, and Question. In the first 15 forum threads 263 answers were given to 31 different questions, multiple questions were sometimes asked in a single thread. Only four of those answers were incorrect and all were corrected by the community. Answers to questions were the majority of the 394 posts. However, there were 70 posts that were completely superfluous to the conversation. This was vastly more than posts that were intentionally subversive; only two posts were coded as Subversive from the first 15 threads. This means information literacy is being applied at the group level, evaluating each post to determine validity. It also takes information literacy skills at the individual level to determine what information is superfluous or subversive and therefore of no real value. The collective intelligence of the *WoW* community is proving to be accurate and efficient at self-correcting when information is given that is incorrect. This makes the collective intelligence of those interested in *WoW* an accurate and useful resource for others in need of information on the same subject.

Conclusions

Overall this study will develop the analytical framework for information literacy practices in online affinity spaces. Beyond this, this study will help to describe the information literacy practices of the *WoW* community. The analysis demonstrates that players in the *WoW* community use a variety of information literacy practices in order to solve problems and answer questions about their game play. The level of complexity of the information literacy practices used depends greatly upon context in which the question is asked. If asked in a synchronous format, players are usually looking for information that has come up spur of the moment and can be answered in a succinct way. If asked in an asynchronous format, players have the luxury of asking more in depth questions that require longer answers and that utilize a more complex information literacy practice. The individual player matters as well in how and where they will ask for help. As seen from the information horizon maps, a player's identity influences what they consider to be resources available to them and how they approach those resources. Finally, the collective intelligence of the *WoW* community offers a high degree of accuracy and self-correction making it a reliable source for information. Together these four sub-research questions help to illuminate the forms of information literacy in an online affinity space like *WoW* as well as to fill a gap in information literacy research on what types of practices are engaged in by participants in these online communities. Using this research as a foundation for

change, a process that guides people to become lifelong learners and better informed citizens can be built that takes into account people's natural practices and the work communities like *WoW* already achieve.

This study offers a hitherto unseen look into information literacy practices in a natural and leisure setting. The significance of this work beyond studying information literacy in a new setting is that it is trying to determine the practices that people actual employ related to information literacy. The study offers the chance to work through a framework based on existing literature to determine its applicability, since many of the previous standards and frameworks have been created top down. From this study corrections to the framework will be made, honing the terms based on the practices. The framework as a part of this larger model of information literacy when fully developed will help to predict the information literacy practices of participants in affinity spaces and eventually beyond. The more affinity spaces like the *WoW* community which are studied, the more stable the framework should become, eventually leading to a larger predictive model, in which a change in parameters will result in a predictive change in outcomes. This framework differs from some of the previous models of information literacy moving use of information to the culmination of the process; this presents a chance to see a process ending in information use. A major implication of this study is that it does not present information literacy as a scarcity model. It is based on the assumption that information literacy practices are enacted by people all the time, people with sophisticated information literacy practices can detect crap. As well as the assumption that people can have individualized information literacy practices, a personalized crap detector, that they use to help them successfully fulfill their information needs. This change in perspective is a departure from the idea that everyone needs to be taught to utilize the same strict structure of information literacy. Over time, this research can influence the way information literacy is utilized as a building block of education.

Endnotes

(1) Analytic description is a method of analysis that Constance Steinkuehler uses to describe her analysis method when presenting her work and was suggested to me by her. The term does not appear in any of her publications to date, so this footnote is being used as a method of citation.

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