RE-EXAMINING TEACHER PRESENCE IN ONLINE COMMUNITIES OF INQUIRY: CAN GAMIFIED LEARNING ENVIRONMENTS REPLACE ASPECTS OF TEACHER PRESENCE?

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ABSTRACT

This research has examined the role of teacher presence in online education. The research has been guided by two research questions: 1) are there challenges to consistently establishing teacher presence in online courses?; and 2) can the role of teacher presence be assumed, in part, by the learning medium? The Community of Inquiry framework as outlined by Garrison, Anderson, and Archer (2000) has framed the discussion about the role of teacher presence in online education. Three research projects are presented to explore the research questions. The first study is a case study that examines twelve online instructors' engagement and experience teaching online over a year at the University of Saskatchewan. The next study builds on that study by exploring teacher engagement and satisfaction of 28 online instructors at the University of Regina using survey techniques. Together the studies suggest that teacher engagement in online courses might be affected by the culture of the university. The third study addresses the second question by creating the NECSUS social computing environment, which assumes some functions of teacher presence. The NECSUS system has been tested in a graduate level ethics courses and demonstrates that it has the potential to support a community of inquiry. This is further demonstrated by the presentation of a NECSUS-like system design that could be modified to support a non-formal learning community for a commercial online education course for snowmobile safety. The outcome of this research suggests that the Community of Inquiry framework can inform the design of learning environments and that assume some responsibilities traditionally assumed by the instructor.

ACKNOWLEDGEMENTS

I read online that the acknowledgement section should be used to thank all of the educators that helped you to get to where you are. I also recently heard a story of a professor at my University, whom I respect, that used his Master's Thesis acknowledgement to tell those that called him stupid to go bleep themselves. This approach appealed to me as well. Overall, I would say that the teachers in my life had a net negative impact on my development. Thus, this acknowledgement landed somewhere between the two, but I have taken care to focus on the few positive teachers and make peace with my past.

I do not remember much from grade one, but I do remember loving my teacher. I don't remember her last name, which is odd given that students refer to their teacher's by their last name, but I do remember that her first name was Felicia. The thing that stood out to me about her is that when I, the dyslexic kid with a speech impediment, proudly announced that I want to be a vegetarian when I grow up, she did not laugh at me or make me feel bad. Instead she lent me a book about veterinarians. That meant a lot to me. Unfortunately, I changed schools the next year and didn't see her again.

It wouldn't be until grade six until a met the next teacher I would like to thank, who sadly has past, Ms. Aben. It was a good time for me to meet her. In the interim, I survived a condescending speech therapist, a grade four teacher that made it clear she didn't approve of me being included in the gifted program, and a grade five teacher who made me read a book report I failed aloud in front of the class to teach the other students what not to do. My grades and confidence were slipping. But Ms. Aben looked out for me. She did her best to convince me that I was creative and have the potential to be a great writer. I started to actually enjoy writing. I was even invited to join a writing group the school organized. I started to believe in myself again.

Unfortunately, grade seven was a rough year. I stopped writing. That teacher is now a principal. Grade eight was thankfully indifferent. And in grade nine I met Ms. Warren, who has also sadly past. She was stern, but fair, and very intelligent. She was the first person that took the time to ask me about my difficulties with reading and writing. At the time, I was not officially diagnosed with a learning disability. I later learnt that because my average IQ was high, I did not qualify for assistance in grade school. She gave me extra homework to help me improve my reading and writing. I probably grumbled a little about getting extra work, but I was so grateful that someone cared.

Not many of my high school teachers standout in my mind. I chose to go to a self-directed learning High School. The school allowed me to study on my own and only see teachers when I decide I require their assistance. I enjoyed going to Mr. McDougall for Math help, because he was the only teacher I met that would admit when he didn't know the answer. He demonstrated that it was okay to not know something and that if you sat and worked on the problem, you would eventually find the answer. I probably had the most interaction with Mr. Wozniak, who was my Teacher Advisor (TA). I finished most of my three years of course work in the first two years, so he gave me a lot of freedom around how I spent my time at school. At the beginning and end of each day, all the students with the same TA would gather in a set location for attendance. One day, during this time, I went on a rant about a school policy that I didn't like. To which Mr. Wozniak said something to the effect of "Now is the time to rebel while you are young". That really struck me. Why just complain about something when you can try to take action. As a result, I made an appointment with the Principal to discuss some ideas I

had for the school. That was not very rebellious, mind you, but I think Mr. Wozniak was trying to encourage me to gain the courage to question authority while I was young and the stakes were lower.

I completed my first two years of my undergraduate education at Mount Royal University, then Mount Royal College. Those were some of the happiest times in my life. I feel indebted to the entire institution. The college's focus on small class sizes and quality instruction helped me to thrive in the new academic environment. In particular, I am thankful to my Anthropology professor Fredrick Ulmer. I took an introduction to cultural Anthropology course and was hooked. His classes were hard though. I remember finding it hard to justify changing my major from Psychology to Anthropology because I had an A in Psychology with little effort, but struggled to keep my B in Anthropology. After class one day, I told Fredrick about the past difficulties I have had with reading and writing and asked if I could have any accommodations in his class. He told me that unless I had been formally diagnosed with a learning disability, making accommodations would do more harm than good. He explained that graduate school is very difficult and competitive and that if I didn't learn how to cope with the pressure now, I would have a lot of difficulty later. I really appreciated this advice. I took it as a challenge and registered for as many Anthropology courses the following semester as I could. I studied constantly. I would lock myself in my room and describe difficult concepts aloud, which was easier for me, while recording myself and then I would write out my recordings and refine how to explain them in writing. It was a lot of work, but I started to improve my grades and proved to myself that graduate school might be a possibility.

The next two years of my undergraduate at the University of Lethbridge, were more difficult. I failed my writing for university exam, which was the impetus I required to get tested and confirm that I did in fact have a learning disability. Ironically, this new status that I thought would help me greatly hindered me. I wanted to finish a combined degree, but some of the professors of one of the Departments did not appreciate the unique way I learned and viewed the world. They ganged up and threatened to fail me if I did not voluntarily withdraw from the program. They even cited my learning disability as a reason that I should not be allowed in the program. They barred my student representative from the meeting, so I had no formal recourse. I did, however, have many great Anthropology instructors during this time, and a Philosophy Professor that made a lasting impression. But this was a dark time in my life that I would rather not reflect upon.

As I will note in my dissertation, I had little contact with my professors while completing my M. A. But that does not mean that there were no professors that influenced me. Of course, my Master's project supervisor Dr. Ellerman has been very influential on how I understand technology. It was through working with her that I came to understand that the future of technology probably lays in the past. Dr. Micheelsen was also very important to me as she helped me to realize that I did belong in graduate studies. There was also another instructor that I enjoyed working with, and helped me enjoy writing again, but unfortunately cannot remember her name.

And finally, my Ph.D. program. Of course I need to thank Rick and Gord for guiding me and putting up with me. Many of the things that you learn completing a Ph.D. are experiential lessons that you have to embody to fully learn the lesson. Thus, much of what they taught me seemed to me, at the time, to be frustratingly indirect, but I got there in the end. Both I and my research are stronger from their guidance and wisdom. I would also like to thank my committee

for their support. They achieved an excellent balance where they managed to inspire and support my research, yet challenge me to do better.

I think that my acknowledgements section is only really supposed to acknowledge the support I had during my Ph.D. program, but I thought a larger scope was more appropriate. I have wanted a Ph.D. since I first heard about the concept when I was around seven. It wouldn't be until I went to College that I would even meet someone with a Ph.D., but nonetheless, all my academic decisions were guided by this goal. I also thought it would be a good idea to look back so that I could acknowledge how hard I have worked to get here to allow me to fulfil that promise to seven year old Jen.

This has been a long road for me and I have almost gave up or failed many times along the way. Thus, my last acknowledgement has to be to my mom. In each of the darkest moments she was there to pick me up and help me to continue.

I cannot possibly acknowledge everyone that has helped me to get to where I am, and I cannot possibly thank those I mentioned enough, but this is a start.

Dedication

To Steven Froese and Kristen Heembrock who helped me stay sane and grounded throughout this process.

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1 INTRODUCTION

The impetus for my thesis was to improve the student experience of post-secondary online education. Initially, the desire to investigate online education was motivated from my personal experience feeling frustrated with distance education while completing my Master of Arts online. Since that time, I have found my experiences were common; other online students faced similar barriers to their online education. Since the early days of online education, students have struggled with the lack of physical presence of their instructors (Hara, 2000). Students cannot see instructors and cannot receive valuable nonverbal feedback from their instructors while participating in online discussion, which can lead to confusion and anxiety (Hara, 2000). This issue has been addressed with research on the importance of the social presence of instructors (e.g. Gunawardena & Zittle, 1997; Garrison, Anderson, & Archer, 2000; Mandernach, Gonzales, & Garrett, 2006). Yet the quality of online education continues to vary (e.g., Allen & Seaman, 2011; Bernard, et al., 2004). Despite growing research into the best practices for online educational environments, there does not seem to be a consistent execution of pedagogical practices. Instructors face barriers instructing online that can hinder their ability to establish their presence (e.g., Hogan & McKnight, 2007; Hislop & Ellis 2004). Therefore, the goal of this research is to understand the barriers instructors face and how to design learning environments to mitigate the barriers.

1.1 Online Education in Context

Currently across the world, eight countries have been identified by ICEF Monitor as leading the way in post-secondary online education in terms of enrollment and innovation: the United States, the United Kingdom, Australia, India, China, South Africa, South Korea, and Malaysia. The United States are the leaders in the number of students attending online courses (ICEF Monitor, 2012). In 2010, 65% of American post-secondary institutions reported online learning was part of their long-term strategic plans. Over 6.1 million university students, or 31% of all university students, take at least one course online and these numbers continue to grow (Allen & Seaman, 2011). Growth in online education is common to all eight countries. The United Kingdom has recently become interested in expanding their online education programs and in 2011 invested £100 million in online education (ICEF Monitor, 2012). However, as of now, only about 200,000 UK students attend Open University, which is the largest online institution in the UK

(The Open University, 2015). Similarly, Australia's online market is growing, 20% between 2007-2012 (ICEF Monitor, 2012), but fairly modest with only 81,900 students as of 2010 (Australian Bureau of Statistics, 2012). The number of online students in the UK and Australia are nowhere near the large number of students in other countries, but the numbers of students are predicted to rise dramatically (ICEF Monitor, 2012).

In India, distance education became an important educational goal in the 1980s as the growing middle class sought out educational opportunities at a rate that exceeded the government's ability to set up new Universities and Colleges. Distance education was incorporated into existing institutions as a quick way to economically expand their enrollment (Agarwal, 2007). Nowadays, India also has institutions that just offer online courses, such as Ignou the People's University[1]. Today, distance education courses are often the main source of revenue for public universities and colleges in India (Agarwal, 2007), and is expected to generate one billion US dollars in revenue by 2020 (ICEF Monitor, 2012). Similarly, China has been showing steady growth in the number of online students in response to the increasing demand for skilled labour (ICEF Monitor, 2012). The National Bureau of Statistics of China reported an enrolment of 6,146,406 students in web-based undergraduate courses in 2013 (National Bureau of Statistics of China, 2014). South Africa has also turned to online education to meet their labour demand and have developed online educational offerings like GetSmarter (ICEF Monitor, 2012), which offer commerce-based short online Postgraduate Diploma courses (GetSmarter, 2015a). GetSmarter is off to a good start accepting 267 students their first semester, only 4 of whom dropped out, and receiving 197 applications in one month for their next offering (GetSmarter, 2015b).

South Korea is developing online programs for South Koreans and international students (ICEF Monitor, 2012). The South Korean Ministry of Education ensures that the national curriculum (on- and offline) remains relevant and linked to the current job market by reforming education every five years (Severin & Capota, 2011). In 2006, the teacher education program was revised to require all teachers to have training on information communication technologies. Further, South Korea is the first country to incorporate digital textbooks into their curricula, which allows the textbook to be interactive and be customized to each student's characteristics and level (Severin & Capota, 2011). Malaysia, like South Korea, also has a strong international

[1] University Website: http://www.ignou.ac.in/

online presence. Asian e University, based in Kuala Lumpur, offers education to those with internet access, but no local University across thirty-one Asian countries (ICEF Monitor, 2012).

In Canada, with its widely distributed population, the quality of distance education is an important topic. Canada now has six academic post-secondary institutions that focus on online and distance learning: Royal Roads University, Thompson Rivers University, Athabasca University, Memorial University, TÉLUQ, and Centre collegial de formation à distance. By 2012, about 950,000 students were studying purely online in Canada, about 100,000 of whom were full-time students (Contact North, 2012a). It is therefore not surprising that Canada has a rich history of developing online learning technologies. The predecessor to modern day Learning Management Systems (LMS), FirstClass, was developed in Toronto in 1990. The First widely adopted LMS (WebCT) was developed in 1995 at the University of British Columbia. Blackboard later acquired WebCT and Elluminate, a Calgary based company. Recently, the Canadian LMS Desire2Learn, from Kitchener, has been growing in popularity (Contact North, 2012a). Despite this rich history, Canada has lost its lead in e-learning (Canadian Virtual University, 2012). One possible cause for this might be that there is no national online directive in Canada. Education is divided into provincial and territorial jurisdictions, which hinders resource sharing across provinces. However, this is still speculation because there is little data about online education across Canada (Canadian Virtual University, 2012).

In the early days of online education in Canada, the quality of online courses could vary greatly (Contact North, 2012a). The growth in distance learning technologies and the demand for online education opportunities from students, companies, and educators outpaced the education providers' ability to respond to the rapid change (Bates, 2001). Initially, local faculty, who may have had the support of an instructional designer, developed the courses and quality was evaluated through internal reviews (Contact North, 2012a). Today, Canadian online programs all follow best practice guidelines, which ensure high standards across the country (Contact North, 2012a). New post-secondary courses are heavily peer-reviewed and must follow the guidelines set by Quality Assurance bodies (Canadian Virtual University, 2012). In the United States, online courses are equal on average, but not better than, face-to-face courses; however, there is not enough data to know if that is also true in Canada (Canadian Virtual University, 2012).

As of January 2012, almost every Canadian post-secondary institution has deployed a learning management system, with the exception of a few small public institutions (Contact North, 2012b). Most institutions use one learning management system for the entire university, but five institutions in Canada use more than one. In each of those five instances, one of the learning management systems used was Moodle (Contact North, 2012b). Moodle has been popular in Canada with 40% of Canadian Universities adopting the platform by 2010, which is a higher rate than in the United States. The next highest ranked platform in 2010 was Blackboard, who had 19% of the market, with an additional 15% via WebCT (Contact North, 2012b), which was supported until 2011 (LISTedTECH, 2015). Desire2Learn had 14% of the market share, followed by Sakai with 6%. Angel, Instructure, First Class, and in-house systems accounted for the remainder of the market (Contact North, 2012b). Due to the dominance of traditional forum based learning management systems at Canadian post-secondary institutions, this thesis will restrict the discussion of online education to these types of environments.

1.2 The Instructor's Role in Online Education

An important development in online education has been the Community of Inquiry[2] framework. The Community of Inquiry framework emphasizes creating online courses that promote higher-order thinking, collaboration, and reflection (Garrison, Anderson, & Archer, 2001). Strong indicators of a Community of Inquiry in a course predict lower attrition in online courses (Boston, et al., 2014). This is an important finding because one key challenge to online education has been the high attrition of online students compared to face-to-face traditional students. A study by Patterson and McFadden (2009) found that online courses had as much as seven times higher attrition compared to traditional face-to-face courses.

A key element in building a successful Community of Inquiry in online learning environments is teacher presence (Garrison, Anderson, & Archer, 2000). Teacher presence is refers to the active involvement of the instructor. It differs from the student's presence because they are expected to complete different functions. First, the instructor, through their active presence, should work to design the learning environment. This task includes: presenting

[2] Community of Inquiry will be capitalized when specifically referring to the framework developed by Garrison, Anderson, & Archer, 2001 for online education. References to the general concept that is not specific to the online context will appear lowercase.

information, establishing connections between what the students are learning and the learning objectives of the course, and other activities that scaffold the learning environment. The second function of teacher presence is to facilitate the social and cognitive presence of the students. This would include things such as encouraging students to post to the discussion forums, asking Socratic questions to probe the students' learning, and moderate the discussion to ensure that students are on task. Although this function does not necessarily have to be performed by the instructor, for instance other students could act in this role, in typical formal education settings, these functions are the responsibility of the instructor (Garrison, Anderson, & Archer, 2000). Therefore, we can see how the instructor acts as a mediator who facilitates social learning among the students and acts as a content expert who translates that knowledge in a way that resonates with the experiences of the students (Lipman, 2003). In this way, instructors not only help to establish social presence among the students, but they are also active in helping the students engage cognitively (Shea, et al., 2010). This role of the instructor is important because it is hard to form and sustain a community within a temporally bound course. Informal learning communities have a core group of members that sustain the life of the forum by welcoming newcomers and establishing a social coherence despite the varying level of participation of periphery members (Fayard & DeSanctis, 2005). In a Community of Inquiry, instructors take over that role by maintaining and nurturing discussion.

Given the necessity of teacher presence in online education, it is particularly important to understand what factors impair an instructor's ability to teach online. Teaching online is not parallel to teaching face-to-face, so experience teaching or learning face-to-face does not prepare an instructor to teach online. One such difference is the change in workflow. Although all teaching requires preparation, online education has traditionally required more preparation than face-to-face courses. Before the students see the course content, the instructor must develop all of the course materials, create focused discussion questions for each unit, create expectations for student performance, and have a plan to communicate all of this to the students (Dykman & Davis, 2008). For a traditional lecture course, an instructor can rely on subject matter expertise and older lectures. Preparation is still needed, but it primarily consists of refreshing slides/notes before each lecture as the class progresses (Dykman & Davis, 2008). Whereas, online instructors must review all the content in detail to ensure all links work correctly and contact all students to help students unfamiliar with the technology to access the course. A study by

Cavanaugh (2005) found that it takes 35 hours (28 hours updating course content and 7 hours assisting students) to prepare for an online course taught before, compared to 3 hours for the same course taught face-to-face by the same instructor.

The approach to online education when one instructor is charged with developing, constructing, and facilitating an online course is called the "Lone Ranger" approach. The Lone Ranger approach requires a lot of work and the courses vary in quality (Bates, 2004). In response, a "boutique" approach to online education was adopted, where trained instructional designers worked with instructors to support them with the development, construction, and facilitation of the course. Unfortunately, this approach is unsustainable because it does not scale well. Increases in help requests are difficult to prioritize and the level of support from instructional designers is difficult to cap (Bates, 2004).

Once a course is running, online instructors can also have difficulty understanding if the students understand the content because they do not have the immediate feedback (Liu, Lee, Bonk, Su, & Magjuka, 2005). Face-to-face instructors could use facial cues during lectures to determine student understanding. Whereas, a study by Beaudoin (2002) found that in their sample only 31 of 55 online students actively participated in forums and that on average the online students spend 15.55 hours engaging in learning tasks that are invisible to the online instructor. Although the instructor could engage these students by sending personalized emails to understand their progress, Woods (2002) found that personal email from instructors did not increase student participation or help to enhance the student faculty relationship. A study by Campbell (2014) had similar results, finding that increasing personal messages to students did not influence student activity, learning outcomes, or dropout rates.

1.3 Thesis Outline

This thesis will focus on critically analyzing the role of teacher presence in online education. The focus will be on understanding what factors affect an instructor's ability to establish teacher presence and whether technology can mitigate the factors involved. The scope of online education has been restricted to solely online distance educational environments that use traditional learning management software (e.g., Blackboard). Although there are many amazing research projects that promise to increase learning outcomes in online environments, novel systems that are not widespread are unlikely to account for the current variation in teacher

presence, which is the focus of this investigation. Similarly, this research focuses on uncovering the causes of the variation in instruction not the effects, and therefore, concentrates on the instructor experience and role in online education, not on student learning outcomes. Two questions guided this research:

1. Are there challenges to consistently establishing teacher presence in online courses?
2. Can the role of teacher presence be assumed, in part, by the learning medium?

The next chapter will review the literature on teacher presence and educational technologies, which are important in understanding how to address these research questions. Chapter 3 and 4 will explore the first question, while chapters 5 and 6 will concentrate on the second question. Chapter 3 provides the results of a yearlong case study that followed twelve online instructors. The purpose of the study was to map the experience of online instructors to get a sense of what could challenge an instructor's ability to engage in teaching online. This understanding of the instructors' experience was then used to inform the design of the survey study presented in Chapter 4. The survey study in Chapter 4 further explores instructor engagement in teaching by surveying twenty-eight instructors at the University of Regina. The study found that there was a relationship between satisfaction with student interaction and engagement in teaching. The connection between teacher presence and student presence presented a challenge; if high teacher presence encourages high student presence, but high teacher presence requires high student presence, how could one be generated independently to stimulate the other? The NECSUS system, discussed in chapter 5, explored this problem with a design aimed to engage students with no instructor interaction. Chapter 6 will conclude with a reflection on what these studies tell us about the challenges online educators face and how technology can reduce these challenges. To further explore how technology can assume the role of teacher presence, Chapter 7 will outline how the concept of teacher presence could be used as a design tool by describing the design of a NECSUS-like system prototype for a non-formal learning environment with no instructor interaction called NERT. Ultimately, this research challenges us to re-think the instructor's role in online education and to envision what online education would look like if the instructors were a value-added feature of online education, not a necessary feature.

2 LITERATURE REVIEW

2.1 The Community of Inquiry Framework and Teacher Presence

The Community of Inquiry framework includes three elements: Social Presence, Cognitive Presence, and Teacher Presence. These elements are not necessarily independent, but act in concert to support discourse, create the educational climate, determine course content, and ultimately create the learning experience (Garrison, Anderson, & Archer, 2000). Communities of inquiry create meaningful educational experiences by encouraging students to co-create knowledge. The three elements of the Community of Inquiry approach each play a role in creating that process (Garrison, Anderson, & Archer, 2000). Social presence includes the student's ability to project their identity in the community and develop relationships with other students (Garrison, Anderson, & Archer, 2010). Cognitive presence refers to the student's ability to engage in the course content and demonstrate their learning (Garrison, Anderson, & Archer, 2000). Teacher presence includes the design of the course, the direct instruction of the course, and facilitating discussion among the students (Garrison & Arbaugh, 2007).

The conceptual framework at the root of the online Community of Inquiry framework is that community supports higher-order thinking. The model draws on the work of Lipman, who argued that inquiry is *necessarily* social.

> "And inquiry is generally social or communal in nature because it rests on a foundation of language, of scientific operations, or symbolic systems, or measures and so on, all of which are uncompromisingly social." (Lipman, 2003, p. 83)

Lipman's work drew upon George Herbert Mead and John Dewey, who argued that the heart of education is social learning. Education was considered the interchange of ideas; students were encouraged to discuss arguments and ideas they could relate to and follow arguments and lines of thought to see where they led. Students were not expected to learn about conclusions, but engage in a process that created more questions than answers; it was the asking of questions that was the transformational process of education and learning. The process is interactive and social so that as a student encounters conflict, they challenge and question their new found understanding as they proceed. This feedback from others, who are informed by different experiences and realities, ensures that students are pushed beyond their understanding and that they will learn how to push others outside of their understanding. The product is a conversation, or mutual exploration (Lipman, 2003).

It would be a mistake to imply that all communities, therefore, create inquiry. Communities of inquiry are unique because they seek knowledge and their purpose is to question and learn. Lipman identified fifteen characteristics of communities of inquiry (Lipman, 2003). However, the problem with his model is that many features do not translate well into an online environment. He specified that, although not essential, face-to-face environments were preferable because faces are "repositories of complex textures of meaning" (Lipman, 2003, p. 95). Similarly, social solidarity was identified as a feature, which refers to bonds that develop due to the close and constant proximity of the students (Lipman, 2003). Although it is not impossible to create these environments online, Garrison et al. (2000) point out that the success of these online environments will depend on the instructional design and the skill of the users to use the technology.

A barrier to creating community online is the students' unfamiliarity with each other and differences among themselves, which limit their ability to create shared understandings (Fayard & DeSanctis, 2005). The Community of Inquiry framework created by Garrison et al. (2000) became the leading model to overcome these challenges (Shea, et al., 2010). Social, cognitive, and teacher presence were identified as the key elements that facilitated the formation of learning communities (Garrison, Cleaveland-Innes, & Fung, 2010). Social presence can be broken into three dimensions: identification with the group, purposeful communication, and interpersonal relationships. Social presence in formal educational online environments is emergent because students do not enroll in courses to create social bonds; rather, bonds are the outcome of communication built on shared purposes in a course (Garrison, Anderson, & Archer, 2010).

Establishing social presence in an online course can be difficult because the mere presence of communication tools does not guarantee that students will communicate with each other. Murphy (2004) found that unless explicit strategies were incorporated into a course, students primarily engaged in monologues. Students would post messages about their thoughts on a topic, but would not show evidence they had reflected on or incorporated the thoughts of others in the class. When interaction was demonstrated between students, it was in asking questions, or asking for elaboration. Little collaboration or co-construction of knowledge occurred spontaneously in online courses (Murphy E. , 2004). A student's motivation to participate in a course is not as simple as being motivated to learn the content in the course.

Several factors can reduce a student's motivation to participate such as perceived lack of relevance, insufficient guidance, time constraints, etc. (Hartnett, St. George, & Dron, 2011).

To combat the difficulty of establishing student presence, the Community of Inquiry framework relies on teacher presence to establish behaviour norms and expectations. Teacher presence includes the instructional design of a course, direct instruction, and facilitation of discussion (Garrison & Arbaugh, 2007). The teacher acts as a leader or role model and encourages participation by acknowledging student activity and guiding students in their inquiry (Garrison, Anderson, & Archer, 2000). This approach has been shown to succeed. Students want their instructors to be active in course discussion (Young, 2006), and teacher presence is positively correlated with student social presence (Shea, et al., 2010). Teacher presence is also the best determiner of student satisfaction in the course (Garrison, Anderson, & Archer, 2010). Therefore, teacher presence is the binding unit of the Community of Inquiry model (Garrison, Anderson, & Archer, 2000). Teacher presence helps to establish student social presence and plays a vital role in establishing cognitive presence.

Cognitive presence is both a process and outcome; it is students' ability to critically engage in the course content and demonstrate high-order thinking (Garrison, Anderson, & Archer, 2000). Without guidance, students primarily produce monologues and do not engage in the inquiry. However, teacher presence acts as a scaffold to facilitate higher-order thinking by diagnosing student understanding, supplying additional sources, and guiding students to ensure they meet the learning outcomes of the course (Garrison & Arbaugh, 2007). Teacher presence orchestrates the educational experience by facilitating social presence and works in concert with students to facilitate cognitive presence (Garrison, Anderson, & Archer, 2000).

Given the clear importance of teacher presence (Garrison, Cleaveland-Innes, & Fung, 2010), not surprisingly, its inclusion in online education is vital. Some even argue that teacher presence is necessary for high-order thinking (Garrison, Anderson, & Archer, 2000; Garrison, Anderson, & Archer, 2001; Garrison, Cleaveland-Innes, & Fung, 2010), that is if there is no teacher presence, students will not engage in substantial discourse. If students must participate and reflect, and have a common goal, they might engage in some critical analysis, but will primarily reject or accept their own ideas, not come to a group consensus (Garrison & Arbaugh, 2007).

2.2 Barriers to Teacher Presence

Online course management requires the traditional responsibilities of face-to-face course facilitation, but has the added responsibility of maintaining social presence (Hartnett, St. George, & Dron, 2011). Facilitating social presence online requires a different skill set than in a traditional classroom, where the mere presence of the instructor is enough. A good instructor must be "VOCAL: visible, organized, compassionate, analytical, and leader-by-example" (Mandernach, Gonzales, & Garrett, 2006, p. 251). The multiple roles of instructors as planners, models, coaches, facilitators, and communicators become more prominent in online environments (Mandernach, Gonzales, & Garrett, 2006). These additional responsibilities can increase the complexity of teaching online (Hogan & McKnight, 2007), and can tax the limited time instructors must dedicate to instruction (Liu, Lee, Bonk, Su, & Magjuka, 2005).

Some online instructors feel that teaching online requires more effort and time than teaching face-to-face. A study by Hartman and his colleagues found that 90% of instructors felt that online courses were more work than the same course taught face-to-face (Hartman, Dziuban, & Moskal, 2000). This perception of increased workload is a top inhibiting factor to teaching online (Schifter, 2000). However, a study by Hislop and Ellis (2004), which measured the time faculty spend teaching online and face-to-face, found that teaching online does not take more time overall than face-to-face courses, but might require more effort. Facilitating an online course fragments the time working on the course over more days than traditional classes, which could change the perception of the time spent. The number of days online instructors work on their online course increase 34% over face-to-face courses. In addition, running an online course requires many activities. Online instructors have 50% more activities they need to complete over face-to face courses, which has led to the conclusion that although teaching online might not take more time, it might require more effort (Hislop & Ellis, 2004). It is unclear how this affects instructors' productivity. A study that looked at ten online instructors found that instructor productivity varied. Some instructors found that the increased organization needed for an online course helped them to develop organizational strategies that increased their productivity in other realms as well. Newer faculty reported a larger decrease in research productivity than experienced faculty, but a number of factors could influence this perception including faculty support for teaching and lower research expectations of tenured faculty (Meyer K. A., 2012).

The higher effort required to teach online, might explain why online instructors have high levels of burnout. A study looking at 76 online instructors found that the instructors had high indicators of burnout compared to levels reported in face-to-face instructors (Hogan & McKnight, 2007). Burnout is a syndrome characteristic of occupations that do 'people-work' (Maslach, 1981). As workers become emotionally exhausted, their ability to deal with people on a psychological level diminishes. The results are symptoms of negative or cynical attitudes by people about those that they interact with and dissatisfaction with their work performance (Maslach, 1981). These symptoms are expressed in the teaching profession as a lowered level of job commitment, lack of enthusiasm, and feelings of alienation. Among tenure-track university instructors, burnout is associated with health problems, reduction in productivity, poor stress management, and career change (Hogan & McKnight, 2007).

The best strategy to deal with burnout is to stop it before it develops. Several steps could be taken to reduce burnout among online instructors. These steps include consulting with online faculty about online education; providing needed resources for instructors or offering professional development opportunities; having clear communication about expectations of instructors and their performance; and reducing the teaching load of online instructors (Hogan & McKnight, 2007). These are important considerations because online instructors are primarily motivated to teach online by intrinsic (but not extrinsic) rewards. Features such as intellectual challenge, interest in technology, and opportunities for professional development increase faculty satisfaction (Bolliger & Wasilik, 2009; Meyer K. A., 2012).

We must address instructor satisfaction and burnout because we need to maintain teacher presence to help to establish Communities of Inquiry and to increase student satisfaction. Similar courses can have different levels of participation and satisfaction based on the facilitation of the instructor. When instructors maintain a high level of facilitation in a course, the level of student participation is also higher and they rate the course higher (Lowes, Lin, & Wang, 2007). Teaching presence establishes a sense of social presence for the students by creating an atmosphere of open communication, group cohesion, and trust (Garrison, Cleaveland-Innes, & Fung, 2010). Establishing social presence for students increases the students' satisfaction in online courses, as social interaction is strongly predictive of student enjoyment and learning in an online course (Muilenburg & Berge, 2005). Further, not only have studies found a positive correlation between students' perceived learning and students' social presence, but this

relationship was also found to be positively correlated to instructor presence (Richardson & Swan, 2003). The quality of online education in terms of both satisfaction and learning outcomes are directly related to teacher presence. Therefore, more understanding about the barriers to teacher presence is needed so strategies to overcome these challenges can be developed.

2.3 Learning Management Software

The technology used to manage online courses is an important aspect of online education. One problem with discussing learning platforms is that many platforms could be utilized. Even systems that allow communication that are not designed specifically for education could be utilized. Wang et al. demonstrated that *Facebook* could function as a learning management system. Although there were limitations, such as lack of support for some file types, awkward threading structure, and privacy issues, overall, *Facebook* proved to be a viable option (Wang, Woo, Quek, Yang, & Liu, 2012). Similarly, Jarmon and her team (Jarmon, Traphagan, Mayrath, & Trivedi, 2009) explored the educational potential of *Second Life*. Their research showed that the *Second Life* environment had potential to support project-based experiential learning. Students found that the virtual environment facilitated virtual collaboration, allowed them to test hypotheses in a safe environment, helped them to explore the relevance of their work, stimulated their imagination, and gave them a sense of a tangible experience. Although the environment had a steep learning curve for students to learn how to use the virtual environment interface, ultimately there was potential to create rich learning environments in Second Life.

This thesis will restrict the discussion of learning management software to more traditional forum-based learning modes. This restriction was chosen because of the widespread use of these tools. For example, the two most popular LMS are *Blackboard* and *Moodle*. Eighty percent of the world's top academic institutions used *Blackboard* to manage their courses (Blackboard, 2015) and *Moodle* hosts 6,024,193 courses in 214 countries (Moodle, 2015).

A fear with the use of these widespread learning management systems is that they support mainly textual material, which may reinforce that teaching online is about transmitting discrete decontextualized information to learners (Coates, James, & Baldwin, 2005). Ideally, the forums should mitigate this concern as they allow instructors and students to contextualize the information via discussion. There is also an expectation that instructors balance their interaction

with students between interacting with students in an intellectual and social manner. A survey of faculty directors, course moderators, and experienced faculty members found that they believed that the ideal online course should have about 24 post from the instructor with (on average) about 35% encouraging posts, 33% posts about course content, 24% probing Socratic style questions, and 8% corrective posts. However, in reality, the spread was 35%, 22%, 6%, and 5% respectively, with only an average of 17.79 posts (Blignaut & Trollip, 2005). Yet, a meta-analysis of studies that compare online education to face-to-face courses conducted by the U.S. Department of Education indicates that on average students in online learning environments outperformed their face-to-face counterparts (Means, Toyama, Murphy, Bakia, & Jones, 2009). However, the report acknowledges that online education can mean many different things and online education accompanied by face-to-face instruction had the highest increase in learning outcomes. Further, many of the studies did not control for curriculum materials or pedagogical practices, which were also the studies that had larger effect sizes (Means, Toyama, Murphy, Bakia, & Jones, 2009). Interestingly, the report also found that variations in implementing online education had no significant difference on learning outcomes (Means, Toyama, Murphy, Bakia, & Jones, 2009).

A closer look at the tools learning management software offer is therefore important because perhaps we should avoid including excessive technology that has no evidence to support increased learning. A meta-analysis in 2012 examined studies exploring tool use and performance (Lust, Juarez Collazo, Elen, & Clarebout, 2012). The study broke tool use into three categories: information tools (e.g. course outline or notes), knowledge modelling tools (e.g. practice quizzes), and communication tools (i.e. forum discussion). There was large variability in how the tools were used, but some trends were found. Information tools were the most consistently used, but studies differed in the effect of their use on learning outcomes. Two studies found an increase in outcomes with higher use of information tools, but one saw no difference. Most studies reported no difference in learning outcomes when knowledge modelling tools were used, except one study that found positive effects when students completed quizzes compared to attempting them. This could mean that students only see a benefit when they invest in using knowledge modeling tools. Finally, in the category of communication tools, frequency of posts on discussion boards positively correlated with higher learning outcomes; however, only content-related and interpersonal posts showed this relationship, organizational

messages (e.g., assignment reminders, or course announcements) did not see similar increases (Lust, Juarez Collazo, Elen, & Clarebout, 2012). Overall, this meta-analysis suggests that more information is needed about how and why students use online tools before we can know how to better design them.

Although ultimately, the element unites technology and learners are the pedagogical practices of the instructor. As outlined, a key element of their pedagogical approach is to cultivate a Community of Inquiry to promote social constructivist learning and higher order thinking. Therefore, we need to understand if instructors have the support they need to implement such approaches, or whether there are barriers in place hindering them. Competing expectations and burnout are serious factors that could undermine implementation of elements of teacher presence in practice. Consequently, the first study of this thesis will examine the experiences of online instructors to understand how online education is deployed in practice. Are instructors engaging in the teaching process, or are there factors that affect their participation levels? This will be the focus of the next chapter.

3 PROJECT 1: A CASE STUDY OF ONLINE INSTRUCTORS

Considerable research addresses student engagement in online courses (e.g. Angelino, Williams, & Natvig, 2007; Oliver, 1999), but the question of instructor engagement in teaching online courses has not received significant attention. This study aimed to explore that gap. Given that teacher presence is such a strong predictor of student satisfaction and outcomes in an online course, we need a better understanding of the instructor's experience teaching online. I intend to understand the perceived barriers to success for online instructors so policies and/or programs can be implemented to support online instructors, which will produce higher quality online courses.

My first study was an exploratory case study to examine the experiences of twelve online instructors during a year. The purpose of the study was to identify themes and trends in their experiences to inform the direction of inquiry of a quantitative survey based study. The goal of this study was to highlight areas for further research.

3.1 Defining Engagement

Studying engagement is difficult because there is no consensus on its definition. Instead, engagement is an amalgamation of several attributes including participation, collaboration, and affect (Beer, Clarck, & Jones, 2010). Studies of engagement differ based on their operational definitions of engagement and whether these definitions focus on behavioural, emotional, and/or cognitive aspects (Fredricks, Blumenfeld, & Paris, 2004). For this study, the concept of engagement is based on the definition used by Schaufeli and his colleagues. Their definition incorporates behavioural, emotional, and cognitive aspects and focuses on vigor (investing high levels of energy in tasks), dedication (characterized by pride and a feeling that work is significant), and absorption (becoming engrossed in tasks). By this definition, engagement contrasts sharply with burnout, which is characterized by exhaustion and cynicism (Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002).

3.2 Methods

This first study was a case study comprising several interviews with twelve participants over a year. Instructors outside of the field of Education and Computer Science were targeted. This

restriction was to reduce the likelihood those studied would have extensive background in online education techniques or conduct research in the field. This restriction allowed for a better understanding of how online instructors who are not well versed in technology or pedagogy mitigate the challenges of integrating technology and pedagogical practices into online learning settings. The focus was to understand what strategies instructors used when teaching online and whether they felt successful teaching online. Because there is little research on instructor engagement in online education, the study's exploratory format was chosen to allow me to identify issues that could then be examined in further research. The exploratory nature of the study was not well suited to hypothesis testing, but the research was guided by these overriding questions:

1. What factors affect faculty engagement when faculty teach online?
2. What are potential barriers to engagement when faculty teach online?

The study focused exclusively on the instructor's *perception* of the quality of instruction, not external measures of the quality of the instruction. This focus encouraged the participants to be honest and open without feeling judged, which helped to establish and retain rapport.

3.3 Participants

An email was sent out to all instructors listed as teaching an online course over the 2012-2013 academic year from every department at the University of Saskatchewan with the exception of Computer Science and Education (51 instructors). As mentioned, this restriction was included to decrease the chance that the participant's program of research focused on online education, which might influence how they taught their online course. Nineteen instructors volunteered to participate in the study, but only twelve instructors met the criteria of teaching a course during the duration of the study. There was an even split between male and female instructors, and they had many academic backgrounds. Half of the instructors taught on campus and half taught their courses at a distance. They varied in their familiarity with technology (see Table 3.3.1), the class size they most commonly taught, and their experience teaching online (see Table 3.3.2 for a summary). All instructors were from the University of Saskatchewan.

Table 3.3.1. Participant Technological Comfort

Early Adopter	Very comfortable with technology and enjoys technology. Early adopters enjoy incorporating new technologies into their lives and try to stay up to date with the latest developments.
Confident	Comfortable with technology but do not go out of their way to be up to date with the latest technology. People in this category are comfortable with technology and tend to see technical problems as fun puzzles to solve.
Adequate	Know just enough about technology to do their job. People in this category can use technology to complete the tasks that they need to, but rely on tech support to handle technical problems that they come across.
Unfamiliar	Intimidated by technology. People in this category not only rely on tech support to help them with technical issues, but they also tend to rely on co-workers/friends to help them with daily use of technology.

Table 3.3.2. Participant Description

Participant	Gender	Department	On or Off Campus	Class Size	Experience	Technological Comfort	Access Instructional Designer
Participant1	Male	Arts & Science	Off	16 to 50	6 to 10 years	Confident	Just course development
Participant2	Female	Arts & Science	On	15 or less	6 to 10 years	Adequate	Just course development
Participant3	Female	Arts & Science	On	16 to 50	6 to 10 years	Adequate	None
Participant4	Male	Agriculture	Off	15 or less	6 to 10 years	Adequate	Just course development
Participant5	Female	Arts & Science	Off	Over 50	6 to 10 years	Early Adopter	Just course development
Participant6	Female	Health Science	On	16 to 50	3 to 5 Years	Confident	For course re-design
Participant7	Female	Health Science	On	16 to 50	Over 10 Years	Early Adopter	None
Participant8	Male	Agriculture	Off	16 to 50	Under 1 Year	Unfamiliar*	For course re-design
Participant9	Male	Arts & Science	Off	Over 50	Over 10 Years	Early Adopter	Just course development
Participant10	Male	Health Science	On	15 or less	Under 1 Year	Early Adopter	Regular access
Participant11	Male	Arts & Science	On	15 or less	3 to 5 Years	Early Adopter	None
Participant12	Female	Agriculture	Off	16 to 50	6 to 10 years	Confident	For course re-design

*By the end of the study, this participant self-identified as Confident

Although I aimed to capture the perspective of an average faculty member, the sample is not representative of average faculty. As one participant said in an interview, the participants were not the average because every participant was bold enough to try online education. Not everyone in the study believed that online education was a preferred way of teaching, but they all seemed to embrace the opportunity as a challenge. The instructors were all invested in their courses and cared if the students succeeded. All instructors felt pride in their successes and seemed troubled by their struggles. The instructors were not apathetic; they all actively thought about how they could improve their courses.

3.4 Data Collection and Analysis

Data were gathered over a course of a year using unstructured interviews. The interviews were scheduled around the beginning of a course, the middle of a course and after the course finished, which captured course preparation, course facilitation, and course evaluation. All interviews were recorded and the audio files were coded. The interview began by asking the participants either how their online course had been going, or if there had been any developments since we last met. The interviews began with neutral event-based questions so the tone (i.e. positive or negative) was established by the interviewee. Subsequent questions were primarily follow-up questions to elicit additional information. Near the end of the study, as themes emerged, the instructors were asked to comment on preliminary findings and asked whether they thought the themes accurately reflected their experience.

The interviews were quantitatively analyzed by recording how many positive and negative experiences participants discussed. Remarks were classified as positive if the participant described an experience as useful, beneficial, or hopeful. A remark such as "The technical support staff was very helpful and helped me to fix all the glitches I found" would be labelled as positive. Even though the experience of finding glitches is negative, it was labelled positively because the memory of the experience was expressed in a positive light. Conversely, a remark such as "My department reduced my work load because I found the online course to be too much work" was labelled as negative. Although the speaker of this statement had the positive experience of departmental support, the remark focused on the negative aspect. Statements were labelled based on the perceived overall affect as expressed by the participant, rather than on whether particular experiences were challenging or beneficial. This sorting strategy aligns with the operational definition of engagement as outlined by Schaufeli et al. (2002). Based on this model, instructors who are more engaged will exhibit a positive mindset related to their online courses and those are less engaged will exhibit feelings of detachment and cynicism.

Aligned with the concept of engagement used in the study, participants were grouped by their level of positive versus negative statements. Based on this model, participants not engaged in teaching online would frame their experiences around their struggles; engaged instructors would describe their experiences in a positive light. Each statement by the participant that reflected a positive or negative affect was coded as positive or negative and then tallied. The

positive versus negative experiences measure led to three broad categories: struggling (less than 30% of emotional comments focused on positive aspects), coping (less than 50% of emotional comments were positive), and succeeding (over 50% of emotional comments focused on positive aspects). This form of classification means that the coding system has room for interpretation; therefore, precautions were taken to ensure that all conclusions represented the participants' thoughts and experiences. After concluding all interviews, the preliminary results were shared with the participants. They learned how their score was determined, and in what category they were classified. They then responded and had the opportunity to suggest a different classification for their experience. None changed their classification. Each participant agreed with the level of success this coding strategy suggested.

To understand which factors could influence the instructor's experience, I grouped the participants by similar demographic characteristics and performed either a single factor ANOVA or a t-Test. The demographic features included: technological comfort; class size; experience instructing online; and research priority, which tracks whether the participants job description requires them to complete research. Because this study is an exploratory study and the sample size is too small to draw any definitive conclusions, the purpose of the statistical analysis was to identify potential areas for further research, not to test a hypothesis.

3.5 Results

3.5.1 Themes

Initially, 21 themes were identified. As the interviews progressed, I found that the 21 themes could be grouped into seven larger themes. The seven themes that continually emerged in the interviews included student engagement, social presence, increased effort teaching online, isolation, software usability, research and miscellaneous. Table 3.5.1.1 shows the initial 21 themes and the larger theme they fell under. There was overlap among the categories, but the table outlines the general trend.

Table 3.5.1.1 Counts of Themes across 26 Interviews

Theme	Example of Dialogue	Total References	Interviews Containing Theme
	Student Engagement		
Ability to Engage Online Students	"I don't know how well that worked because it is only really the students accessing that"	64	19
Engagement Strategies	"There discussion comments are only graded in the week, because it needs to be an interactive experience."	58	19
	Social Presence		
Attitude Towards Online Education	"[Online education is] way less fulfilling. You don't get any eyeballs, you don't meet anyone, you don't get to know your students. It's just work."	133	19
Class Attributes	"[Students] are suppose to participate in online discussion forums as well, interacting with each other."	48	20
Personal Connection to Students	"I find I come to get to know the students better than if I were to teach on campus… There is a lot of interaction online… and I am seeing their work."	39	15
	Increased Effort Teaching Online		
Learning Management Software (Blackboard)	"[Updating course content on Blackboard] is so cumbersome that it is just not worth it"	29	16
Course Development	"[The course re-design] will make the course much less of a here's the information go in your corner and learn it to let's all work together and explore what is available out there in the world…"	52	18
Face-to-Face Teaching	"It is not as good as a classroom setting"	37	14
Time spent Teaching Online	"Some things are more work and some things are less."	61	18
Use of Educational Technology	"We broke [the large class] into smaller groups... have had software issues"	67	17
	Isolation		
Isolation from Students or Colleagues	"This is the first time [a student] didn't acknowledge my contacts."	26	10
Lack of Communication Cross-Department	"Between the technical issues and the inter-organizational problems, we got nothing done in four years."	8	6
	Software Usability		
Interaction with Technical Support	"two hours of speaking with [tech support], we find out it is the permissions… [he] came to my office to fix this… we scheduled an hour, it took four hours"	28	17
Technical Problems	"Anywhere between half to two thirds of the content has disappeared [because of broken links]."	65	20
	Research		
Departmental Attitudes	"In this climate of fiscal restraint, my fear is that they are not going to support [online education]"	32	13
Division of Time	"Check on more email or plant one more flower"	29	13
Job Description	"I still manage [the courses], but the content areas are provided by experts in the area… they are responsible for updating the content."	18	9
Research Pressure	"Junior faculty members, I can't imagine. I have ethical problems assigning online courses to people."	6	4
	Miscellaneous		
Distance Education Pre-Internet	"I have seen a lot of change. It keeps getting better and enrollment keeps going up"	6	4
General Teaching Attitudes	"I will give you the opportunities to do well, but ultimately you have to take those opportunities to do well, I can't do that for you."	23	10

3.5.2 Quantitative Analysis

Table 3.5.2.1 presents the percentage of positive remarks made by a participant compared to all remarks that had either a positive or a negative affect. Because the research was framed around discovering challenges, it was expected that more negative than positive experiences would be generated in the interviews. The rest of the tables show the statistical results, which examined demographic factors in relation to engagement. The tables below show that most of the demographic factors analyzed did not appear to affect engagement. The participants' confidence using technology, class size, and experience teaching online showed no significance differences in engagement. However, dividing the participants based on whether they have an active research agenda (Table 3.5.2.5) did appear significant.

Table 3.5.2.1 Classification of Instructors' Feelings of Success Teaching Online

Struggling	% of Positive remarks	Coping	% of Positive remarks	Succeeding	% of Positive remarks
Participant3	23.9	Participant1	36.5	Participant4	59.7
Participant10	26.9	Participant2	31.5	Participant5	56.6
Participant11	23.5	Participant6	38.6	Participant8	50.0
		Participant7	36.3	Participant9	55.4
				Participant12	54.0

Table 3.5.2.2 Single-Factor ANOVA Comparing Levels of Engagement against Technological Confidence

Technological Confidence & Engagement			
df	SS Between Groups	SS Within Groups	P-Value ≤ 0.05
10	204.76	1557.54	p = 0.8200
Category	Count	Average	Variance
Early Adopter	4	35.83	221.13
Confident	3	43.03	91.30
Simple Tasks	3	38.37	355.77
Not Familiar	1	50.00	N/A

Table 3.5.2.3 Single-Factor ANOVA Comparing Levels of Engagement against Class Size

Class Size & Engagement			
df	SS Between Groups	SS Within Groups	P-Value ≤ 0.05
11	582.85	1403.31	p = 0.2095
Category	Count	Average	Variance
High Density	2	56.00	0.72
Medium Density	6	39.88	116.61
Low Density	4	35.40	273.19

Table 3.5.2.4 Single-Factor ANOVA Comparing Levels of Engagement against Years Experience

Years Experience & Engagement			
df	SS Between Groups	SS Within Groups	P-Value ≤ 0.05
10	260.05	1719.43	p = 0.5693
Category	Count	Average	Variance
Under 5 Years	3	33.47	207.90
6-10 Years	6	43.70	224.24
Over 10 Years	2	45.85	182.41

Table 3.5.2.5 Independent t-Test Comparing Levels of Engagement against Research Priority

Research Priority & Engagement			
df	SS Between Groups	SS Within Groups	P-Value ≤ 0.05
11	1141.02	545.14	p = 0.0004
Category	Count	Average	Variance
Active Research Agenda	6	30.12	40.98
No Active Research Agenda	6	52.03	68.05

3.6 Discussion

Not surprisingly, engagement was a theme because all instructors knew the importance of engaging the students in the learning materials. During the study, four instructors were working with Instructional Designers to improve the student engagement in their courses. In addition, one instructor had just finished working with an Instructional Designer at the beginning of the course. The other seven instructors did not have access to Instructional Designers during the duration of the study and had to create ways to increase engagement without assistance. This discrepancy in access to Instructional Designers was related to how much funding their department had for online course development.

Access to Instructional Designer changed instructor's strategy to engage students. The instructors with access to instructional designers explored how to incorporate new tools and technology into their courses to enhance engagement and participation (e.g., wikis, blogs, and re-designing content). Those without access to an Instructional Designer utilized different strategies to increase engagement. One designed their course to be synchronous and maintained the regular lecture format with the distance students attending with web cameras. Two primarily used email to interact and engage their students individually. The other four used online forums to engage students in discussion. Two of these instructors used grades to encourage posting to the forum and the other two posted questions in the forums to act as a catalyst to start discussion.

The use of forums created problems for instructors whether or not they had access to an Instructional Designer. Some instructors struggled with deciphering what their role should be in

online discussion. This trend in the sample is congruent with the literature. Liu and colleagues found that establishing the social role of an online instructor was difficult for instructors because online students are task-oriented, which makes it hard for the instructor to understand how the community aspect is important and plays a role in the students' learning (Liu, Lee, Bonk, Su, & Magjuka, 2005). A common concern among the participants in this study was that their comments might stop the discussion. Six instructors were concerned that their authority might discourage students from actively participating in conversation. They feared that if they weighed in on a topic, a student might be afraid to question it. Confusion surrounding the social role of an instructor online can cause an instructor to either depend more on individual interactions, or act more as a facilitator of discussion (Liu, Lee, Bonk, Su, & Magjuka, 2005). Both strategies were found in this study. Two participants avoided the confusion by interacting with students individually using email instead of participating in forum discussions. The six instructors, who were concerned about their role as an authoritarian, stated that they tried to act as a facilitator to mitigate their silencing power.

The second theme was the lack of students' social presence. Eight participants in the study found it difficult to teach online because their students had no social presence. Online instructors could not see if a student looked confused when they were presented with the course content as they could in a face-to-face course. The online instructors could not even tell if the students were going through the content or not. This lack of presence made it difficult for the instructors to understand who their students were and if they were interested in the subject. The two prominent things that the instructors in the study wanted to know about their students were what the students' interest in the subject was, and if the students understood the content. The instructors did not receive feedback about students' understanding until a student submitted an assignment, at which point, it was too late to intervene.

Another strong theme was that online courses required more effort than F2F courses. There was no consensus it took longer to teach, but I believe it would be fair to say that all participants found it took more effort to teach online compared to face-to-face. As discussed, the distinction is that the work that was done was more difficult, but did not necessarily take longer to complete. Several comments were made about how it was easier to answer a question as it came up in class compared to answering a question online. Because online courses are primarily based on text communication, the instructor had to put more thought into the composition of the

text. The same question may also arise often when a private communication channel such as email was used. Further, an online course necessitates more effort by its very nature. Instructors must learn to use a new technology to manage the course. Even once an instructor invests in learning the software, new updates may change the interface or tools requiring continual learning. There is also the cumbersome process of the interface itself that requires logging in and many clicks to access common services. The increased effort was not always seen as a negative aspect; some participants enjoyed learning about new technology and playing with online tools. However, online courses still require additional effort over and above teaching that face-to-face courses do not.

Isolation was an interesting theme that emerged because it encompassed both isolation from students and isolation from co-workers. Eight out of twelve instructors felt isolated from their students due to the lack of student social presence. However, the instructors were also isolated themselves, both physically and collegially. Half of the instructors did not teach on campus. Therefore, the participants could not bump into a colleague in the hall and discuss how their online course was going. They were physically isolated from the university. Of those on campus, two instructors were isolated by being the only online instructors in their department. Online instructors also had little opportunity to interact with each other beyond department boundaries. Many participants in this study taught courses for the same multidisciplinary program, yet they never met or mentioned each other. In one instance, a participant had mentioned that she was struggling with a course she had taught often because twice as many students enrolled as she expected. I was surprising to find out that she did not expect the increased enrollment because previously one of the other instructors mentioned that course is recommended as an elective to his students that semester. Therefore, an increased enrollment was expected. This episode highlights the importance of communication between departments.

Among the most talked about aspects of online education were the technical problems. Most problems were with the usability of the course management tools and not a lack of understanding of the technology. A common issue with the LMS was with how the permissions were set. Permissions set who can and cannot see the course content. Instructors cannot control or change permission settings and need to depend on their technical support to ensure that they are set appropriately. The default permission settings were unintuitive and often caused problems for both the instructors and the technical support staff. Usability issues also challenged

instructors. Simple tasks, such as checking email, were cumbersome and required far more mouse clicks than they believed should be necessary to complete a simple task. These issues are software design issues and cannot be overcome with familiarity with the software. Further, frequent updates to the LMS software often required the instructors to re-learn how to use the tools, which meant that often their experience was not transferable from year to year. The instructors rarely had issues with not being competent enough to use the technology.

The statistical results support that in this sample, technological confidence predicted no higher success rate in teaching online. Technology is often cited as a challenge for online instructors (Liu, Lee, Bonk, Su, & Magjuka, 2005), but it does not appear to be linked to the competence of the instructor. Not only did the coding schema used in this study find no connection between technological confidence and feelings of success, but the technical problems that the participants faced teaching online throughout the study supported the lack of connection. The participants faced a multitude of technical problems with the Learning Management System (LMS) used by the institution (Blackboard); however, very few issues were issues that even a competent end user could solve. Most problems with the LMS were related to poor design and usability. Issues included too many clicks required to access content, copy and pasting content did not always work as expected, and end users could not control the permission settings that determined who could see video content. The technical issues did not arise from the participants' lack of understanding of general computer technology, but rather poorly designed software.

The statistical results only found one significant variable; instructors hired to teach and research were less successful than those that were hired just to teach (see table 3.5.2.5). Participant 1 was an exception. He was the only non-researching instructor not classified in the succeeding category. However, it was discovered that although he was not hired by the university to conduct research, he had another job that was a research position, which might suggest that regardless as to whether the participants job description prioritized research, research might affect engagement in online instruction.

Research priority was not considered from the onset of the study. As more interviews were conducted, a strong theme surrounding the concept of "publish or perish" emerged. One participant commented:

> "Everyone is busy. Faculty members are primarily evaluated on research. Teaching, I don't care what the university says in its strategic plan, teaching is not considered a priority at this University, or any other University I have ever been associated with... As long as there isn't a line of student outside complaining [tenure-track junior faculty] will be fine if their research is fine. That's the reality of University life."

This concern around research encouraged a closer look at the research aspect of the demographic factors analyzed. Because this variable was not predicted, without additional research it is hard to say why this trend exists so strongly in this study. Further, Participant 1, who did research outside of his position with the university, fits better in the category of instructors who were required to complete research, which makes this finding compelling.

After all the data were gathered, the finding that research priority predicted the level of engagement of the instructors was shared with the participants and they were asked to comment on why they thought this relationship existed. Several instructors who had no research priority, and one that did, suggested that it might be that those in research positions enjoy research more than teaching. This conclusion does not fit with the qualitative data collected. All instructors were trying to teach well and actively sought resources to help improve their quality of instruction. Several of the other suggestions from the participants seemed to fit better. These suggestions were 1) lack of time to devote to instruction; 2) it is easy to ignore an online course when dealing with competing pressures; and 3) research is linked to promotion, whereas quality instruction is not. It is unlikely that any one of these factors is the cause. Rather, it is likely to be a combination of factors, although, the relationship between research and recognition at universities seem like a strong factor. More research is needed, but understanding the teaching culture of a research university will be a first step.

There is still considerable variation in success within the research priority group of instructors. Half were coping and the other half were not. This trend seems tied to the suggestion that researchers might have larger time management challenges than non-researchers. The research instructors who practiced time management strategies were more likely to fall into the category of coping than those who did not (See table 3.6.1).

Table 3.6.1. Independent t-Test Comparing Levels of Engagement against use of Time Management Strategies

Researchers & Time Management Strategies			
df	SS Between Groups	SS Within Groups	P-Value ≤ 0.05
5	161.33	43.55	0.018
Category	Count	Average	Variance
Discussed Time Management Strategies	2	37.45	2.65
No Strategies Mentioned	4	26.45	13.64

The time management strategies observed comprised activities such as: only checking emails at designated times, not checking on course discussion on evenings and weekends, insisting students only contact them via the course email system, etc. The techniques aided in creating a solid distinction between their online course time and other activities. The participants who used these strategies said it helped them to not worry about the course when doing other activities. I hypothesize these techniques gave the coping instructors a sense of control over their online course. The number of research participants is too small (n=6) to definitively say that time management strategies help struggling instructors, but it highlights an area for further research.

3.7 Conclusions

The purpose of this study was to explore areas for further research into the experience of online instructors. This study succeeded in highlighting some important areas for further research. The conclusion that an institutional expectation that instructors have a strong research program can hinder online instruction deserves further attention. Although, further research is needed to substantiate this finding, it highlights the need for a better understanding of the culture of a research university and the effect that may have on the quality of instruction. Successful online courses appear to depend on a strong instructor presence to create a Community of Inquiry. If the culture of a university does not foster dedication to instruction, it might have a large effect on the quality of online courses. In traditional lecture based face-to-face courses, lecture time is scheduled off, and the mere presence of the instructor during the lecture is enough to establish that they are present. Online courses do not have these same benefits. Instructors have to make a point of establishing their presence in the online course to build a sense of being there for their students. Further, they do not have an appointed scheduled off time to work on their online courses as they would for delivering a lecture. Therefore, if instructors feel pressure to work on an aspect of their job other than teaching, such as research, they might find it difficult to find

time to spend on their online course obligations, which might make it difficult for them to establish teacher presence for the students.

The potential of competing priorities when teaching online makes the role of time management and interesting theme in this research. A fruitful area of research would be to understand whether introducing time management strategies could lead to feelings of success among online instructors. In this study, the divide between the coping and struggling instructors appeared linked to their time management strategies. Coping instructors had clear boundaries that established when they would and would not work on their online course, whereas, the struggling instructors did not. Perhaps if the amount of time an instructor was to spend on their online course was more explicit, similar to lecture and office hours in a face-to-face course, it could guide instructors in how to allocate their time when facing competing priorities.

In addition, more research is needed on how technological challenges are hindering instructors and what kind of support is needed for instructors. This study suggests that the challenges faculty face when using learning management systems is related to the usability of the software, rather than the competence of the instructors. Further, this study found that the technology could isolate the instructors from their students. Previous studies have outlined the importance of instructor and student presence for students to feel satisfied (Garrison, Anderson, & Archer, 2010; Lowes, Lin, & Wang, 2007), but perhaps, student presence is just as important for instructors to become engaged in teaching their course. In this study, the instructors were troubled when they could not connect with their students. In some instances, instructors would reach out to students via email and not receive a reply, and in others, they were troubled because they could not see their students while teaching to get visual cues as to whether the students got the content. This indicates that student presence might have a direct impact on instructional strategies and instructor satisfaction. Granted, the Community of Inquiry framework does acknowledge the overlap and interaction between student presence, cognitive presence, and teacher presence, but to what degree each interact needs further exploration.

The next chapter expands on this research by further exploring the role of engagement in teaching online. The goal was to discover if similar trends could be discovered at a different institution, which would indicate that similar support for online instructors could be beneficial at different institutions.

4 PROJECT 2: SURVEY EXPLORING TEACHER ENGAGEMENT

The instructor study discussed in Chapter 3 highlighted many questions for further research. I thus ran another study, a questionnaire exploring teacher engagement. I was interested in seeing if similar trends would be found at another institution. If common trends could be found, it would indicate that policy, programs, or technology designed to overcome these barriers might also be beneficial at other institutions. To get a larger picture of the experiences of online instructors, questionnaires were used for this project. Such methods would allow more instructors to be sampled. This study sample was recruited from the University of Regina. It was important to have a sample that was not from the University of Saskatchewan to increase the likelihood that the same instructors from the last study were not recruited again. The University of Regina was ideal, because the dedication to online programs at each institution is comparable, and because they are from the same province, they would have similar funding and provincial context. Following on from the first study, the guiding research questions for this project were:

1. Are instructors with a higher research priority less engaged in teaching online?
2. Does practicing time management strategies affect engagement teaching online?
3. How does instructor's interaction with students affect their engagement teaching online?

With regard to the first research question, there is evidence that faculty concerns about tenure and promotion appear to affect instructors' perception of teaching online (Hartman, Dziuban, & Moskal, 2000; Schifter, 2000). This is a valid concern because despite online education often cited as a priority, institutional practices often concentrate on different priorities. Tenure and promotion depends largely on research despite the fact that instructors are expected to contribute to research, teaching, and service activities (Wolcott, 1997). There is little incentive for instructors to invest in teaching, let alone teaching online courses, at institutions that do not value the contribution. Online education requires more effort to teach (Hislop & Ellis, 2004), yet, instructors receive little credit for teaching the course, and some institutions rank online education below traditional teaching for tenure and promotion decisions (Wolcott, 1997).

The debate between research and teaching for tenure and promotion is not unique to online education. In 1996, Hattie and Marsh completed a meta-analysis of 58 studies evaluating the relationship between research and teaching and found that there was no significant

correlation. Rather, there is a one-to-one trade-off between teaching and research. Those that spend more time teaching have high teaching outcomes, and those that spend more time researching are more productive researchers (Hattie & Marsh, 1996). Yet, institutions recognize scholarship over teaching and will favour nationally recognized researchers over almost any weakness (Kasten, 1984). Teaching performance is rarely tied to performance reviews and mediocre or poor student evaluations do not affect merit pay (Kasten, 1984). Although lip service is given to the importance of teaching at institutions, even at smaller institutions that emphasize teaching, research is still much more heavily weighted (Terpstra & Honoree, 2009). Many institutions do not have a clear understanding of what the scholarship of teaching entails and base promotion on dissemination of research on teaching, not the incorporation of pedagogical techniques and fostering a reflective practice (Vardi & Quin, 2010).

Not surprisingly, teaching online is a risk to non-tenured faculty. Although online education might not be denigrated, faculty risk investing more effort in teaching online and receiving no benefits. Facilitating a successful online course receives little recognition, yet being unsuccessful can jeopardize one's career (Wolcott, 1997). Institutions that support online education can mitigate these concerns. Faculty satisfaction teaching online is higher at institutions that provide release time, provide faculty with professional development, or implement other policies to support their online instructors (Bolliger & Wasilik, 2009). The key is that the instructors need to know the costs and benefits of teaching online, which is problematic because the trade off might not be known. Wolcott (1997) captured that sentiment in a quotation of an academic vice president:

> "How much credit will they get for [teaching online]? You know that if you spend your time writing a peer-reviewed journal article, the value of that is fairly well known as a commodity, whereas doing a service or an extended education workshop, things like this… there's a risk involved because it's not been quantified. There's not enough experience for people to know the value of those kinds of efforts" (Wolcott, 1997, p. 13).

At the heart of the concern over teaching online is that teaching online requires more effort (Hislop & Ellis, 2004). Teaching online is not a direct parallel to teaching face-to-face. Further, all instructors have had experience learning in classrooms, whereas not all online instructors have experienced learning in an online environment. Therefore, when some teachers begin teaching online, they might have no experience to draw from (Bennett & Marsh, 2002). Although online teaching draws on common educational practices, the mode of communication

is very different. Instructors require the technical skills to manage the technology used to administer the course, the experience online to understand how to manage the absence of non-verbal cues, and the social skills to manage the tone of their online written communication (Bennett & Lockyer, 2004). Instructors must also negotiate how to including interactive instructional strategies to engage students, because requiring too many activities can frustrate students (Northrup, 2002). The flexibility of the format also creates challenges. If an online instructor would like students to complete a group project, they must design the project to accommodate the flexibility of online courses. The instructor must account for students not being co-located, having variable availabilities, and any technical difficulties that impede the collaborations (Bennett & Lockyer, 2004).

The previous study (Chapter 3) indicated that time management strategies might help to manage the increased workload; thus the second question aims to test whether there is a connection between using time management skills and increased engagement or satisfaction when teaching online. The theory behind time management strategies is that they give people a sense of control over their use of time and increase their self-efficacy. This is thought to reduce the stress on individuals, so they are more efficient, healthy, and satisfied (Hoff Macan, 1994). Hoff Macan tested these beliefs by comparing workers' use of time management strategies, their perception of control over time, job stress, and job performance. The results suggested there was a connection between time management techniques and a sense of control, which reduced job-related stress (Hoff Macan, 1994). Similarly, a study that looked at time management among students also found that a sense of control over time was related to lower levels of stress (Hoff Macan, Shahani, Dipboye, & Peek Phillips, 1990).

Finally, although it is fairly well established that teacher presence is needed to encourage student interaction (e.g. Shea, Swan, Li, & Pickett, 2005; Garrison, Cleaveland-Innes, & Fung, 2010), the last question focuses on how student interaction affects instructor engagement in online courses. This is an important consideration because although high teacher presence correlates to high student presence, there is a higher correlation between student presence and instructor social presence (Shea, et al., 2010). Therefore, it might be important for instructors to be socially engaged in the course, not merely facilitating it. Yet, instructor engagement in the course and student satisfaction might depend on each other. Faculty satisfaction teaching online is dependent on student outcomes (Hartman, Dziuban, & Moskal, 2000). When dissatisfied

instructors work with students that have good student outcomes, their satisfaction increases. Conversely, satisfied instructors will decrease their satisfaction when working with students that obtain low student outcomes. This has led to the conclusion that faculty satisfaction is co-linear with student outcomes (Hartman, Dziuban, & Moskal, 2000).

4.1 Methods

A questionnaire with 61 questions (see Appendix A) explored the connection between instructor engagement, research priority, time management strategies, and satisfaction teaching. The first six questions were demographic questions that collected information about the instructors' affiliation, familiarity with technology, class size, research priority, and employment. The next section contained 36 questions from the short version of Schaufeli's Utrecht Work Engagement Scale (UWES) and the Online Faculty Satisfaction Survey (OFSS). The short UWES includes nine questions that assess engagement as the antithesis of burnout. Three aspects are assessed: 1) Vigor – energy level and persistence; 2) Dedication – feelings of significance, enthusiasm, inspiration, and pride for work; 3) Absorption – deep engrossment in work (Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002). The internal consistency of this survey was reported as ranging between .80 and .90 (Schaufeli & Bakker, 2004). The questions were modified slightly to make them applicable to online instructors (e.g. "At my work, I feel bursting with energy" changed to "When I am working on my online course(s), I feel bursting with energy"). The OFSS includes 28 items that assess instructors' satisfaction within three areas: 1) Student-related factors – student interaction and performance; 2) Instructor-related factors – intrinsic motivators of teaching online, such as challenge, interest in technology, or professional development; 3) Institution-related factors – policies that support faculty. The reliability reported for the 28-questions was 0.85 (Bolliger & Wasilik, 2009). When validated, the UWES was randomly merged within a larger survey to reduce answering bias; therefore, the nine questions from the UWES were merged with the questions from the OFSS survey. To reduce the fatigue of the participant, the surveys were then split into two sections, one that focused on student focused questions, and the other that focused on job duty related questions.

The last section included the 33 item Time Management Behaviours Scale, which assesses participants' goal and priority setting, use of scheduling and planning devices, and preference for organization (Hoff Macan, 1994). For this study, items that assessed preference for organization

were excluded. This decision was made to reduce the length of the survey, and because preference is not a variable that could easily be changed with intervention. The purpose of the study was to gain insight into how instructors could be better supported; it is unlikely that programs or policy could change their organizational preference. The coefficient of congruence reported for the Setting goals and Priorities section is 0.94 and 0.87 for the section on the Mechanics of Time Management (Hoff Macan, 1994).

4.2 Results

4.2.1 Participants

Online instructors from the University of Regina were recruited for this study. The Flexible Learning Division at the University of Regina sent out the recruitment information to all of their online instructors; the University of Regina have approximately 135 online instructors. Twenty-eight instructors completed the survey in the winter semester of 2014. This represents approximately one fifth of the population. See table 4.2.1.1 for an overview of the participant demographics.

Table 4.2.1.1. Participant Demographics

Participant	Department	Technological Comfort	Typical Class Size	Percent of Research	Outside Employment
ID001	Faculty of Arts	Adequate	10-15	10	No
ID002	Faculty of Arts	Adequate	10-15	80	Occasional Part-time
ID003	Faculty of Arts	Adequate	30-40	10	Part-time
ID004	Faculty of Arts	Adequate	30-40	70	Part-time
ID005	Faculty of Arts	Comfortable	10-15	10	No
ID006	Faculty of Arts	Early Adopter	20-30	0	Full-time
ID007	Faculty of Arts	Early Adopter	20-30	20	Full-time
ID008	Faculty of Arts	Early Adopter	30-40	0	No
ID009	School of Business	Comfortable	30-40	40	No
ID010	School of Business	Early Adopter	20-30	0	Full-time
ID011	Continuing Education	Adequate	15-20	0	No
ID012	Continuing Education	Adequate	15-20	5	Occasional Part-time
ID013	Engineering & Applied Science	Comfortable	10-15	40	No
ID014	Faculty of Fine Arts	Adequate	50-75	10	Occasional Part-time
ID015	Faculty of Fine Arts	Early Adopter	10-15	30	Occasional Part-time
ID016	Faculty of Fine Arts	Early Adopter	10-20	10	Part-time
ID017	Faculty of Fine Arts	Early Adopter	50-75	25	No
ID018	Kinesiology & Health Sciences	Comfortable	30-40	0	No
ID019	Kinesiology & Health Sciences	Comfortable	50-75	50	No
ID020	Faculty of Nursing	Comfortable	15-20	30	No
ID021	Faculty of Nursing	Comfortable	20-30	30	No
ID022	Faculty of Nursing	Comfortable	50-75	40	No
ID023	Faculty of Nursing	Comfortable	Over 100	0	No
ID024	Faculty of Science	Comfortable	40-50	0	Occasional Part-time
ID025	Faculty of Science	Early Adopter	10-15	60	No
ID026	Faculty of Social Work	Adequate	20-30	10	Part-time
ID027	Faculty of Social Work	Comfortable	30-40	25	No
ID028	Faculty of Social Work	Comfortable	75-100	0	No

Above contains shows the overall demographics of the participants that completed the survey.

4.2.2 Surveys

Overall, the online instructors scored a 3.79 for engagement on a 5 point Likert scale; vigor had an average score of 3.52 (SD = 0.88), absorption 3.60 (SD = 0.72), and dedication 4.64 (SD = 0.56). An average score lower than 3.0 across all three measures would indicate that instructors were closer to feeling burnout than feeling engaged. In this study, only three instructors had an overall engagement score that fell below 3.0. All three of these cases had their highest score in the dedication category (4.33, 3.00, and 4.00). Two of these three instructors had their lowest score in vigor (1.33 and 1.67), and the other participant's lowest score was in absorption (2.33). Twenty-seven of the twenty-eight instructors had their highest score in the dedication subset. This is an important trend because a high score in feelings of dedication seemed to be a shared source of engagement that offset lower feeling of absorption and vigor. In three cases, instructors' high dedication scores raised their engagement level above three; scores below three

are associated with burnout. Table 4.2.2.1 provides a breakdown of the scores and standard deviation for the dedication subsection. No one in the study choose a rating below 3.0 for the second question on enthusiasm and third question on pride.

Table 4.2.2.1. Dedication Subscale Average Scores and Standard Deviation

Item	Average Score	Standard Deviation
My online course(s) inspires me	3.82	0.98
I am enthusiastic about my online course(s)	4.33	0.73
I am proud of the work that I do for my online course(s)	4.64	0.56

The table above includes the three survey questions from the Dedication Subscale of the UWES with the accompanying average scores and standard deviation among the participants.

The OFSS survey explored three domains of instructor satisfaction: student-related factors, instructor-related factors, and institution-related factors. This survey was scored on a 5 point Likert scale as well. Overall, the online instructors had a satisfaction average of 3.71 (SD = 0.59) for student-related factors, 3.52 (SD = 0.49) for instructor-related factors, and 2.99 (0.68) for institution-related factors. Only two participants averaged below 3.0 in student-related factors, and four for instructor-related factors. In contrast, for institutional-related factors, thirteen participants averaged below a score of 3.0. A breakdown of the averages for the institutional-related factors can be seen in table 4.2.2.2.

Table 4.2.2.2. Institutional-Factors Subscale Average Scores and Standard Deviation

Item	Average Score	Standard Deviation
I have a higher workload when teaching an online course as compared to the traditional one	4.04*	0.96
It takes me longer to prepare for an online course on a weekly basis than for a face-to-face course	3.46*	1.37
I receive fair compensation for online teaching	4.07	1.25
I am concerned about receiving lower course evaluations in the online course as compared to the traditional one	2.61*	1.45

The table above includes the four survey questions from the Institutional Satisfaction Subscale of the OFSS with the accompanying average scores and standard deviation among the participants.
* Items reverse scored

The final scale was the Time Management Behaviours Scale. The two subscales included examined how often the instructors set goals and priorities (goals) and utilized planning and organizational tools (mechanics). The participants rated the items on a 5 point scale including "Almost always true", "Occasionally true", "Usually not true", and "Almost never true". The overall score for goal and priority setting was 4.29 (SD = 0.62) and 3.91 (SD = 0.68) for mechanics (See Appendix B for the score for each question).

A Single Factor ANOVA was run to determine if there were any significant differences in the survey scores in terms of various demographic factors. A summary of the results is presented in table 4.2.2.3. The numbers in bold highlight the demographic factors that were found to be statistically significant. The following tables (Tables 4.2.2.4 – 4.2.2.6) provide a more detailed description of the factors that suggested significance including the counts, mean and variance of each category.

Table 4.2.2.3. Single Factor ANOVA of Demographic Factors

		Demographics				
	Surveys	Department	Tech Comfort	Employment	Class Size	Research
P-Values	Student-factors	0.977	0.116	**0.019**	0.973	0.871
	Instructor-factors	0.144	0.123	0.282	0.334	0.438
	Institution-factors	0.463	0.944	0.692	0.865	0.058
	Vigor	0.566	0.141	0.081	0.949	0.455
	Absorption	0.303	0.166	0.142	0.738	0.192
	Dedication	**0.043**	**0.004**	**0.068***	0.430	0.616
	Mechanics	**0.046**	0.617	0.884	0.189	0.287
	Setting Goals	0.511	0.358	0.531	0.170	0.861

The table above reports the p-values of a Single Factor ANOVA testing whether there are differences in the overall average of the participants sub-scale scores when grouping them based on demographic factors. The numbers in bold fell below the alpha level of 0.05.
* When comparing "has outside work" to "no outside work" the p-value drops to 0.013

Table 4.2.2.4. Breakdown of Department Demographics by Count, Mean, and Variance

		Dedication (p = 0.043)		Mechanics (p = 0.046)	
Department	Count	Mean	Variance	Mean	Variance
Faculty of Arts	8	4.25	0.34	4.04	0.38
School of Business	2	4.67	0.00	3.82	0.15
Continuing Education	2	4.83	0.06	4.68	0.04
Faculty of Fine Arts	4	4.67	0.22	3.82	0.44
Kinesiology & Health Sciences	2	3.67	0.00	4.50	0.20
Faculty of Nursing	4	3.46	0.17	3.66	0.28
Faculty of Science	3	4.44	0.48	4.24	0.43
Faculty of Social Work	3	4.33	0.44	2.88	0.21

The table above reports a more detailed description of departmental differences when looking at the Dedication Sub-Scale of UWES and the Mechanical sub-scores of the Time Management Behaviours Scale, both of which showed a statistically significant difference between departments. Kinesiology & Health Sciences, the Faculty of Nursing, and the Faculty of Social Work are lower in Dedication than the other departments. Mechanics varied between departments, but was fairly consistent with in the departments, with the Faculty of Social Work having the lowest score.

Table 4.2.2.5. Breakdown of Technological Comfort Levels by Count, Mean, and Variance

		Dedication (p = 0.004)	
Technological Comfort Level	Count	Mean	Variance
Adequate	8	4.33	0.25
Comfortable	12	3.88	0.36
Early Adopter	8	4.75	0.15

The table above reports a more detailed description of how the participants' Dedication Sub-Score of the UWES differed when grouped by Technological Comfort, which was a statistically significant factor. Those that were Comfortable with Technology had lower dedication scores. See table 3.3.1 for a description of the Comfort Levels.

Table 4.2.2.6. Breakdown of Employment Demographics by Count, Mean, and Variance

	Student-related (p = 0.019)				Dedication (t-Test p = 0.013)		
Employment	Count	Mean	Variance	Employment	Count	Mean	Variance
None	16	3.73	0.24	None	16	4.01	0.45
Occasional Part-time	5	3.59	0.25	Some	12	4.58	0.14
Part-time	4	3.18	0.44				
Full-Time	3	4.51	0.15				

The table above reports a more detailed description of how employment was associated to the survey results. When analyzing employment by the four employment categories, there was a significant difference between the groups and those that had a full-time job, in addition to teaching, had the highest Student-Related Satisfaction scores in the OFSS. When comparing people with employment to those with no employment, there was a statistically significant difference in the Dedication Sub-Scale of the UWES between the groups. Those that had outside work in addition to teaching had higher dedication scores.

To determine if there was a relationship between instructor satisfaction, engagement, and time management, a Pearson r correlation test was completed between the scores on the test. Table 4.2.2.7 shows the results of the analysis; the statistically significant ($p \leqq 0.05$) relationships are in bold. These results highlight that there is a positive co-relation among the different aspects of engagement (absorption, dedication, and vigor), which was anticipated. The results also show that there is a positive relationship between satisfaction with teaching and satisfaction with student interactions. Interestingly, the other aspect of satisfaction measured (institutional interactions), showed no relationship to satisfaction or engagement. Yet, satisfaction with student interactions increased each aspect of engagement. Additionally, satisfaction with teaching (instructor satisfaction) were positively correlated to feelings of vigor and dedication to teaching online.

Table 4.2.2.7. Pearson r Correlations among Survey Sub-scales

	Student	Instructor	Institution	Vigor	Absorption	Dedication	Mechanics
Instructor	**0.635**						
Institution	0.103	0.287					
Vigor	**0.789**	**0.647**	0.106				
Absorption	**0.486**	0.363	-0.233	**0.685**			
Dedication	**0.584**	**0.776**	0.100	**0.595**	**0.553**		
Mechanics	-0.020	0.014	0.020	0.213	0.319	-0.064	
Goals	-0.232	-0.060	-0.140	0.055	0.294	-0.0267	0.608

The above table reports the Pearson r correlation values between the tests. The values in bold identify statistically significant correlations at $p \leqq 0.05$.

4.3 Discussion

In this study, no relationship was found between research priority and time management skills and instructor satisfaction or engagement. Because this study took place at the University of Regina and the previous at the University of Saskatchewan, the study does not negate the findings at the University of Saskatchewan, but it suggests there might not be one primary barrier to online teaching; the culture of the institution is likely a variable. This supports the research by Hartman and his colleagues who concluded there are several factors at a university that affect faculty satisfaction (Hartman, Dziuban, & Moskal, 2000). They identified ten environmental factors that affect faculty satisfaction: reliable infrastructure, high-quality faculty development, extensive faculty support, faculty recognition and incentives, interdisciplinary approach, experience with educational technologies, student support, assessment, institutionalization, and continuous improvement. Institutions would probably all vary in these factors creating different barriers at different institutions.

This study did however suggest that institutions could use similar survey techniques to identify areas that need support at their institution. The analysis found there was a significant difference in the dedication subsection of engagement among departments (see Table 4.2.2.3.). The Faculty of Nursing and Kinesiology & Health Sciences had lower scores (see Table 4.2.2.4.). When this was shared with the Flexible Learning Division, they noted those two departments were undergoing program restructuring. This survey indicates that that process might lead to burnout among those involved in online instruction. Another consistent trend was that it was the instructors' sense of dedication that seems to be one of the most important variables in this sample. The instructors' sense of dedication (overall average 4.26) is much higher than their vigor (overall average 3.52) or absorption (overall average 3.60) engagement

scores (see Appendix B for the detailed results). This indicates that the instructors shared sense of dedication might help to increase engagement and compensate for a lower sense of vigor and absorption. It was also interesting to note this survey showed that the instructors were unhappy with the institution-related factors that affect online education, but these factors did not correlate to their sense of engagement. It is hard to say why this is so, but maybe a strong culture of dedication to quality instruction is more beneficial than policy that offers extrinsic motivators. Because the institutional satisfaction subscale, which focus on institutional policy, did not appear to affect engagement or the other subscales of satisfaction, it raises the question of whether institutional culture is more influential than university policy. The questions in the institutional subscale (Table 4.2.2.2) do not assess the institution's culture. More research is needed.

This study did find a correlation between student interaction and instructor engagement. Positive student interactions were positively correlated with all three aspects of engagement and instructor-factors of satisfaction. The instructor-factors sub-scale of the OFSS was also positively related to dedication and vigor, but not absorption. These findings indicate that the connection between teacher presence and student satisfaction is more complicated than merely requiring instructors to post more in online forums. Instructor engagement teaching online is not independent from student interactions and therefore student presence. Although more research is needed, this study does highlight the need to understand how student presence is connected to teacher presence. This is an important consideration, because if teacher presence and engagement is related to student presence, online courses might suffer from an initial cold start problem. Instructors might feel just as disconnected from the classroom community as the students in courses with low student presence.

4.4 Conclusions

This study highlighted two important considerations for improving online education. First, the barriers that online instructors face will likely vary from institution to institution; it is unlikely there is one solution to decrease the barriers to online instruction. This suggests that centers that support online education at institutions might benefit from completing internal evaluations, similar to this study, to understand how to support their online instructors in their unique context. As more research into the barriers teaching online at institutions is collected and shared, larger patterns might emerge.

Second, the connection between teacher presence and student presence might be co-linear. If so, then approaches that focus on promoting teacher presence to increase student presence and create a Community of Inquiry might be a false start. If teacher presence does in fact orchestrate student and cognitive presence, but instructors are not present because they are not engaged in the teaching environment, then a course might suffer. This might be a paradoxical situation where teacher presence is needed to encourage student presence, but student presence is needed to engage the teacher helping them to be present. If this is the case, then creating a Community of Inquiry online is far more difficult than mandating minimum levels of instructor interaction.

Increasing student presence without instructor intervention might be the first step towards creating online environments engaging for both the instructor and the student. If we could create student presence without the instructor, this might help to engage the instructor in the course. Once they are engaged in the course, a positive feedback loop would be expected where higher student presence creates higher teacher presence that creates higher student presence and cognitive presence. The first step would be to discover if it is possible to create student presence without an instructor present. The next chapter will discuss an educational tool called NECSUS that was designed to discover how to design learning environments to increase student presence.

5 PROJECT 3: NECSUS

The studies in the previous two chapters outlined why it is important to understand how to encourage student presence without a teacher present. The work described in this chapter aims to test whether it is possible to increase student engagement without teacher presence. The GRS 960 graduate ethics course offered by the University of Saskatchewan was chosen to explore this question because the course is designed to be taken online with little to no student-teacher interaction. The objective of the course is to introduce students to Canadian behavioural research ethics and academic ethical standards. By the end of the course, the students should be aware of the Tri-Council Policy Statement on ethical conduct for research involving humans, the University of Saskatchewan Academic Code of Conduct, legal definitions of intellectual property, and conflict resolution skills. The course is short a pass\fail text-based independent study course. It is possible for a student to complete the whole course with no interaction with the instructor; this made it an ideal to test to understand whether student engagement could be increased without instructor presence. Increasing student engagement for this course is important because the students are encouraged to complete the course slowly to reflect on the content before completing the tests, but there was no mechanism to encourage the student to reflect on the content. Adding a social component where they discuss the content with other students could facilitate such contemplation.

The conceptual framework at the root of the Community of Inquiry model is that community supports higher-order thinking. Beyond that, some have argued that teacher presence is key to creating high-order thinking in online communities of inquiry (Garrison, Anderson, & Archer, 2000; Garrison, Anderson, & Archer, 2001; Garrison, Cleaveland-Innes, & Fung, 2010). Some argue that if there is no teacher presence, students will not engage in substantial discourse (Garrison & Arbaugh, 2007). If students must participate and reflect, and have a common goal, they might reach synthesis or resolution phases of higher-order thinking, but will primarily reject or accept their own ideas, not come to a group consensus (Garrison & Arbaugh, 2007). If this were true, we would expect that the online GSR 960 course, which requires no student participation in the forums and has no instructor present, should show no signs of a Community of Inquiry or higher order thinking. This project aimed to test whether it is possible to build a system that encourages student engagement and high-order thinking without the presence of an instructor.

5.1 NECSUS Design

NECSUS is an advanced learning technology that was designed for the GSR 960 graduate ethics course. The ethics course could be completed in a day or two, but students were encouraged to take more time to allow for reflection on the content. The course is entirely text-based, and learning is assessed via two multiple-choice quizzes and one short answer question; the short answer question is manually graded by an instructor. The course is pass/fail and students have to obtain 100% to receive a pass. There is no required student interaction in the course and the students could not contact each other even if they wished. The course is text-based and there is little student interaction with an instructor. The students have the option to email the instructor, and the instructor has the option to provide feedback on the short answer question, but no interaction is required on either part.

NECSUS provided an optional social component for the students in the course to use. The course content was unchanged, and students were not required to interact, but interpersonal interaction was an option available to them within the confines of NECSUS in the form of discussion boards. NECSUS did not require any interaction between the students and the instructor. The instructor did have to grade the short answer question and evaluate the tests, but no communication was required.

NECSUS was a standalone system that did not operate in the original course's LMS (Blackboard). Although NECSUS relied on forums for student communication, much like Blackboard, NECSUS highlighted the social nature of the course. To navigate to the course content, students would go to the course map, which was a visual representation of the course content with an overlay of their social network (see figure 5.1.1). The links to course discussions on the course map page also indicated how many discussions there were in the forum. Highlighting the social nature of the course through design was an important feature of this system, as widely used Learning Management Systems are not designed to support social awareness. To incorporate a visualization that depicted the students' participation rate, the navigational map in NECSUS also gave students feedback about how often they were using course tools. If students rarely visited the course, the map would fade making it more difficult to navigate. This visualization represented course content fading in their memory. How much the course faded depended on both how often the student logged into the course and how much they interacted with the course while logged in. Every action the student performs (e.g. reading a

forum post, reading course content, taking a quiz, posting on a friend's wall, etc.) earns the student 30 "health points". These health points decay at a rate of 4 points every two hours between logins. If the student's health points go below 500 points (students start with 1000 points) the navigation links become 50% transparent. As their points continue to decay, the course fades more with links 75% transparent below 300 points, and links 90% transparent below 100 points (see figure 5.1.2).

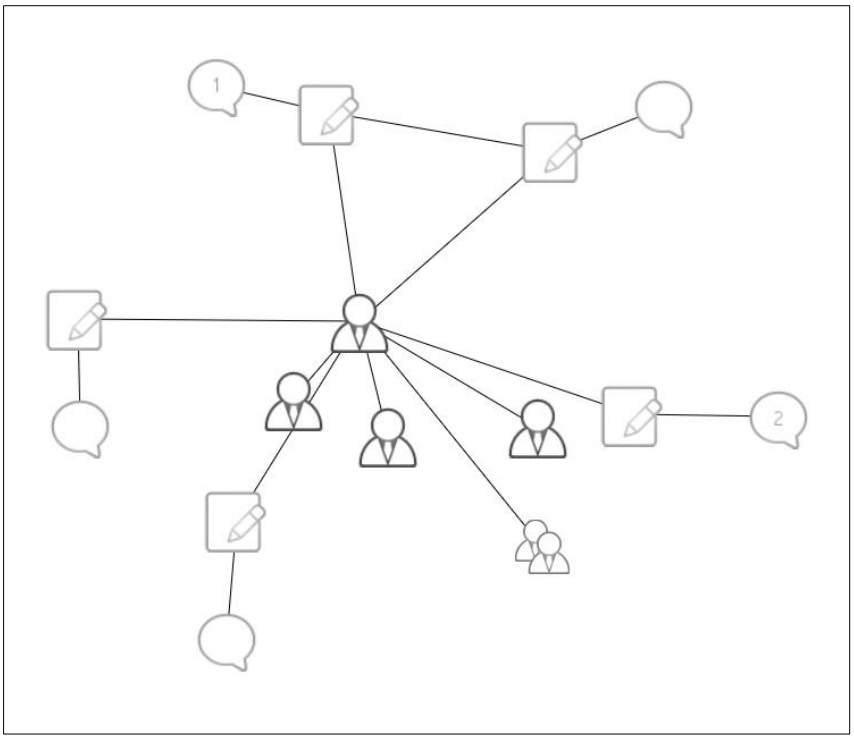

Figure 5.1.1. Screenshot of NECSUS Map Navigation

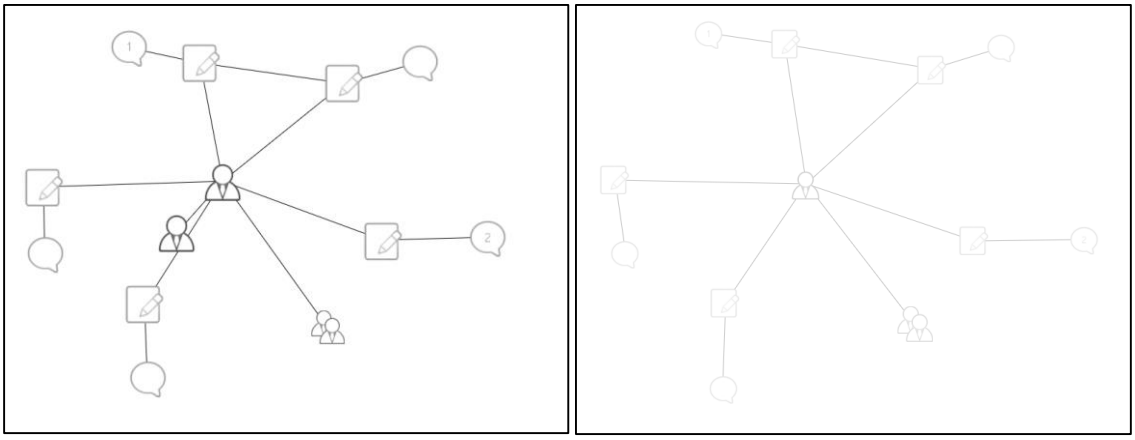

Figure 5.1.2. Screenshot of a Healthy and Unhealthy Student Map up to 90% Transparent

The gaming approach of NECSUS was inspired by game dynamics found in the games *The Sims*, *EverQuest*, and *Farmville*, which all explicitly require strategic friendships. These games are designed to require players to develop friendships to be successful in game situations. This kind of "strategic sociality" encourages individuals to build and maintain relationships for their utility in coping with modern societal pressures (Nutt & Railton, 2003). Maintaining a friendship that offers networking opportunities, but no personal fulfilment, would be one such strategic social decision. Similarly, NECSUS was built around strategic sociality to encourage interaction to solve problems.

The object of the game *The Sims* is to advance in your (simulated) career and acquire material goods. The appeal of the game is that it allows players to develop rich narratives about the characters they create (Griebel 2006). A central task of the game is building and maintaining friendships with non-player characters (NPCs). Friendships are required for career advancement, and, in the newer editions, can offer networking opportunities. Players create friendships by having positive interactions with NPCs and avoiding negative interactions. Once players reach a threshold of positive points, the player and the NPC are considered friends. Over time, accumulated friendship points deteriorate and social grooming is required to maintain the friendship. In *The Sims*, social grooming includes a full range of intimate social activities from talking to (simulated) sex.

NECSUS incorporated a similar friendship system. Students could not add friends, as one could on social platforms similar to *Facebook*. A study by Ball & Newman (2013) found that in such social networks where members add friends Junior High and High School students will generally create networks where only 50-30% of the person's network is with people they actually know. Typically, the majority of the ties will be non-reciprocal ties to those with higher social status. Instead, in NECSUS students started the course friended to all the other students (900 friendship points), but their friendship points would deteriorate (3 points per hour between logins). If friendship points fell below a threshold (500 friendship points), then the friendship would be lost, which was represented by friends disappearing from their map (see figure 5.1.3). Each interaction with their friend would add approximately two days to the friendship and the students started the course with enough points to sustain the friendship for the first eight days. This feature encouraged social grooming behaviours. In the NECSUS system, social grooming consisted of behaviours such as replying to a friend's posts, liking a friend's post, visiting a

student's profile pages, or leaving comments on profile pages. Conversely, students could lower their friendship points by disliking posts, or deleting their friends' posts on their wall (see figure 5.1.4). As in *The Sims*, students could see a progress bar under their friend's icon that would warn them if their friendship point were getting low. Losing friendships, as in *The Sims*, had consequences for the students. Students could only see the forum posts of students they were friends with; non-friend posts, and any replies to that post, would include a message that the content was unavailable (see figure 5.1.5).

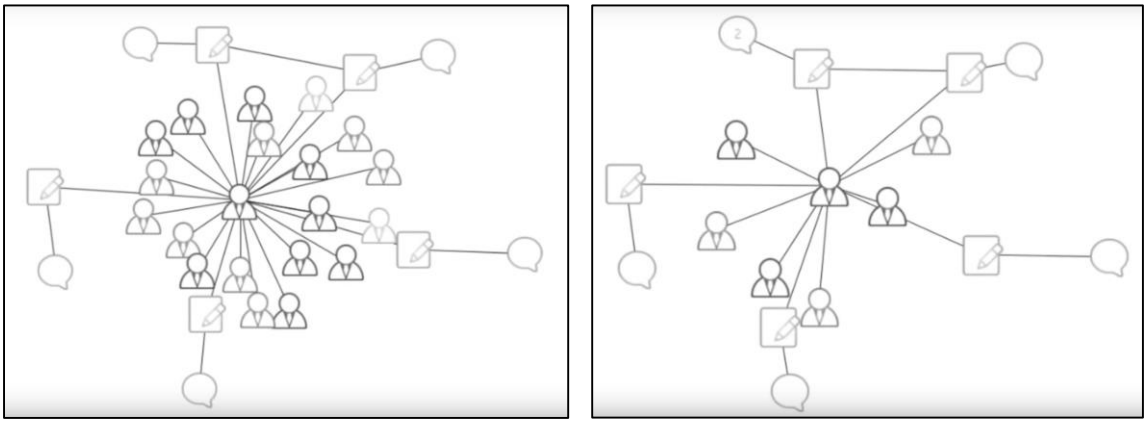

Figure 5.1.3. A Navigation Map with many Friends and one with Few Friends.

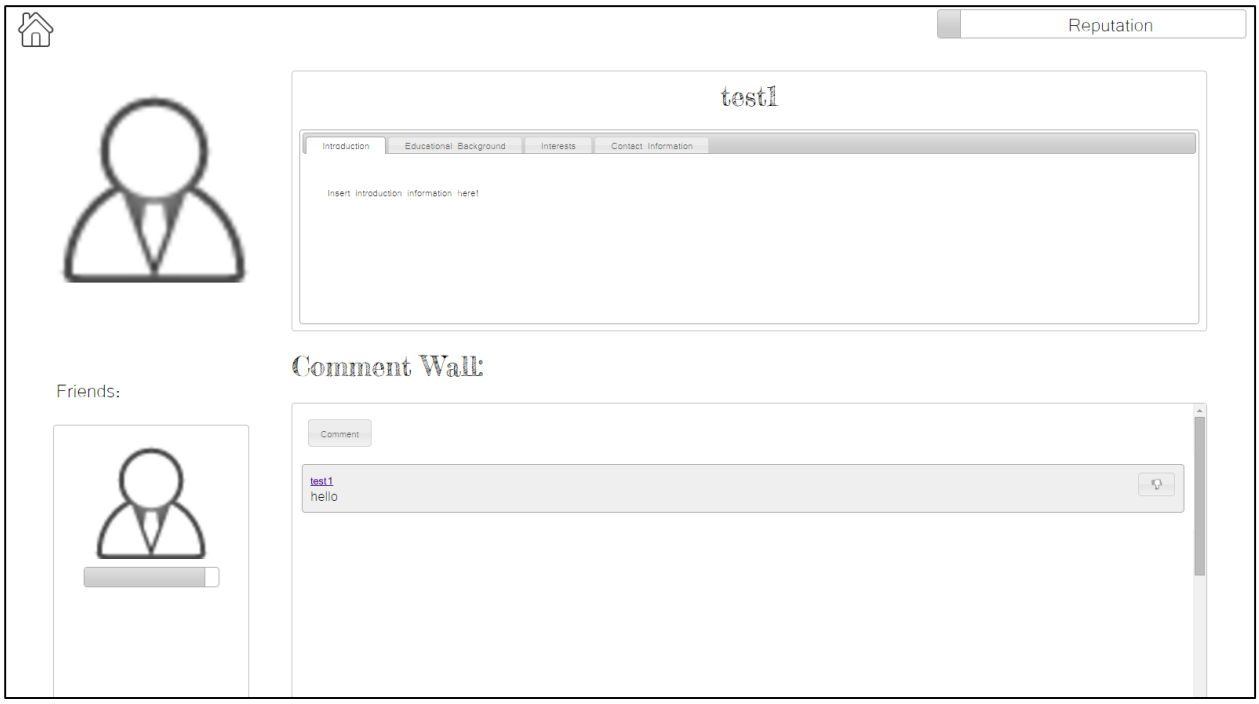

Figure 5.1.4. Screenshot of Student Profile Page with a Wall Comment

Figure 5.1.5. Screenshot of Message Boards with a Message from a Non-Friend

This approach of quantifying relationship statuses is similar to a system designed by Webster and Vassileva (2006). They designed an article sharing system that changed users visibility based on the number of interactions members have with each other's content. As a user viewed more posts by one member, that member's posts became more visible to that user. A major difference between their system, *The Sims*, and NECSUS is that users started with no relationship points in Webster and Vassileva's system and in *The Sims*. In NECSUS, everyone began as friends to highlight the loss of a relationship over the gain of one. This decision was informed by an economic theory that people have a greater aversion to losing something than they have an attraction to gaining something (Tversky & Kahneman, 1991).

Strategic sociality was incorporated into NECSUS by adopting an approach common to Massively Multiplayer Online Role Playing Games (MMORGPs) where collaboration is necessary for success. MMORPGs, like *EverQuest*, build interdependence of players into the design of the game. Not only are quests designed to be too difficult to win alone, the quests also require different character types to play together. A common strategy to defeat a high strength Non-Player Character (NPC) involves coordinating a tank, DPS (damage per second) player, and a healer. Using this strategy, players with high armour (tanks) engage in close combat to attract and absorb potential damage from the NPC. Nimble characters with weaker armour, but strong long-range weapons, or DPS players, attack the NPC from behind the tanks. Finally, healers heal players, especially tanks, who take damage to ensure they do not die. This strategy is well known and allows unfamiliar players to quickly take on different roles and collaborate (McDonald, 2010). The co-dependence of players, coupled with clear and distinct roles, helps co-operation and encourages social solidarity (Durkheim, 1933) between players. Brad

McQuaid, the co-creator of *EverQuest*, included this interdependence specifically to encourage cooperation hoping it would foster community (Taylor, 2006).

Few educational MMORPGs exist, but some lessons have been learned about how they can affect student learning. For example, *Talking Island* is an educational MMORPG designed in Taiwan to teach students English (Hou, 2012). It features role-playing where students can perform scenarios, like buying groceries, alongside more traditional learning activities like flash card recall. Students can also work together in the game world to solve the learning challenges they encounter. Hou (2012) analyzed the students' activity in *Talking Island* over 335 days to understand how students behaved in educational MMORPGs. He found that the format did have the potential to support student learning, but students primarily engaged in "battle" activities as opposed to cooperative activities. Battle activities included challenging other students to contests, whereas, cooperative activities would entail working together to solve a mutual problem. He also found that the MMORPG format supports social behaviour. Players that played often displayed a high degree of social interaction.

NECSUS incorporated MMORPG elements by creating interdependence among students. Interdependence was incorporated by including a test challenge feature. This feature gave the students the option to challenge the answer to a multiple-choice test question marked wrong (see figure 5.1.6). Because NECSUS was designed for an ethics course and ethics is contextual, some of the multiple choice questions based on scenarios could be ethically negotiated different ways. To challenge a question, the students must create a forum post that explains why they think the answer they chose was correct (see figure 5.1.7). If three other students supported the student's argument, indicated by liking the comment, the challenge was considered won, which prompted the instructor to consider giving the student credit for their answer. Framing this cooperative element around the notion of a battle, would potentially appeal to the students, much as similar competitive aspects did in *Talking Island*. The test challenge feature introduced interdependence to the course, but by itself did not encourage strategic sociality. However, because only friends could see the challenge post, the test challenge feature required students to maintain their friendship network.

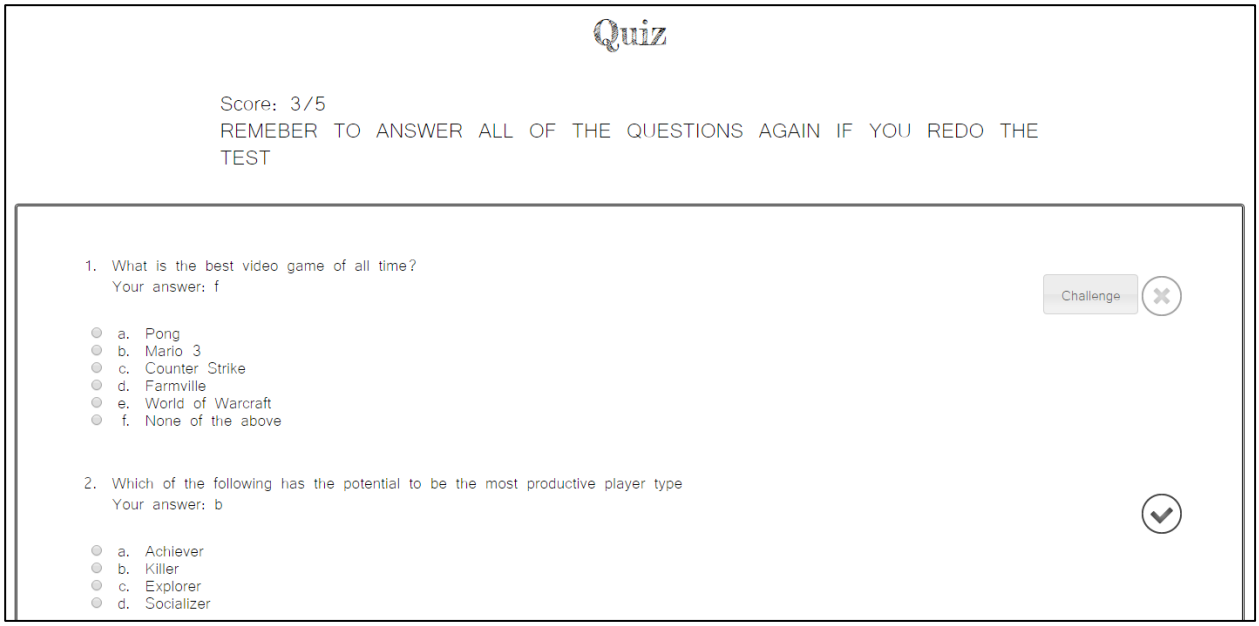

Figure 5.1.6. Screenshot of Test Challenge Feature for Incorrect Answer

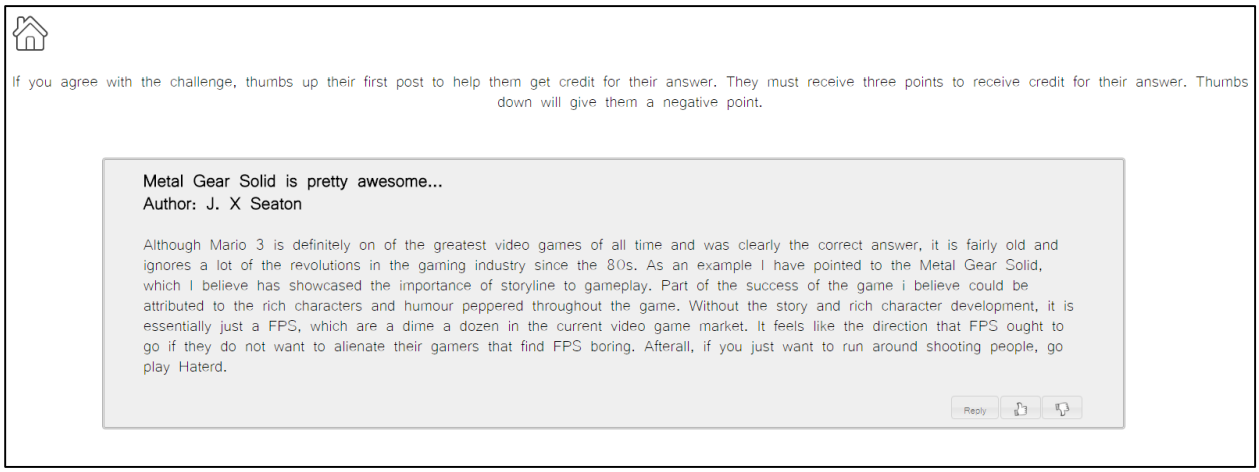

Figure 5.1.7. Screenshot of Test Challenge Forum

Simply requiring friendships can encourage people to game the system. This type of gaming can be seen in forums for games like *Farmville*, which often feature "Add me" threads. To counter this problem, *Farmville*, and similar games, require not only a high number of friends, but also a high number of actively playing friends. An early quest in *Farmville 2* is to build a water well, which requires a wood plank, a brick, and metal. The problem is that you cannot harvest those items, nor, at that level, craft those objects. You have to request that your in-game friends send you the items you need. To do this, your friends must log into the game,

see that you requested items, and click the "Help" button. This ensures that every player has a vested interest in encouraging their in-game friends to continue to play the game.

A similar dynamic was added to NECSUS by making friendship one-way. Therefore, if a student became friends with someone to see their post, it did not guarantee that that original poster could see their reply. This means that not only must social interactions be positive, they must be reciprocated between friends to maintain communication. This feature had the strongest bearing on the test challenge feature. To win a challenge, students needed three friends to vote up their challenge, which meant they needed to encourage others to do actions that would maintain their friendship. Just as in *Farmville 2*, it was not enough just to have friends; your friends needed to be actively participating in the system.

Visualizations that show the reciprocity of relationship have been shown to be a promising tool to encourage reciprocity in social networks (Raghavun & Vassileva, 2011). Lambropoulos, Faulkner, and Culwin (2012) also suggested that visualization tools depicting social networks and participation rate were useful to increase social knowledge construction; however, they noted that tutors were still needed to assess the students' knowledge. In their study, the tutors assisted by assessing student understanding and encouraging the students to post comments and connect their interactions to educational tasks. Tying the friendship system to the test challenges aimed to mitigate this potential problem. The student social interactions with each other were linked, via strategic sociality, to the goal of completing the course and demonstrating their knowledge. In the case of NECSUS, tutors were not necessary because the students shifted into the role of a tutor when they assessed each other's test challenges.

5.2 Pilot Study

A proof of concept study with 13 graduate students taking GSR 960 at the University of Saskatchewan in the Fall of 2012 was conducted to test the initial design of the NECSUS system (Seaton, Traves, McCalla, & Schwier, 2013). When students logged into the system they were taken to the navigation map where they could see the course content and their social network. The home page would also show the students how many discussions threads were currently in the forums. The student could then navigate to the content or their friends' profiles by clicking on the course page icons or their friend's avatar on the map page. The course content pages included all of the course information for one module and contained a test for them to complete

once they read the content. At the end of each module, there was a discussion forum where students could discuss the course content and a separate forum they would gain access to after they completed the test to discuss the test content. If the students navigated to their friends' profile pages, they would see their friends' information and have the option of commenting on their profile wall. The student's profile page looked the same, but they could edit the user information and had a button to check their grades (see figure 5.2.1).

Figure 5.2.1. Screenshot of Student Profile Page

The largest hurdle that the system faced is that students did not visit the site regularly. The sparse usage meant that students were not in close enough temporal proximity to have the opportunity for much interaction. The mean time between sign-ins in this cohort was 5 days 14 hours and 28 minutes. Further, students only logged in an average of 4.72 times. This means that students did not have many opportunities to see other students' activity and few chances to interact themselves. The lack of usage made the maintenance of friendships very difficult. Because the friendship points degrade while students are offline, when they signed back in, they rarely have any friendships and could not participate in the forum conversations. The possibility of being in a community did not appear to be enough of a motivator to encourage students to log into the system more often.

The most successful aspect of the course was the test challenge feature. Nine challenges were made by six students. Some challenges were inspired by the misunderstanding of a question or a question about interpreting a regulation. The exciting and useful aspect of the challenge system is it gave students an outlet to demonstrate their learning when a standard multiple-choice test would not have caught that learning. A student who interpreted a question differently could still demonstrate that they understood the core lesson that the test is trying to assess.

5.3 NECSUS Design Changes

The pilot study indicated that some design changes were necessary to increase the student participation rate. Therefore, NECSUS was re-designed and re-tested. The conclusion of the pilot study was that the students seemed to require a model demonstrating how to create discussion topics. Most of the discussions in the forums during the pilot study focused on either pointing out usability issues, or creating test challenges. I hypothesized that the test challenge feature encouraged more discussion because the multiple-choice questions provided a model of ethical issues to discuss that related to the course content. This hypothesis was based on the role of teacher presence in the Community of Inquiry framework, which required teachers to model desired behaviour (Garrison, Anderson, & Archer, 2000). To simulate this, an additional forum called "Practice Area" was added (see figure 5.3.1). The re-designed NECSUS gave students ambiguous ethical questions based on course content, and were asked how they would resolve the conflict. I developed six questions, which were then approved by the instructor and added to the practice area. The application automatically posted two questions a week over the three week course. To encourage students to answer the additional questions, which were a not required component of the course, a scoring system was added. If a student's suggestion was liked, they received 10 points that were added to a leader board. As an added enticement, students could trade in 30 points to attempt a Kobayashi Maru Challenge (see Appendix C).

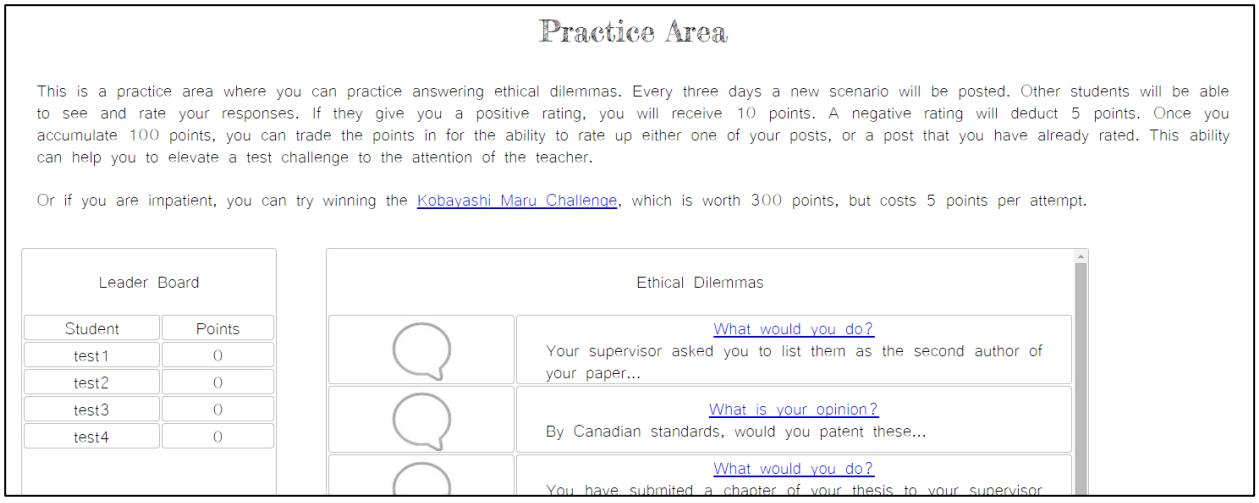

Figure 5.3.1 Screenshot of Practice Area

The Kobayashi Maru was a test created on the television show *Star Trek* (Meyer N. , 1982) where Captain Kirk is presented with a "no win" situation and must try to act anyway. Drawing from this idea, I defined a "Kobayashi Maru" test to be an unbeatable test where the goal is to learn through the process of attempting the test, not by completing the challenge. An important aspect of the test is to humble the student by demonstrating that there are no easy answers in real life. In this study, students were told that the test for the course was not unbeatable, but that it will take a "superior understanding" of Ethics policy, and that no cheating was allowed. The test consisted of asking the students whether they would approve an ethics protocol application. The test was unbeatable because the students would need to recognize that the presented study did not require ethical review because it was not classified as research based on the Canadian Tri-Council Policy Statement. The study presented to the students involved analyzing the design of software not how human subjects use the software. If the student successfully recognized this, they would be given the ability to automatically elevate any test challenge (including their own) without requiring the support of three other students.

The final change made to NECSUS after the pilot study was tweaking elements that enhanced the social presence of the students. When students signed into the course, instead of seeing the map, they started at their profile page and alerts were added to their comment wall if they received any likes or replies on their comments (see figure 5.3.2). The friendship dynamic was also changed to help students maintain friendships. Friendships still degraded over the same time (approximately two days for each interaction), but friendship points became easier to acquire once a friendship was lost. Once a friendship was lost, interactions with the former

friend (i.e. visiting their profile, commenting on their wall) gave the student a 50% chance of regaining the friendship. For example, if a student required 100 points to regain their friendship, an interaction would randomly give them between 50 and 150 points.

Figure 5.3.2 Screenshot of Comment Wall Alerting Student to Activity

5.4 Second Study

To understand if the changes above were successful in improving student participation, NECSUS was tested with two groups of students. Twenty-six graduate students were recruited in the winter semester of 2013 to test NECSUS. Twelve students completed the course at the beginning of the semester and fourteen students completed the course at the end of that same semester. The recruitment targeted graduate students who had lived in Canada for at least 10 years. This restriction was included because ethical understandings may vary from culture to culture and the study was not designed to explore that pedagogical aspect.

5.4.1 Use Case

When a student logged in, they would start on their profile page. This would alert them if anyone commented or rated any of their posts since they last signed in. Their profile page would also allow them to change any user information they would like such as their password, picture, or personal information (introduction, educational background, interests, and contact

information). They could also view their grades in the course. From this page, they could navigate to one of their friend's profiles by clicking on their picture, visit the profile of someone that posted on their wall, or go to the main navigation page. The main navigation page contained the links to the course content, discussion boards, and practice area. If they clicked on the course content, they could view the module, see the forum discussions, and take any course tests (see figure 5.4.1.1). Although students were encouraged to reflect on the course content, the course was designed so the student could take the test immediately after reviewing the content. Once they took the test in the NECSUS system, they had to wait 3 hours to see the results. However, immediately after they submitted the test, they could view the test discussion area and any test challenges created.

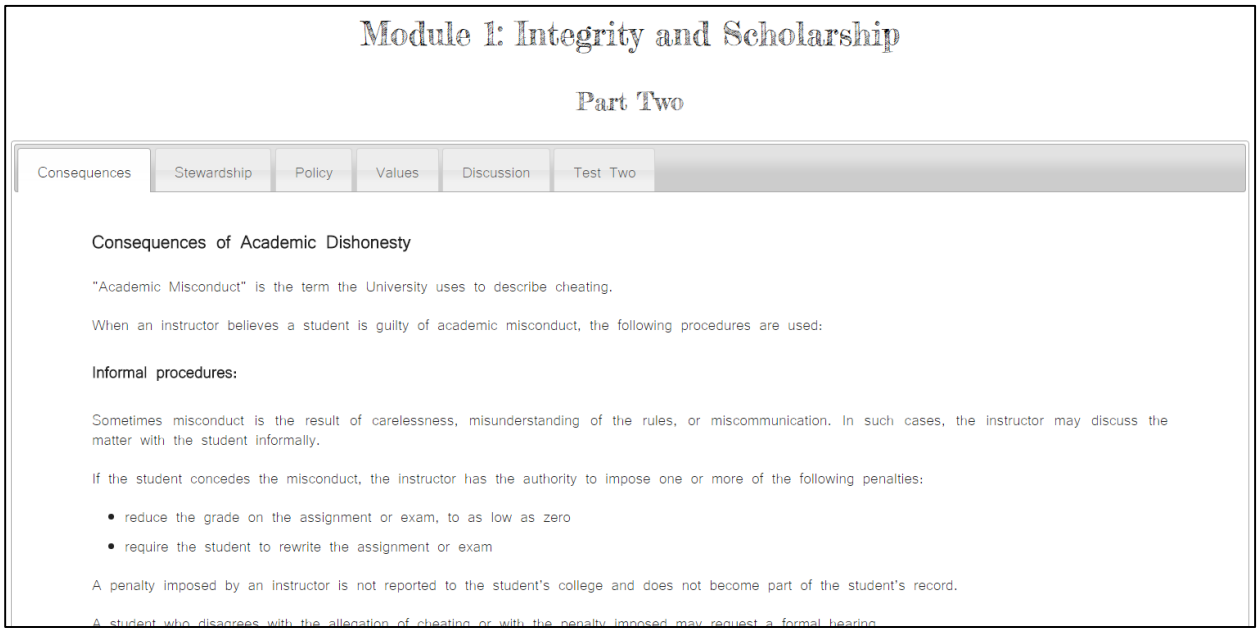

Figure 5.4.8 Screenshot of Course Content Page

The user features that are unique to NECSUS in comparison to many online courses include the test challenge feature, the practice area, and the Kobayashi Maru challenge. Although none of the students attempted the Kobayashi Maru challenge, the other features were popular. A student would gain access to the test challenge feature by completing a quiz and getting a question wrong. If the student reviewed their answers, a button would appear next to the wrong answer and ask them if they would like to challenge the test question. If they chose this option, a forum would be created where they could support their answer for other students to vote on. Otherwise, the student must reattempt the quiz to obtain the required mark of 100%.

Students could also debate ethical issues in the practice area. Every week, two new ethical questions would appear for the student to debate. See Appendix D for the list of topics.

5.4.2 Analysis

The NECSUS System tracked student usage. The time when they logged in was tracked and any activity they did while using the system was recorded. Their user id, activity description, number of health points, and a time stamp were stored in the system database. These data were used to get an overall picture of which features the students used and how often they interacted with the system.

The postings that students made during the course were coded for indicators of Community of Inquiry. The coding scheme adopted in the study conforms to the coding framework employed by Shea and his colleagues (2010) (see Appendix E). The coding system that they developed allows researchers to quantify the pattern and level of student, teacher, and cognitive presence in a course to directly measure the level of Community of Inquiry in a class. This method is more reliable than previous measures that rely on survey methods that reflect participant perception (Shea, et al., 2010). The unit of analysis for coding was individual posts, including both thread posts and posts on students' profile walls. This coding technique allowed more than one indicator in a post for each category of teacher presence and social presence. "Open communication", which is a sub-category of social presence, includes: "Continuing a thread"; "Quoting from others' messages"; "Referring explicitly to others' messages"; "Asking questions"; "Complimenting", "Expressing appreciation"; "Expressing agreement"; "Expressing disagreement"; and "Personal advice" (Shea, et al., 2010, p. 19). The complete list of categories with descriptions is included in Appendix E.

5.4.3 Results

<u>Participants</u>

One prominent finding of the second study was that there was a large disparity in the level of discussion activity between the two groups of students. The first offering, started with twelve students, seven of whom completed the course, and had eight students that posted at least once.

The second offering, started with 15 students, with nine completing the course, and only two students posted at least once. Table 5.4.3.1 contains the data about these two offerings.

Table 5.4.3.1. Participant Profiles and Use Rates

User Stats							Features Used												
User ID	Number of Logins	Average hours between logins	Average Health points	Changed Profile Picture	Changed Profile Description	Reputation	Re-took Test	Created Test Challenge	Viewed Test Challenge	Posted in Test Discussion	Viewed Test Discussion	Viewed Course content	Created Discussion Thread	Replied to Discussion Thread	Viewed Discussion	Replied in Practice area	Viewed Practice	Rated Discussion Post	Rated Test Challenge
First Course																			
3	10	39.9	2822	0	1	0	0	0	0	1	17	47	0	1	14	1	7	2	0
4	12	32.4	1959	1	0	0	0	0	3	0	2	28	0	0	5	0	0	0	1
5	5	59.9	903	0	3	0	0	0	3	0	4	31	0	1	8	0	1	0	1
6	12	78.1	2848	0	2	0	0	1	4	0	4	48	1	1	23	1	21	0	0
7	21	22.6	5129	0	1	0	0	0	3	0	6	67	0	0	9	0	2	0	1
8	1	N/A	1025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	6	59.9	1074	0	0	0	0	0	0	0	6	26	0	0	0	0	0	0	0
10	14	45.9	2422	0	3	460	0	0	0	1	8	44	1	1	5	0	7	0	0
11	25	18.6	3446	0	1	0	0	0	0	1	11	49	0	0	10	1	5	2	0
12	1	N/A	1043	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
13	1	N/A	1467	0	0	237	0	0	0	0	1	8	0	1	4	0	0	0	0
14	3	53.4	1436	0	0	90	1	0	0	1	5	40	0	1	6	2	11	0	0
Second Course																			
3	19	21.7	3704	1	3	0	0	1	2	0	4	30	0	0	0	0	0	0	0
5	15	22.8	1173	0	4	0	0	0	3	0	7	30	0	0	2	0	0	0	1
7	14	49.4	1630	0	2	0	0	0	0	0	7	48	0	0	1	0	1	0	0
8	12	39.0	1707	0	4	0	0	0	2	0	4	33	0	0	0	0	5	0	1
14	9	62.9	1635	0	0	0	0	0	0	0	5	28	0	0	0	0	0	0	0
15	13	25.8	2055	1	4	0	0	0	0	0	4	31	0	0	0	0	0	0	0
16	1	N/A	1036	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
17	4	129.7	1331	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0
18	10	18.2	2104	0	0	0	0	0	0	0	4	19	0	0	1	0	0	0	0
19	12	20.8	2720	0	2	136	0	1	1	0	8	51	1	0	5	1	5	0	0
20	5	17.3	1624	0	0	0	0	0	0	0	4	20	0	0	1	0	1	0	0
21	1	N/A	1055	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	4	28.9	2264	0	0	0	0	0	0	0	11	43	0	0	0	0	0	0	0
23	11	23.4	2880	0	0	0	0	0	1	0	5	45	0	0	2	1	5	1	0

Indicators of Community of Inquiry

Although the course content and the level of teacher presence remained the same in both offerings, the participation in each course differed greatly. The low number of active students dramatically lowered the level of social presence in the second offering of the course. Table

5.4.3.2 outlines the results of the Community of Inquiry coding. Based on the coding schema, the practice discussion questions meet the criteria of Facilitating discussion. Thus, although the course had no instructor present, interestingly, it was not devoid of the characteristics typical of teacher presence.

Table 5.4.3.2. Community of Inquiry Coding Results

Categories	Counts in Course 1 (25 Posts)	Counts in Course 2 (4 Posts)
Teaching Presence		
Design & Organization	0	0
Facilitating Discourse[3]	6	6
Direct Instruction	0	0
Assessment[4]	0	0
Student Presence		
Affective	11	5
Open Communication	21	0
Group Cohesion	8	0
Cognitive Presence		
Triggering Event	4	1
Exploration	1	0
Integration	2	2
Resolution/Application	4	1

The table above reports the quantified content analysis of the Community of Inquiry as developed by Shea et al. (2010) in the two courses.

The indicators of cognitive presence showed a distinct pattern. All posts that reached the resolution phase were test challenges, or posts in the practice area. Among threads that students created, the highest phase reached was Integration (CP-RE-1). The following is a portion of the transcription of that thread from course 1:

> **Student 6:** During my undergraduate education, a professor once pressed us to be vigilant with respect to our own work and that of our peers. Her point was that, for those of us continuing on to graduate school, our peers would essentially be competition. Any advantage they sought in the way of dishonest conduct put our own success at risk. While it could be argued that such a view (of competition amongst peers) might foster or encourage disingenuous behaviour, it was an appealing perspective for me. Critical and reflexive thinking are requisites for graduate education, and this should apply not only to our field of study, but also to the society within which we live. Not that distrust or skepticism should be the way to approach all social relations, but neither should we live naively and in ignorance.
> **[Coded: CP-TE-1 – Recognizing a problem]**
>
> > **Student 13:** It's interesting to read this comment. It makes me wonder about what is going on in many of the on-line courses. I don't think there is anything wrong with sharing work for review, as

[3] Counts represent the six practice area questions. These questions were coded as: FD5 – Drawing in participants, prompting discussion.

[4] The course instructor had the ability to give students written feedback on their short answer question or their test challenges, but did not in either offering of the course.

I am doing with classmates in an instructional design course right now. However, the instructor REQUIRES that we share our work with classmates and comment on it. As you mention here, at the graduate level, it's important to essentially protect your ideas and work. Is forcing students to share and review peer work encouraging accidental plagiarism? When you see something well done in a paper, and walk away from it for a while - how can you be sure that the ideas you come up with later aren't built upon something one of your classmates did? It sounds tricky. **[Coded: CP-TE-2 – Sense of puzzlement]** ***Liked by Student11 & Student3***

> **Student 14:** I don't think there's any way of generating an idea that isn't sparked by an idea somebody else had before you. It is okay to build upon work that somebody else did - as long as the ideas upon which you are building are credited. I would not enjoy going through grad school not sharing my ideas with other grad students, or hearing ideas from them. Learning from peers is half the fun. I don't think it's tricky - you can't control somebody else's behavior, but you can control your own, and choose simply to engage with others generously and respectfully. Peer review is how we learn. **[Coded: CP-RE-1 - Application]**

In contrast, below are two examples of students reaching resolution when replying to a practice question. Both posts address the ethical question as to whether to add your supervisor's name to your paper as second author, who you have consulted when developing your methods, but has only given "you some good advice as to where to submit the paper, [no comments] on the paper".

> **Course 1 Student6:** Yes, you include them as a second author.
> Provision of funding (and thus bench time and space), participation in experiment design, and critique of methods constitute fundamental inputs into the overall research. Without that input and support, the research may not have been undertaken, completed, or found to be unsound science. ***Liked by Student3, Student10, & Student14. Supported and defended by Student11***

> **Course 2 Student23:** Although the supervisor has not been completely involved, he has taught me the idea; I am using his laboratory material and also his support. Also his knowledge has helped to finish the idea.
> I will include him as a second author.

In both instances, the students presented a solution, and defended their answer by citing specific contextual reasons for their decision. Further, students demonstrated the ability to assess each other's understanding using the "like" feature, which is best demonstrated by the test challenges. One test question consistently troubled students. This question asked students how a student

should resolve a conflict with her supervisor. In each of the three offerings of the course (including the pilot), at least one student challenged this question. In each of these cases, the other students in the course had to evaluate the quality of the answer to determine if they believed the student should receive credit for their understanding. It is important to note that the application indicated when a challenge was elevated, so challenges were unlikely to receive more than the three required votes. The following are three challenges:

> **Pilot Student19:** Maybe the correct answer would be to meet with her supervisor first, but because it said "and try to change her mind" I didn't think this the best attitude to enter a meeting with her supervisor. She should talk to her supervisor and try to find out why the supervisor does not think her data collection is sufficient. **[Coded CP-IN-2 – Supported tentative hypothesis]** ***No Likes***

> **Course 1 Student6:** My response to this question was that Jane should call a meeting of the committee. While the "correct" answer is likely to be that Jane should meet with her supervisor and attempt to change Dr. Adams' mind, I argue that the Jane has already taken an adversarial position to their relationship. If she already doubts her supervisor's motives, she may feel that any argument she makes will be futile. Furthermore, at least within the [student's] department, graduate students are required to meet with their advisory committee at least once a year. Given that this time frame had already lapsed, it would appear to be a fortuitous moment for Jane to update her committee members and receive their feedback.
> If we frame Jane's concern as a complaint, the "chain" of action preferred by the CGSR would dictate that she should first attempt to address the issue with her supervisor, and move up hierarchically if she was unable to reach a satisfactory resolution. Although this is seen as an appropriate way to attend to specific complaints, the context of this specific incident would likely need a different approach. Jane's suspicion of Dr. Adams' motives, combined with the failure of those involved to call and attend the required committee meeting, may be best addressed by first getting her program "back on track" overall, thereby avoiding the possibility of an emotionally charged confrontation from detracting from the student-supervisor relationship. **[Coded CP-RE-2 – Resolution]** ***Liked by Student7, Student4, & Student 5***

> **Course 2 Student19:** I think that calling an advisory committee meeting would allow more input from others rather than the student and the supervising professor meeting alone. There may be others' ideas that are helpful to the situation. Then the student and supervising professor could meet to decide how to solve their conflict. **[Coded CP-IN-2 – Supported tentative hypothesis]** ***Liked by Student8 & Student5***

The examples above demonstrate that students were correctly identifying which solutions demonstrated higher learning and only elevated those challenges to the instructor's attention. The only test challenge that succeeded at winning is the challenge by Student6, which

demonstrated higher-order thinking. Further, every post that demonstrated the resolution phase in course 1 (see table 5.4.3.2), received at least one like, with an average of 2.25 likes. Conversely, in course 1 Triggering posts had an average of 0.75 likes, Exploration 0, and Integration 0.5.

NECSUS featured ways for students to create social presence other than posting. The ability to like comments and change their profile allowed students to participate in ways other than posting comments. In both course 1 and 2, two students that did not post used the like feature to vote on test challenge posts. The profile page was another tool to create social presence. In course 1, six students personalized their profile and seven students in course 2. There was also some evidence that profile walls could help students complete social grooming tasks. In course 1, seven posts were made on students' profile walls. The purpose of four of these posts was explicitly to maintain friendships with another student and half of the group cohesion codes were from profile wall posts. The like feature and the profile wall, that is not available in the Blackboard LMS, nor accounted for in the coding system to gauge social presence developed by Shea et al. (2010), gave users different tools to develop their sense of social presence.

5.5 Conclusions

The disparity in participation between both cohorts suggests there are other key factors that affect student engagement beyond teacher presence. When asked whether teacher presence, student presence, and cognitive presence capture the core dynamics of communities of inquiry, Garrison and Arbaugh (2007) concluded that, although the dynamics might be complex and need research, the three elements do "account for much of the complexity of the teaching and learning transaction" (p. 166). Yet, this study controlled for the level of teacher presence, but still found large differences in student presence and cognitive presence. If the primary element orchestrating a Community of Inquiry was teacher presence, and most of the complexity could be attributed to teacher presence, social presence, and cognitive presence, one would expect both courses that deployed the second version of NECSUS to have similar results. The different patterns of student interactions between the two courses suggest there are additional complexities not accounted for in the model of Community of Inquiry. This supports Shea and Bidjerano's work (2010) that suggests that learner agency must be accounted for in the model of Community

of Inquiry. They argued that the Community of Inquiry framework does not account for the learners' self-directed course goals. Their study found that teacher presence and social presence were correlated to student self-efficacy, and suggested this dynamic be incorporated into the Community of Inquiry framework. This study suggests that different students will exhibit different patterns of interaction when the level of teacher presence is controlled. Similarly, this study points to the student's agency in the learning environment as an additional factor in developing a Community of Inquiry.

Another aim of this study was to determine if higher order thinking could be obtained without teacher presence. In both courses, students demonstrated higher order thinking; however, although there was an absence of an instructor, teacher presence was still present. The concept of teacher presence, as initially constructed, did not necessitate that teacher presence be performed by an instructor.

> The third element of the model, teaching presence, consists of two general functions, which may be performed by any one participant in a Community of Inquiry; however, in an educational environment, these functions are likely to be the primary responsibility of the teacher. (Garrison, Anderson, & Archer, 2000, pp. 89-90)

Although the model did imply that a teacher presence would be performed by a human, the coding system utilized in this study, developed by Shea et al. (2010), can serve as an outline of how to design for teacher presence in the absence of an instructor. Higher order thinking was demonstrated in the practice area and during test challenges, which both had elements of teacher presence from the coding system. The practice area functioned as teacher presence by providing students with a model of how to connect the course content to real world ethical dilemmas. The test challenges gave students feedback about their understanding and challenged them to question their understanding. Therefore, it would be unfair to say that teacher presence is not required; however, the study does question whether a human teacher is needed. NECSUS built in teacher presence through features encouraging the students to essentially take on the teacher roles themselves. This study suggests that LMS can incorporate elements of teacher presence without needing a human teacher.

One fear of reducing the role of instructors is that they will be needed to serve as content experts to diagnose understanding. The concern was that students would primarily only accept

or reject their own ideas, and not attempt to reach consensus (Garrison & Arbaugh, 2007). This concern appears to be more related to course design than to the lack of an authoritative presence. The test challenge feature necessitated that students reached consensus on topics. Students could not accept their own ideas and had to appeal to the other students. Although more work is needed on how to build student interdependence into online course design, interdependence can be a useful tool to encourage co-construction of knowledge, perhaps even better than an authoritative figure.

Finally, NECSUS demonstrated ways that game dynamics could be incorporated into an online course to foster community. Strategic sociality was a useful tool to encourage social grooming behaviours. There were indications that the friendship feature encouraged social grooming behaviours and no evidence that students tried to game this feature. Further, in spite of the fact that communication was not required for the course, neither class was devoid of discussion. Students who did not wish to post to the NECSUS discussion boards utilized the other social grooming behaviours such as liking comments, or visiting friends' profile pages.

5.5.1 Limitations

An important limitation of this study is that it studied a homogeneous population. Students likely acculturated to Canadian culture were specifically targeted. Different results might be obtained when looking at a demographic that is culturally different, or that might struggle with the course content. The study was also fairly modest, both in the sophistication of technology used and the number of participants. More studies looking at diverse populations could add to this body of work. This study also only examined how the NECSUS tools functioned in an environment with no instructor presence. This research could benefit from understanding how increased teacher presence in the course design affects online courses when instructors are involved in the course discussion. The study also did not examine the students' perception or acceptance of the technology.

5.6 Future Work

This study demonstrates there is potential to create systems designed to stimulate student presence. More research is needed to explore which factors are the most effective at increasing student presence, but this is a promising start. Future research is also needed in how such

systems affect instructor engagement. A larger question this research inspires is whether it is possible to create communities of inquiry around a formal course that has no instructor, and meet the courses learning outcomes. This is a salient question as more Massively Open Online Courses (MOOCs) are being offered (Pappano, 2012). It is not possible for the instructor of a MOOC to develop a relationship with over a thousand students every course offering. This low level of teacher interaction might help to explain why about 90% of students in MOOCs drop out (Yang, Sinha, Adamson, & Rose, 2013; Clow, 2013). The research into MOOCs has not yet addressed questions around creating socially engaging environments, and has instead concentrated on analytics (Yang, Sinha, Adamson, & Rose, 2013). The focus has been on identifying factors that predict retention, not building software that promotes retention. Yet, social factors have been identified as important in attrition rates (Yang, Sinha, Adamson, & Rose, 2013). Similarly, a NECSUS-like design might apply to commercial online courses, which also have many students or do not include interaction with an instructor. Although testing how a NECSUS-like system would function in other learning environments is outside the scope of this thesis, my research outlines potential future directions for this research.

6 CONCLUSIONS & RECOMENDATIONS

The focus of this research has been on examining the role of teacher presence in online education. The literature suggests that teacher presence is important for fostering community and student engagement in online education (e.g., Shea, Swan, Li, & Pickett, 2005; Garrison, Cleaveland-Innes, & Fung, 2010). My research supports that increasing teacher presence increases student engagement. Where my research diverges is in whether a physical instructor is the best option to create teacher presence. Are there ways we can incorporate the functions of teacher presence into the design and management of online courses? This is an important and relevant question. There are many barriers to establishing teacher presence online. Those barriers appear to be contextual and might have no one solution. To work towards a consistent high standard for online education, we need to look towards technological support as we continue to work towards supporting instructors.

This project was inspired by my experience as an online student and, upon reflection, I think that personal experience has added an interesting dynamic to my research perspective. Online education is relatively new, and the format and technology is continuously changing as more research is completed. This means that online instructors, and even many researchers in the field of online education, might not have experience learning in the online environments in which they teach and it is unclear how this affects teaching online and researching online education. However, as a new generation of instructors and researchers enters the field this is likely to change. With 950,000 online students in Canada as of 2012 (Contact North, 2012a), and more and more across the globe, it is likely that future online instructors and researchers will have experience learning in online environments and will be able to draw on their experiences. As part of the first generation of students that have experienced the newest iteration of distance education first hand, I have been able to draw on my experience of what has and has not benefited my learning. Further, unlike my predecessors, I have been exposed to many online instructors who have served as role models when I facilitated my own online course. Nevertheless, whatever the future may hold, experience is unlikely to be the sole solution. Comparison studies looking at the learning outcomes between face-to-face education and online education find that they both vary depending on the quality of instruction (e.g., Allen & Seaman, 2011; Bernard, et al., 2004). Teaching is a difficult skill to master and if experience in learning environments were enough, we would expect to see less variation in learning outcomes between

online instructors and instructors in traditional educational environments. This variation is a key issue that we need to continue to address. There is a lot of promising research outlining best practices for online learning environments; I argue that we need to now focus on the consistent execution of pedagogical practices.

At the heart of this study is the quest to understand why instruction online varies and how technology can stabilize the variables involved. Therefore, it was important that this research retain a narrow focus on current widespread online educational practices and exclude the research on niche educational practices. Although there are many amazing research projects that promise increased learning outcomes in online environments, novel systems are not the norm. The majority of campuses across Canada manage their online education with a major learning management platform (i.e., Moodle, Blackboard, WebCT, or Desire2Learn) (Contact North, 2012b). Additionally, the research presented in this thesis focused on uncovering what variables effect how an online course is taught, not the effects of different teaching methods, thus the focus remained on the instructor experience and their role teaching, not the learning outcomes of online students.

The framework of my research that I used to understand the desired role of the online instructor was the Community of Inquiry framework. This framework was chosen due the mounting evidence of its effectiveness in online educational environments (e.g., Boston, et al., 2014; Shea, et al., 2010). Strong indicators of a Community of Inquiry predict lower student attrition (Boston, et al., 2014), higher student presence (Shea, et al., 2010), and higher student satisfaction (Garrison, Anderson, & Archer, 2010). Specifically, teacher presence, as outlined in the Community of Inquiry framework, is the key mechanism that facilitates higher-order thinking and student presence (Garrison & Arbaugh, 2007). Although the Community of Inquiry framework is very promising, there are barriers to creating teacher presence online. Many instructors find that teaching online requires more effort than the same course face-to-face (Hartman, Dziuban, & Moskal, 2000); additionally, online instructors are at higher risk of suffering from burnout (Hogan & McKnight, 2007). Further, it is still an open question as to whether basing promotion on scholarship at universities discourages cultivation of pedagogical practices among faculty.

This tension between the potential of the Community of Inquiry framework and the possible barriers faculty face motivated my research effort. The first goal of this research was

therefore to understand the relationship between teacher presence and barriers online educators face. In chapter 3, a case study method was utilized to begin to investigate this question. The year-long study of twelve online instructors at the University of Saskatchewan revealed that one potential factor was the competing pressure that instructors had to produce research. In this sample, those that were required to maintain a program of research struggled to engage in teaching online. The study also supported that although online education might not take all instructors more time to teach, it did appear to require more effort. Software usability issues were one major source of increased effort. Another factor that affected effort was the persistent nature of online education. Those that did not have clear boundaries around when they worked on their online courses struggled more. This finding supports the work by Hislop and Ellis (2004), which found that the fragmented nature of online education might increase the perception of effort teaching.

The second study, presented in chapter 4, further explored instructor engagement teaching online. This study employed a questionnaire method and sampled twenty-eight instructors at the University of Regina. The primary finding of this study was that the online instructors' level of engagement in teaching appeared to be correlated with intrinsic motivators, not extrinsic motivators. The institutional factors assessed (i.e., work-load, compensation, and evaluation), showed no relationship to engagement while teaching online. However, student factors (i.e., positive student interactions) and instruction factors (i.e., satisfaction using educational technology and including pedagogical techniques) did show a relationship to engagement. This is in line with studies that suggest intrinsic motivators are more important to instructors than extrinsic rewards (Bolliger & Wasilik, 2009; Meyer K. A., 2012). More importantly, it supports Hartman, Dziuban, and Moskal's (2000) theory that faculty satisfaction, student learning outcomes, and student interaction might be dependent on each other. This finding is troubling because it has the potential to create a paradox. If student presence is dependent on teacher presence, but instructors are less likely to engage in teaching when student presence is low, there is no catalyst to encourage community formation. This potential problem indicated that an independent intervention was needed to either increase instructor motivation, or increase student presence in online environments.

The second goal of this research was to understand if creating a learning environment that assumed part of the role of teaching presence in a Community of Inquiry could act as the catalyst

to encourage student interaction. NECSUS, discussed in chapter 5, was designed to explore this potential. In lieu of a physical instructor, the system use game dynamics and conflict to create interdependence among students to increase participation. The results from NECSUS showed that these techniques were successful in encouraging social grooming behaviours and higher-order thinking. Further, the aspects that mirrored the features of teacher presence, as outlined by Shea et al. (2010), were more successful in encouraging student participation. This is exciting because it suggests that there is potential for the Community of Inquiry coding schema to guide design for online educational environments. More research is needed into refining a heuristic for online learning environments, but the initial results from the NECSUS study suggest that there is potential.

Assigning some of the responsibilities traditionally assumed by the course instructor to the technology of the learning environment has the potential to decrease some of the variation in the quality of online education. There is a lot of research that supports the value of modelling online learning environments after a Community of Inquiry framework. Specifically designing online learning environments to support and encourage communities of inquiry is therefore a logical place to start. The key to developing these communities will be to create engaging environments for all members of the community. Learning environments need to be rewarding and engaging not only for students, but for instructors as well. We must not build learning environments just for students; we must build them for the entire learning community.

This thesis also argues that technology might be more suitable to addressing teaching outcomes than instructors. It is not that instructors are incompetent or that they do not care about the quality of their teaching, but rather that lessening the dependence on the instructor is more in-line with the pedagogical goals of communities of inquiry. The transformative power of communities of inquiry is that they are driven by the students. Students were envisioned as leading the inquiry and challenging each other. Instructors are not the "sage on the stage"; they are senior members of the learning community that act as mentors. To construct such an environment, the focus needs to remain on the building of a community. No one individual can or should be responsible for the health of a community.

As it stands, the most widely adopted learning management systems are not designed to support the development of communities with little to no teacher presence. Therefore, the solution will require more than software selection. Institutions that buy software need to hold the

companies that make the software accountable. Purchasing a product that might burn out your instructional staff and detract from their research because of poor usability is unacceptable. Employing learning management software that does not help students manage their own learning and actually requires the intervention of an instructor is not sufficient. The future of online learning management software might be found in open source projects. With open source software, there will be an increased cost of running and maintaining the system, this is hands-on work experience that may be beneficial to students. Is it preferable to have companies design the learning environments for our students, or should we empower our instructors and students to design their own experiences? Investing in open source software and learning could enrich the learning opportunities of both staff and students.

Institutions are not in the best position to reimagine online education, given their investments in existing infrastructure, their reliance on traditional systems, and their obeisance to existing policies, which are difficult to change. However, the individuals that make up an institution are designed to care, given their personal investments in learning. Therefore, I suggest changes need to start at an individual level. One concern about teaching online is that the work is not sufficiently valued because it can be hard to quantify. This could be mitigated if department heads made a point of teaching online to understand the work involved. Department administrators could also organize instructor and student demonstrations to hear about what innovative teaching strategies their instructors are implementing in on- or off-line courses. Not only could that help all the instructors improve their teaching, but it might make the work they do more visible and contribute to a culture of dedication to teaching.

I would recommend that instructors engage more deliberately in self compassion. The instructors that had an active research agenda in my case study who strived to put their students first struggled, which seems counter intuitive. Teacher immediacy is important in online courses, which conscientious instructors understood and appreciated, so they checked their email and the discussion boards often to support students. But it is exactly this type of 'people-work' that can lead to burnout. I experienced this myself. I was so excited to teach my first online course (given my research interests) that I checked on the course constantly. Very soon, I began to experience symptoms of burnout. At that point, it is very easy to feel lost and frustrated. I saw it happen to my participants and I experienced it myself. The hardest thing to do in such a circumstance can be to step back and take care of yourself. It challenges the instincts of

instructors, especially highly conscientious instructors, and their natural compulsion to provide selfless attention and support. It is therefore important to establish boundaries and set time aside to do that work. Instructors can inform students of schedules they establish, and then stick to the schedule to give time for recovery and other tasks. One beautiful spring day, one of my participants explained that teaching an online course comes down to decisions: plant another flower, or check your email. Attention to personal care can direct when each is the appropriate thing to do.

Instructional designers are in an excellent position to begin reimagining online education. They have a direct and immediate impact on how online education is deployed at an institution. The key I would offer from this research is that building good learning environments is not about building, it is about evaluating. Ask whether the tools introduced into the class have a measurable impact on teaching and learning. Concentrate on making what works work even better. Streamline the design as much as possible. It might seem like including blogs, wikis, videos, and quizzes are a great idea, and may be appropriate in some circumstances, but consider that an over-taxed instructor might be running the course. Each new tool adds a layer of complexity that increases the investment in maintenance from instructors, and which draws from the energy instructors will have to participate in the learning environment. In addition, create the learning materials to encourage student interdependence to alleviate some dependence on the instructor. More research is needed on how to accomplish this, but some ideas include: group projects where the students receive the average mark of all the group members' individual marks; jigsaw assignments, where students are assigned different readings and discuss them to learn everything they need for an assignment; and assessment strategies as in NECSUS where students are forced to demonstrate their knowledge to their peers for credit on assignments.

A key lesson for me has been that it is important to understand how to design learning environments for the instructor's experience. One way that I would like to extend this research is to understand how games can be incorporated into teaching environments. Much of the research into game-based learning environments has focused on how to increase student engagement. However, I think game based-learning approaches have a lot of potential to increase instructor engagement in the act of teaching. Through this research, I have found that many instructors would like to integrate more technology and different teaching practices into their courses, but lack the necessary skills or feel overwhelmed. The success of game-based

learning, on the other hand, is that it transforms perceived barriers into fun challenges that build on previous success. The next step is understanding how to add an element of gameful-learning into online teaching environments. What aspect of teaching do people enjoy? How can teaching environments be designed to trigger those joyful behaviours? What feedback about students can help to motivate instructors and improve teaching? Often games, or play, are used as examples of good learning environments. But they are not restricted to learning. When playing, everyone has fun, and everyone teaches and learns. My goal is to create playful environments that support teaching and learning; this research serves as a small step in that direction.

7 EPILOGUE

The biggest limitation of this research was identified very early on in this thesis: niche technology is not the answer. Yet, that is exactly the solution that this thesis outlines. I outlined the potential problem of the Community of Inquiry creating a cold start problem if a paradox exists in that student presence and teacher presence are dependent on each other, then proposed a solution in the form of NECSUS. If design could increase student presence without requiring teacher presence, then there would be no paradox. However, although I demonstrated that NECSUS did demonstrate potential to support community development, unless such a system was adopted across the country, this technology is unlikely to solve anything. It is for this reason that I consider the contribution of this thesis to be actually theoretical not technical.

The real contribution of this research is arguing for the importance of designing learning environments for the act of teaching as well as the act of learning. We should continue to evaluate how learning environments support learning outcomes, but we should also understand how learning environments support teaching outcomes. Can learning environments be built to support teacher presence and encourage student presence in a broader context? Has NECSUS taught us anything about design principles for other online learning environments? I would argue that yes it has. NECUS did not do well in the pilot study. It was not until I used the Community of Inquiry framework to inform my design decisions that I was able to create an environment that demonstrated the beginnings of community building. Further, the community growth was not mandated by required participation and was in no way associated with the students' grades. The discussions were spontaneous, on topic, demonstrated higher order thinking, and the students correctly evaluated the discussion by rating posts that demonstrated higher order thinking higher than those that did not. That community and higher order thinking is possible in online learning environments with no teacher interaction is an exciting prospect. This idea is my main contribution.

Therefore, I believe that it is important to explore what the future of this research might look like. How can the Community of Inquiry Framework serve as a design tool? This thesis will end with the description of a prototype that was designed for a Non-formal snowmobile safety learning environment. The importance of this section is not the niche technology designed here, but rather, how the Community of Inquiry framework was utilized to inform the design. My contribution is the process, not the product per se.

7.1 NERT an Instructorless Non-formal Learning Environment

Non-formal learning environments still face a challenge in producing engagement. In a previous study that compared interaction patterns between formal, nonformal, and informal learning environments we found that nonformal learning environments had the lowest activity rates and lowest indicators of community (Schwier & Seaton, 2013). Further, in that study we found that well-structured discussion topics stimulated discussion. This is similar to the behavioural patterns in NECSUS, where user interaction was focused around the practice area and test challenge questions. Therefore, a NECSUS-like system might have potential for encouraging participation in non-formal learning environments.

Thus, a new project was conceived, aimed at developing a prototype called NERT, a non-formal learning environment designed to incorporate elements that functioned as teacher presence. The project was undertaken with the input of a company called Fresh Air Educators, who offer recreational activity safety certifications online (e.g. boating safety), and the Saskatchewan Snowmobile Association. The organizations wanted to create a learning environment that not only engaged students enrolled in their non-formal courses, but also would engage the larger community of snowmobilers in a lifelong process of learning about safety and best practices. The goal was to build a system designed to reach users across Saskatchewan, to offer support to those that want to learn more about snowmobiling, to create a safety culture, and to promote lifelong learning.

For my work, I will define non-formal learning environments as *Education structured and led by experts, but not governed by a government ministry/department of education*. By this definition, nonformal education encompasses professional development, interest groups, or community initiated educational programs. Such non-formal environments are well suited to programs aiming to: provide greater access to education, especially when incorporating educational technologies; respond to our increasing need to cope with technological advances; and support the need for lifelong learning (Dumitrescu, 1999). Plakhotmik and Rocco (2012) utilized a non-formal educational environment to help graduate students with their academic writing. They were concerned that their students did not have the required information technologies literacy or practice writing to succeed at a graduate level. To address this, they created a non-formal writing support circle. The learning environment was face-to-face and the students signed a learning contract that promised that they would attend and participate with the

group. Each session began with a mini-lesson, but the primarily focus was on students supporting each other through the writing process. Unfortunately, the writing support circles had mixed success as the students resented not receiving academic credit for their participation (Plakhotnik & Rocco, 2012). This study highlights the challenge to motivate participation in non-formal educational environments.

Snowmobile safety is well suited to a non-formal learning environment because it is important to provide access to all snowmobilers and safety education is a life-long process. Further, snowmobile safety is an important concern in Canada. Over 590,000 snowmobiles are registered in Canada (McGhan, Adler, & Morris, 2012), and in some places in Canada, like Manitoba, it is estimated there are as many snowmobiles as there are households (Stewart & Black, 2004). As technology has advanced, snowmobiles allow users to go faster, farther, and climb higher than ever before. This has allowed snowmobilers to go into more terrains than ever before, but has also increased safety concerns (McGhan, Adler, & Morris, 2012). The tragic part is that most snowmobile accidents are preventable. Only 1% of accidents are caused due to mechanical failure (Stewart & Black, 2004); most are caused by many overlapping impairments such as intoxication (69 - 70%), speeding (82%), or poor lighting (83 - 86%) (Stewart & Black, 2004; Rowe, Milner, Johnson, & Bota, 1992). Eighty-one percent of the time, the injured person was the driver when the accident occurred; preventive efforts have focused on educating drivers (Rowe, Milner, Johnson, & Bota, 1992).

One barrier to educating snowmobilers about safety has been the negative stereotypes that exist about snowmobilers. Educators often view them as ignorant overweight rednecks (Chabot, 2002). However, mostly, snowmobile riders welcome safety education. People affected by snowmobile accidents advocate for more training and create grass-root initiatives to meet that need (McGhan, Adler, & Morris, 2012). As more snowmobile accidents involved avalanches, snowmobilers requested more avalanche training (Chabot, 2002). Despite these positive steps, not all snowmobilers recognize that they need education. When we look at avalanche safety, there is a split in the community between those that seek educational opportunities (attentive riders) and those with little training and awareness of educational opportunities (heedless riders) (Murphy M. , 2012). The mitigating factor appears to be the person's locus of control. Those that believe that they can manage risk, tend to be attentive riders. Heedless riders often live in fear of avalanches, but think that chance is the biggest factor

determining the risk to their safety. Presenting educational opportunities as empowerment might help to encourage heedless riders to seek more education (Murphy M. , 2012).

There are best practices for teaching snowmobilers that have been developed. Knowledge-based education is best suited to expert riders, but rule-based decision-making is better for novice riders (McCammon & Haegeli, 2006; Adams, 2004). Because snowmobiles move so fast, and the helmets that riders wear limit their vision, riders have little time for decision making at the time of an incident. Many of the safety precautions must be completed while planning for the trip. Once in motion, the rider might not be able to properly assess a situation before they need to act (Staples, Chabot, & Knoff, n.d.). Because of these different constraints, it is also important for the education to be specific to snowmobile activities. Therefore, it is important that those educating snowmobile riders are riders themselves, understand the needs of the "students", and understand the lingo used in the sport. In addition, the educational materials should feature snowmobiles specifically and not stray onto generic backcountry activities (Chabot, 2002). Moreover, an effective teaching strategy is storytelling (Staples, Chabot, & Knoff, n.d.). Students prefer education that is specific to their local terrain so that they can build on their local knowledge (Adams, 2004). Incorporating interactive education, including celebrity role models, or including gear incentives can increase participation by more than 25% (McGhan, Adler, & Morris, 2012).

7.1.1 System Design

Fresh Air Educators has designed an online course that teaches safety education using the best practices for online education (Fresh Air Educators, 2015). The course is interactive, provides snowmobile specific information in multiple formats (audio, pictorial, and written), and provides feedback to the student about their progress. The students that completed the course do well, but the company wanted to lower the attrition rate of their course. This project aims to add a social component to the course to reduce attrition.

The social component of the course was added by creating a forum and GPS enabled mobile application accessible to those enrolled in the course and the general snowmobile community. The pilot NECSUS project showed that it could be difficult to maintain a community unless a critical mass of users is actively using the system within the same temporal proximity. To address this challenge, I opted to design the social component for the entire

Saskatchewan snowmobile community to increase the likelihood of reaching a critical mass. Because Saskatchewan snowmobile online communities already exist, the mobile application was added to provide an incentive to migrating to the NERT environment. No Saskatchewan snowmobile online community featured the integration of a GPS enabled mobile application. Because of this advantage, Sasksnowmobile.com[5] with the Saskatchewan Snowmobile Association, agreed to support the project and assume responsibility of maintaining the system after the project completion.

7.1.1.1 Android Mobile Application

The mobile application was designed with a team of six senior level SIAST students. The application uses GPS to track rider statistics and routes, which is integrated with the forum. This integration allows users to track their rides online, and share routes with others in the community. In the application, the user can view their ride statistics (see figure 7.1.1.1.1), track and save routes (see figure 7.1.1.1.2), and view previously saved ride routes (see figure 7.1.1.1.3). A safety mechanism that disabled the screen when the user was moving was added to ensure that the users would not use these features while moving.

Figure 7.1.1.1.1 User Home Screen Displaying User Statistics

[5] 6,823 members

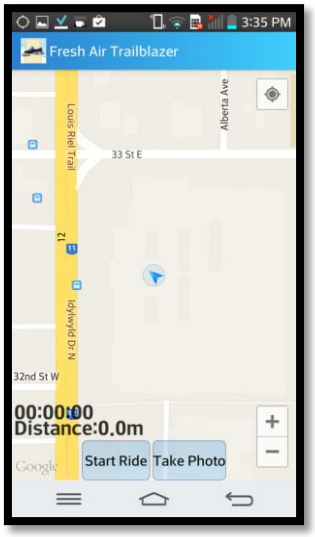

Figure 7.1.1.1.2 Ride Screenshot that allows Riders to Track their Current Ride

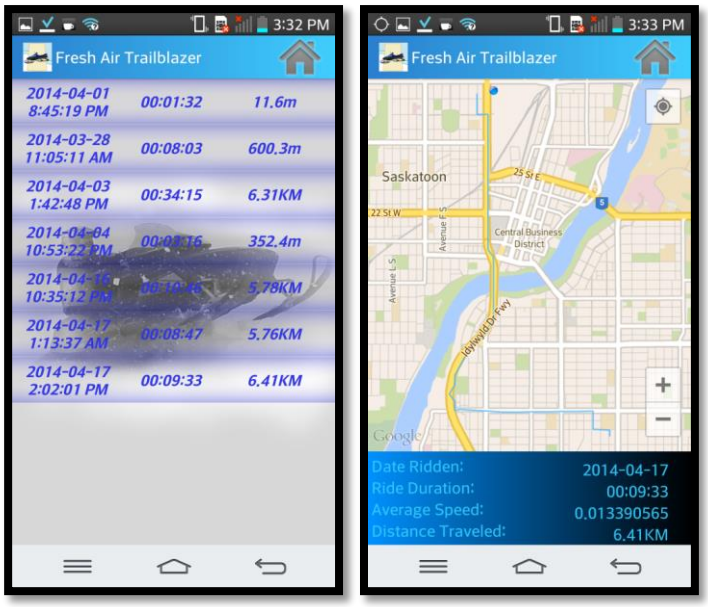

Figure 7.1.1.1.3 Screenshots of Ride History and Previously Recorded Route

7.1.1.2 Forum

A forum was added to the NERT system, adapted from the NECSUS System. In contrast to NECSUS, NERT only featured discussion pages, no content, or tests; user's snowmobile statistics were added to the user's profile; users could view their mobile rides online; and the latest community uploaded rides were displayed on the home screen. In addition, instead of

directing users to their profile page when they signed in, the user profile and navigation page were merged. This change had the benefit of ensuring the user would see any new posts on their profile wall or changes in their social network when they logged in (see figure 7.1.1.2.1).

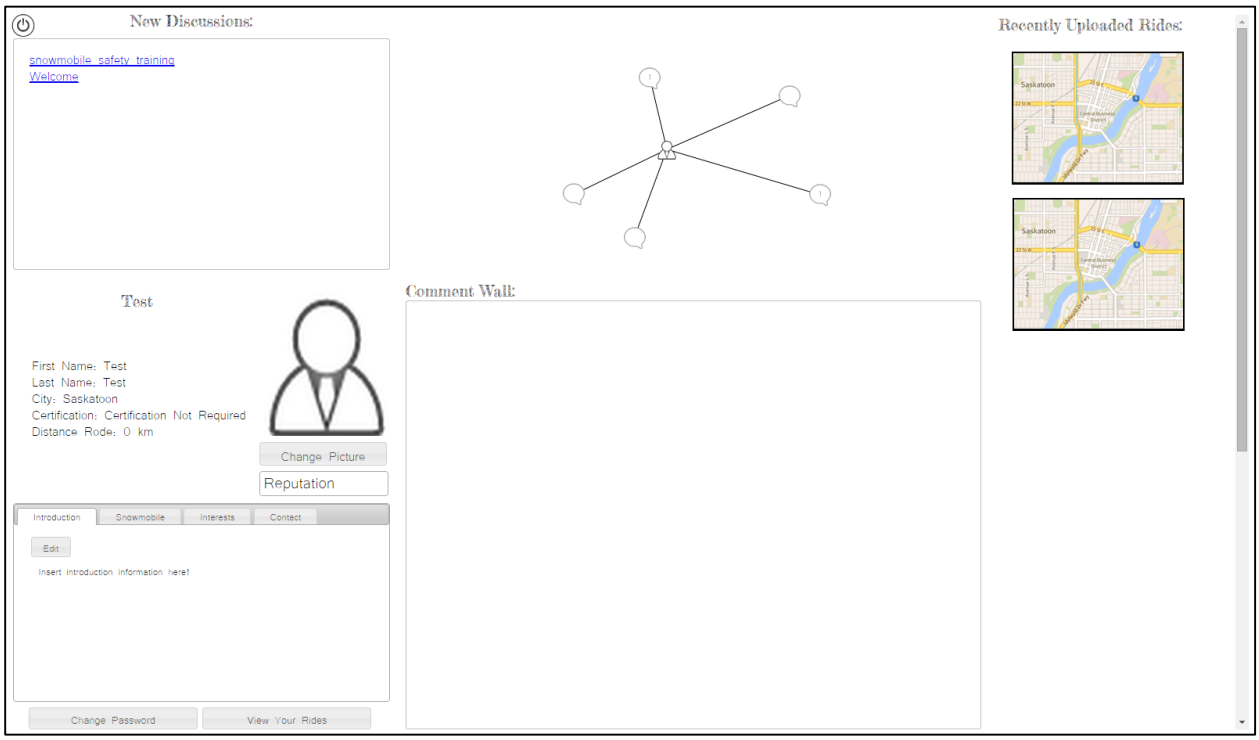

Figure 7.1.1.2.1 Screenshot of Snowmobile Forum's Home Screen

7.1.1.3 Use Cases

NERT was designed for three user types: those new to snowmobiling, those enrolled in the safety course, and existing members of the snowmobile community. New members and those enrolled in the safety course, would have a similar user experience. They would have access to all of the online content, but could not use the mobile features until they completed their snowmobile safety certification. Although the current design of the system cannot verify if they have completed their certification, the Saskatchewan Snowmobile Association would like to build that functionality into the system, once the pilot proves successful. The primary function of the system for new members and those enrolled in the safety course would be to introduce them to the larger snowmobile community and highlight the diversity of public trails that will be available to them once they can legally drive[6].

[6] Unlicensed members can legally drive on private property.

The third use case is for existing members of the snowmobile community. The goal of this application is to encourage them to migrate from their existing community, sasksnowmobile.com, to the new application for the mobile application. The discussion forums in NERT were modeled on those at sasksnowmobile.com to support such a transition. These users would have access to both the online forum and the mobile application. These users could use the application to track their routes so they could re-trace them later or share new trails with others in the community. The application also tracks the average speed of rides, which could be helpful in organizing community rallies, and the GPS functionally could help to arrange meet ups.

7.1.1.4 Initial Testing

An email was sent out in March 2015 inviting all of the snowmobile clubs in Saskatchewan to test the application. Unfortunately, due to a mild winter, little snow remained and the clubs declined to participate. However, four members of the Saskatchewan Snowmobile Association agreed to test the initial system design to ensure the functionality. This small sample cannot suggest too much about the performance of the design, but it has served two functions. First, it showed that the basic functionality and usability appear to be suitable. No bugs were reported and the users could navigate the system with no instruction. Second, the user activity suggested that the system might suffer from cold start problem relating to critical mass. The users signed in and explored the different forums, but only one person created a thread, to which no one replied. Further, none of the users visited the site a second time.

When the system was originally designed, NERT was not designed to incorporate a Community of Inquiry framework as outlined in the previous chapter on NECSUS. In retrospect, it was decided that NERT could be aided by designing the system to simulate teacher presence. In NECSUS, the features that served the same functions as teacher presence generated the most user participation. It would be interesting to explore if this same approach could succeed in this learning environment. Below outlines how I could re-design the NERT system around the concept of teacher presence for future studies.

7.1.2 Incorporating Teacher Presence in NERT

As a guide for design, the NERT system used the Community of Inquiry framework, but instead of relying on a physical instructor for teacher presence to stimulate student and cognitive presence, NERT would assume those responsibilities. Teacher presence can be broken down to four categories: design and organization, facilitating discourse, direct instruction, and assessment (Shea, et al., 2010). I aimed to re-design NERT to fulfill those functions by incorporating standard forum practices and game dynamics into the program in lieu of an instructor. See Appendix E for a table outlining indicators, and definitions of each aspect of teacher presence.

7.1.2.1 Design & Organization

According to the criteria outlined by Shea et al. (2010), the role of design and organization in teacher presence can be broken down into five components that design and organize a learning environment. The elements are: setting and communicating learning goals, setting time parameters, assisting students to use the technology, establishing netiquette, and providing rationale for learning objects. These elements work together to help the students to understand their role in the learning environment. Many solutions to these issues are already implemented in informal learning forums. In forums, the "learning objectives" of each discussion area are described in the title and description of the discussion area (see figure 7.1.2.1.1). This helps users to understand the rationale for each discussion area and establishes the learning goal of participating in that discussion. Further, sticky posts are included at the top of the discussions that provide information on the expectation for appropriate behavior in each discussion area (see figure 7.1.2.1.2). Most objectives of design and organization can be met by following these established practices; however, setting time parameters for posts remains a challenge.

Figure 7.1.2.1.1 Example of Discussion Descriptions on sasksnowmobile.com

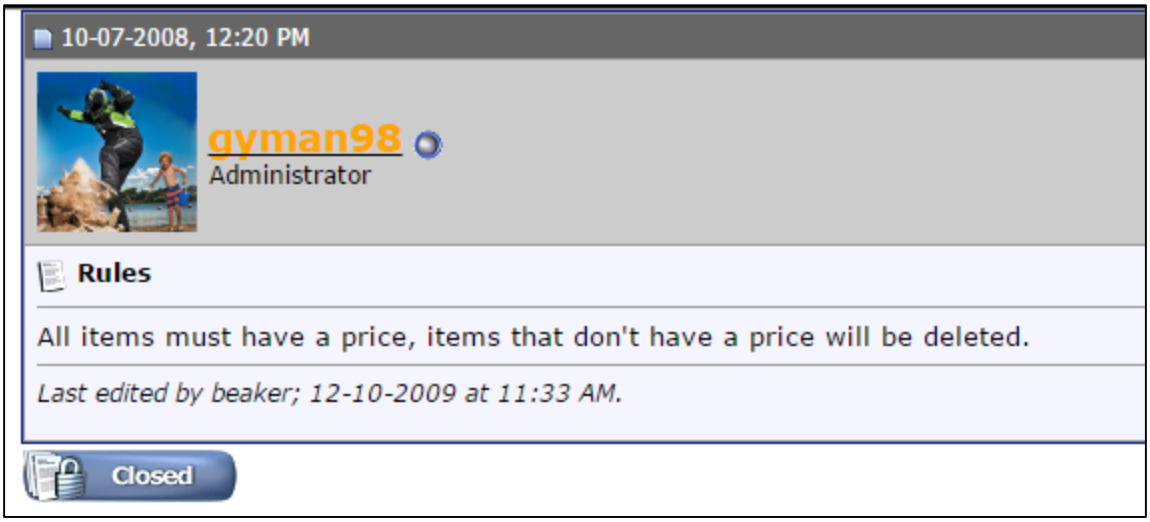

Figure 7.1.2.1.2 Example of Sticky Thread Outlining Expectations in "Snowmobile for sale" Thread at sasksnowmobile.com

The NECSUS system used the concept of fading content away if users waited too long to be active in the system again. This game dynamic is called an appointment dynamic. Appointment dynamics reward users for checking in at scheduled intervals of time. A famous example of a successful implementation of this dynamic is the Facebook game Farmville. In this game, players must regularly log into the game to harvest plants that ripen after a set time. This encourages players to play the game regularly and enforces a time parameter for the players. In NECSUS, the students had to log into the course often and interact with their friends to ensure that their relationships did not fade away. The same appointment dynamic used in NECSUS

would not work for a non-formal environment. Because only students signed up for the course accessed NECSUS, the system did not have to attract new users. A system that depends on attracting members, such as software to support the snowmobile community, must allow potential new members to preview the content before committing to joining the community. Individuals that mostly read content and rarely contribute, are called lurkers. Most communities have a relatively small core of active users and a large, up to 90%, community of users that do not contribute often (Preece, Nonnecke, & Andrews, 2004). Lurkers browse the content and do not post due to several reasons including shyness, belief they have nothing to contribute, or not seeing a benefit to contributing (Preece, Nonnecke, & Andrews, 2004). If the content faded away, these users would have less incentive to continue visiting the site. Forums deal with this by including stats on the number of users' posts per day to establish a time parameter. A similar feature could be included in the NERT system by awarding badges based on activity within an established period. Badges could be awarded to users with the top activity over the month in four categories: most forum posts, highest reputation, most kilometers ridden, and most new trails discovered[7]. Together, the badges would promote both activity and quality of activity. The most forum posts and most kilometers rode badges would encourage use of the system. The awards for highest reputation and most new trails discovered both focus on highest quality activity.

7.1.2.2 Facilitating Discussion

There are seven sub-categories in the category Facilitating Discussion: identifying conflict/agreement, encouraging consensus, reinforcing contributions, promoting divergent thinking, focusing on productive dialog, prompting discussion, following-up on topics, keeping discussion on topic, and summarizing discussions (Shea, et al., 2010). Many of these functions can be addressed by designing for conflict. As we saw in NECSUS, the parts of the design that focused on dissenting opinions generated the most discussion. Similarly, Harper et al. (2007) found they could encourage users' activity by encouraging users to reply to posts that their system predicted contradicted the users' beliefs. Conflict has even been found to increase learning by encouraging reflection on beliefs (Aïmeur, Frasson, & Lalonde, 2001) and

[7] This badge would look at how many likes they got for each trail they posted

stimulating collaboration. Conflict encourages collaboration because it increases a sense of social presence and necessitates that students articulate their views to co-construct a shared understanding of the conflict (Murphy E. , 2004).

Conflict could be introduced into NERT by including user-generated polls. To ensure that the content is debated over, relates to the users, is frequently updated, and promotes conflict, the system could leverage user-generated content. Often forums and news sites will feature polls to entice participation from their users. The polls feature a question, ask readers for a response, and show the aggregated results. News sites create the polls, whereas in forums, users create the polls. The polls are a reactive medium that encourages users to react to something rather than create new content (Schultz, 1999). Interactions that require users to expend more effort, like posting an idea, do not get used much or engage the audience (Chung, 2008). Polls require little effort and can spark discussion. Use of polls on news sites has been criticized because they are unscientific and unrepresentative (Schultz, 1999), but that is not necessarily a bad feature when using polls to promote conflict. In this system, a poll could act as a low cost social outlet. Initially, an administrator of the forum could periodically post polls on controversial topics to entice participation by offering a low cost way for members to participate. Once a user responds to a poll, they could be shown comments from other users that chose the same poll option and asked if they would like to comment. Once they either submit a comment, or decline to comment, they could then be shown the comments from those that chose a different answer and given the option to reply to those comments. The hope is that by first reinforcing the users' beliefs, showing them contrary beliefs will heighten the perceived conflict also increasing the likelihood they will reply to a comment.

7.1.2.3 Direct Instruction & Assessment

Both of the categories Direct Instruction and Assessment are the primary responsibility of the accompanying online safety course. However, inherent in these categories is evaluating if the instructor is available to go over and above the course content and provide additional instruction when needed. The coding scheme developed by Shea et al. (2010) only looks at forum posts, not all of the course content. Thus, although accredited online courses provide course content and formal assessment and feedback of assignment and grades, we can assume that it is expected that instructors with high teaching presence elaborate on the course content in the forum area as

needed. To simulate that in the snowmobiling environment, I would need a way for community members to request additional information, and a way to evaluate the quality of the information. In the NECSUS system, this was achieved though the test challenge feature. Students could discuss an area they were struggling with, provide additional information about their understanding of the topic, receive feedback from the community, and have their understanding evaluated by their peers. A similar approach would not work in this non-formal setting because this environment was designed to run parallel to the course, the tests and content are not integrated. Thus, the students would not have learning objects to challenge and debate. Designing learning objects to take on a similar role would require the presence of an instructor. Because the challenge of this project is to simulate the instructor role without their presence, user-generated content would need to be utilized instead.

The tasks of requesting information and demonstrating understanding are complementary. The first task requires giving users an outlet to request better understanding and the second requires encouraging users to demonstrate their understanding. Many informal learning spaces meet these needs by having a question/answer format. A classic example of such an informal learning environment is Stack Overflow (Pal, Chang, & Konstan, 2012). Stack Overflow is a community of programmers and software engineers whose discussion is arranged around topics where users post questions to the community and the community answers the questions for users needing help. The help seeker looks through the answers and when they find a solution that helped them, they mark the question as answered. Stack Overflow even has a built in form of assessment to evaluate the quality of the answers to assist the help seeker in finding the best solution. Other users can vote the answers up or down to indicate whether they recommend the answer. To encourage the community to participate, users gain reputation for asking good question, and providing good answers. This system has been shown to be effective at identifying experts in the community. The experts are found to provide answers more than other members. In addition, when they post an answer, it significantly decreases the number of posts by non-expert users on that same post, who are more likely to provide a poor answer (Pal, Chang, & Konstan, 2012). The NERT system could incorporate a Stack Overflow-like discussion subsystem focused on help seeking to give users a way to request help, share their understanding, and have that understanding evaluated. The community could police the answers by rating them up or down to assist the help seeker to find the best answer.

7.1.3 Discussion

This modified NERT system could be deployed to test the value of teacher presence to inform design. There are 76 snowmobile clubs across Saskatchewan, whose members could be recruited to test the system. All of the students enrolled in Fresh Air Educators online safety course could also be invited, and any students taking safety courses through the Saskatchewan Snowmobile Association. Once the data are collected, the forum activity could be assessed for indicators of a Community of Inquiry and the student attrition rates could be compared to previous years. Lower attrition rates and a high level of a Community of Inquiry in the forums would support the hypothesis that student engagement can be improved without requiring an instructor to be present in the community by designing to support teacher presence.

It is important to explore how the Community of Inquiry model can be incorporated into non-formal learning environments because of the applicability to lifelong learning contexts. Snowmobile technology is not the only technology that is becoming increasingly more complex and capable. Non-formal education has been identified as an important tool to cope with increasing technology. The Council of Europe has encouraged the development of non-formal learning environments to support those coping with the increase in technologies in developed nations. The council believes that non-formal education's flexibility is better suited to provide widespread access to education and respond to the changing technical landscape (Dumitrescu, 1999). Understanding how to support non-formal learning environments will continue to be an important area of research. This chapter outlines how the research in this dissertation could extend in that direction.

7.2 Conclusions

As mentioned, the importance of this section was to explore how the Community of Inquiry framework could inform design. Learning technologies have become dramatically more sophisticated since the inception of the Community of Inquiry framework. In 2000, it might have been unreasonable to build a learning environment that is expected to increase the social presence of students and coax participation. However, in 2000, we were just starting to explore the potential of web 2.0 technology. Now we are beyond the curiosity of social technology; even the term web 2.0 seems antiquated. In time, I am confident that the fields of artificial intelligence, persuasive computing, and personalization will progress to the stage that they will

allow the computer to assume the functions of an instructor as described in the Community of Inquiry framework.

If this prediction is correct, it leaves us with an uncomfortable question: what is the role of the instructor? I cannot answer that question. Further, I do not think there is one answer. The role will continue to change, adapt, and evolve as we identify new ways that instructors can support the learning process that our technology cannot quite handle (yet). We no longer need instructors to read aloud a limited number of textbooks for students to copy because we invented the printing press. Maybe soon we will not need instructors to form community in online courses. Maybe they will have a yet unimagined more important role.

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APPENDIX A – ONLINE INSTRUCTOR SURVEY

The following Appendix lists the questions that were included in the questionnaire used in Project 2. The questions are in the same order and format that the participants would have seen them.

Demographic Questions

1. What University are you from?
   Choose an item.
2. What department are you from?
   Choose an item.
3. How familiar are you with technology?

○ **Early Adopter** Choose this option if you are very comfortable with technology and enjoy technology. Early adopters enjoy incorporating new technologies into their lives and try to stay up to date on the latest developments.
○ **Comfortable** Choose this option if you are comfortable with technology, but do not go out of your way to be up to date on the latest technology. People in this category are comfortable with technology and tend to see technical problems as fun puzzles to solve.
◉ **Adequate** Choose this option if you know just enough about technology to do your job. People in this category can use technology to complete the tasks that they need to, but rely on tech support to handle and technical problems that they come across.
○ **Unfamiliar** Choose this option if you are intimidated by technology. People in this category not only rely on tech support to help them with technical issues, but they also tend to rely on co-workers/friends to help them with daily use of technology.

4. Generally, how many students are enrolled in your online courses?
   Choose an item.
5. Based on your job description, about what percentage of your work time is allotted to research?
   Choose an item.
6. Do you have additional employment?
   Choose an item.

How do you think the online format affects the students?

1. The level of my interactions with students in the online course(s) is higher than in a traditional face-to-face class
   Choose an item.

2. My online students are actively involved in their learning

Choose an item.

3. I miss face-to-face contact with students when teaching online
   Choose an item.

4. I do not have any problems controlling my students in the online environment
   Choose an item.

5. My students are very active in communicating with me regarding online course matters
   Choose an item.

6. My online students are more enthusiastic about their learning than their traditional counterparts
   Choose an item.

7. I am able to provide better feedback to my online students on their performance in the course
   Choose an item.

8. My online students are somewhat passive when it comes to contacting the instructor regarding course related matters
   Choose an item.

9. It is valuable to me that my students can access my online course from any place in the world
   Choose an item.

10. The participation level of my students in the class discussions in the online setting is lower than in the traditional one
    Choose an item.

11. My students use a wider range of resources in the online setting than in the traditional one
    Choose an item.

12. Not meeting my online students face-to-face prevents me from knowing them as well as my on-site students
    Choose an item.

13. Online teaching is gratifying because it provides me with an opportunity to reach students who otherwise would not be able to take courses
    Choose an item.

14. It is more difficult for me to motivate my students in the online environment than in the traditional setting
    Choose an item.

How do you feel about teaching online?

1. The flexibility provided by the online environment is important to me
   Choose an item.

2. I get carried away when I am working on my online course(s)
   Choose an item.

3. The technology I use for online teaching is reliable
   Choose an item.

4. When I get up in the morning, I feel like checking on my online course(s)
   Choose an item.

5. I feel strong and vigorous when I am instructing my online students or managing the course
   Choose an item.

6. I look forward to teaching my next online course
   Choose an item.

7. I feel happy when I am working intensely on my online course(s)
   Choose an item.

8. I am immersed in my online course(s)
   Choose an item.

9. When I am working on my online course(s), I feel bursting with energy
   Choose an item.

10. Online teaching is often frustrating because of technical problems
    Choose an item.

11. My online course(s) inspires me
    Choose an item.

12. I am enthusiastic about my online course(s)
    Choose an item.

13. Technical problems do not discourage me from teaching online
    Choose an item.

14. I receive fair compensation for online teaching
    Choose an item.

15. I am proud of the work that I do for my online course(s)
    Choose an item.

16. I incorporate fewer resources when teaching an online course as compared to traditional teaching
Choose an item.

17. I have a higher workload when teaching an online course as compared to the traditional one
Choose an item.

18. I appreciate that I can access my online course any time at my convenience
Choose an item.

19. I have to be more creative in terms of the resources used for the online course
Choose an item.

20. It takes me longer to prepare for an online course on a weekly basis than for a face-to-face course
Choose an item.

21. I am satisfied with the use of communication tools in the online environment (e.g., chat rooms, threaded discussions, etc.)
Choose an item.

22. I am concerned about receiving lower course evaluations in the online course as compared to the traditional one
Choose an item.

How often do you do the following activities?

1. I create and keep to long-term goals
Choose an item.

2. I carry an appointment book or e-device that I use to track appointments
Choose an item.

3. I make lists of the things I need to do
Choose an item.

4. I write myself reminder notes
Choose an item.

5. I find productive things to do while waiting
Choose an item.

6. I set deadlines for when tasks need to be completed
Choose an item.

7. I keep records to chart my performance on tasks

Choose an item.

8. I take care to complete tasks as efficiently as possible
   Choose an item.

9. I carry note taking device with me to jot down ideas
   Choose an item.

10. I asses the tasks that I need to do for priority
    Choose an item.

11. I schedule my work time to avoids interruptions
    Choose an item.

12. I create weekly schedules
    Choose an item.

13. I keep daily logs
    Choose an item.

14. I breaks down large tasks into smaller tasks to complete
    Choose an item.

15. I set short-term goals
    Choose an item.

16. I create daily schedules
    Choose an item.

17. I review my goals
    Choose an item.

18. I keep my paperwork organized
    Choose an item.

19. I complete priority tasks first
    Choose an item.

APPENDIX B - SURVEY RESULTS OF ONLINE INSTRUCTORS' ENGAGEMENT, SATISFACTION, AND TIME MANAGEMENT SKILLS

*The following chart shows the complete questions and average score of the questionnaire used in Project 2. The questions are grouped by scale. Reverse scored questions are indicated by an *.*

Online Faculty Satisfaction Survey	
Item	**Average Score**
Student Subscale	
The level of my interactions with students in the online course(s) is higher than in a traditional face-to-face class	3.46
The flexibility provided by the online environment is important to me	4.61
My online students are actively involved in their learning	4.15
I miss face-to-face contact with students when teaching online*	3.39*
My students are very active in communicating with me regarding online course matters	4.32
I appreciate that I can access my online course any time at my convenience	4.64
My online students are more enthusiastic about their learning than their traditional counterparts	3.39
I am satisfied with the use of communication tools in the online environment (e.g., chat rooms, threaded 2cussions, etc.)	4.18
I am able to provide better feedback to my online students on their performance in the course	3.57
My online students are somewhat passive when it comes to contacting the instructor regarding course related matters*	2.82*
It is valuable to me that my students can access my online course from any place in the world	4.59
The participation level of my students in the class discussions in the online setting is lower than in the traditional one*	2.61*
Not meeting my online students face-to-face prevents me from knowing them as well as my on-site students*	3.54*
Online teaching is gratifying because it provides me with an opportunity to reach students who otherwise would not be able to take courses	4.07
It is more difficult for me to motivate my students in the online environment than in the traditional setting*	2.96*
Instructor Subscale	
I incorporate fewer resources when teaching an online course as compared to traditional teaching*	2.11*
The technology I use for online teaching is reliable	4.04
I do not have any problems controlling my students in the online environment	3.92
I have to be more creative in terms of the resources used for the online course*	4.36*
Online teaching is often frustrating because of technical problems*	2.52*
My students use a wider range of resources in the online setting than in the traditional one	3.56
Technical problems do not discourage me from teaching online	4.29
Institution Subscale	
I have a higher workload when teaching an online course as compared to the traditional one*	3.85*
It takes me longer to prepare for an online course on a weekly basis than for a face-to-face course*	3.46*
I receive fair compensation for online teaching	4.07
I am concerned about receiving lower course evaluations in the online course as compared to the traditional one*	2.61*

* Reverse Scored for Analysis

Utrecht Work Engagement Scale	
Item	**Average Score**
Vigor Subscale	
When I get up in the morning, I feel like checking on my online course(s)	3.75
I feel strong and vigorous when I am instructing my online students or managing the course	3.68
When I am working on my online course(s), I feel bursting with energy	3.11
Absorption Subscale	
I feel happy when I am working intensely on my online course(s)	3.82
I get carried away when I am working on my online course(s)	3.30
I am immersed in my online course(s)	3.68
Dedication Subscale	
My online course(s) inspires me	3.82
I am enthusiastic about my online course(s)	4.33
I am proud of the work that I do for my online course(s)	4.64

Time Management Behaviours Scale	
Item	**Average Score**
Setting Goals Subscale	
I create and keep to long-term goals	4.39
I set deadlines for when tasks need to be completed	4.71
I take care to complete tasks as efficiently as possible	4.32
I asses the tasks that I need to do for priority	4.64
I breaks down large tasks into smaller tasks to complete	4.00
I set short-term goals	4.15
I review my goals	3.54
I complete priority tasks first	4.57
Mechanics Subscale	
I carry an appointment book or e-device that I use to track appointments	4.04
I make lists of the things I need to do	4.68
I write myself reminder notes	4.54
I find productive things to do while waiting	4.44
I keep records to chart my performance on tasks	2.78
I carry note taking device with me to jot down ideas	3.79
I schedule my work time to avoid interruptions	3.96
I create weekly schedules	4.29
I keep daily logs	2.78
I create daily schedules	3.71
I keep my paperwork organized	4.04

APPENDIX C – KOBAYASHI MARU CHALLENGE

The following contains the script that the students saw for the Kobayashi Maru Challenge discussed in Project 3 NECSUS.

Kobayashi Maru Challenge

If you are familiar with Star Trek, you know that the Kobayashi Maru is an unbeatable challenge. Although this challenge is not impossible, it will take a superior understanding of the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans*, which can he found here. In other words, no cheating (this is an ethics course after all). If you want to win, you have to work for it.

Below is an ethics application. In this test you play the role of an ethics board member and will choose whether or not to approve the application. To win the Kobayashi Maru you have to correctly choose whether or not the study should be approved, what (if any) modifications are necessary for approval, and identify all of the important ethical aspect to consider.

This test cost 5 points to attempt. You can make as many attempts as you please, but they will each cost 5 points. You will be informed as to whether you have passed or failed, but you will receive no further additional feedback.

Behavioural Research Ethics Application

Title of the Study: The Price of a Facebook Friend

Research Question: What does the cost of recruiting a friend for Facebook social game equate to in monetary terms?

Background: Facebook games, such as Farmville, are considered free social games; however, they do have a cost associated with playing them. In order to progress in the game, people have to recruit friends to play the game. To achieve "in game" bonuses, players need many "neighbours" (Facebook friends that have added the game as well, but are not necessarily active players) and to level-up, players need actively playing neighbours to send them virtual gifts from the game. Alternatively, players can choose instead to buy in-game currency that can be spent on virtual items that will take the place of a friend. I want to determine the monetary value of having a friend. How much money does a person save by recruiting a friend?

Participant Recruitment: I will not actively recruit any participants . Due to the value of having friends in games like these, players are already actively trying to recruit more friends. I would go to recruitment sites and add players that are looking for friends. I will not be recruiting any

participants and will only be adding friends to my account that are publically recruiting friends for the purpose of the game.

Consent: I will not obtain consent.

Research Methodology: I will start up a Facebook page and add several Facebook games. All the games will be social games that require friends to play and advance in the game. Each time I log into a game, I will record: How many friends I have, how much money I have, how much it costs to buy "in game" currency, how many energy points I have, how many requests I have received, and how many gifts I have received. While playing the game, I will record: what quests I have available to play, what their objectives are, how many friends I require to complete the challenges, whether I completed the quest, and how much any status items in the market cost. I will also record any additional notes about the game experience pertaining to the game-play and not to neighbour behaviour. I will then use this data to determine how much it would have cost to play the game if I had no friends and determine how much money each friend saved me. I will then compare all the games‘ costs to see if a trend exists. Any information that is collected about my in-game neighbours will be anonymized. During the course of the research, no actions will be staged to elicit reactions from players and no personal data will be collected or disseminated.

Storing Data: All electronic data will be stored in password-protected files and all non-electronic notes will be stored in a locked cabinet. Only the primary researcher will have access to the information. The raw data will be held for five years after the conclusion of the study at which time all the raw data will be destroyed.

Dissemination of results: All information collected is for scholarly purposes; thus, any results will only be distributed to academic venues such as, journals and/or conferences.

Risk or Deception: There is no risk or deception.

Do you approve the study?

Why or why not?

APPENDIX D – PRACTICE AREA DISCUSSION

The following are the discussion questions from Project 3 NECSUS. These questions were posted in the practice discussion area. Two questions were posted each week. The questions below are in the order in which they were posted to the forum.

What would you do?

You just completed a paper on a study you conducted looking at whether Gouda or Cheddar cheese motivates lab rats more. You have asked your supervising professor, who is funding your research, if he would be able to help revise the paper and help you to find a good venue for publishing it. Your supervising professor gives you some good advice as to where to submit the paper, but does not comment on the paper. He tells you that he is too busy to help with writing the paper, but expects to be listed as the second author. Although you did consult him when you designed the experiment, and your supervising professor was helpful by pointing out some flaws in your methods, you do not think he has contributed a significant amount to the research. Do you include them as a second author when you submit your paper to a publisher?

What is your opinion?

The following are examples of chindogu, which are Japanese inventions that are questionably useful. By Canadian standards, could any of them be patented? (source)

What would you do?

You are currently in the process of writing your thesis entitled: The Effects of Writing a Dissertation on the Sanity of Doctoral Candidates. You have been submitting each chapter to your supervisor for review as you have finished them. Both you and your supervisor have found that this helps to spread out the work over a longer time and therefore makes the process more manageable. Everything was going great until three months ago when your supervisor left on maternity leave. Since then, you have found it hard to reach her. You have two chapters that need to be reviewed and are almost done another chapter. You were hoping to defend you thesis in four months, but now you are not sure if your supervisor will let you defend. How do you manage this conflict?

How would you advise your friend?

Your friend Raj just got a job teaching Social Media 101. You joke around about how he should teach the entire course using social media sites. After thinking about it for a bit, Raj decides that that would be a great idea. He plans to design a research project around the feasibility of teaching using social media and use Social Media 101 to gather his data. He will keep a record of the students activities, their assignments, and their evaluations of the course. He will then use this information to publish a paper discussing which social media sites work well in the class and which did not. Are there any conflicts of interest that Raj should be aware of? Or any other ethical concerns that Raj will have to address?

What would you do?

You are at a conference and you just finished presenting your paper. It went really well and a couple of people even hung around after to ask you some more questions. One of the people that stuck around is Robert, a fellow graduate student in your field. He was impressed with your work on whether providing lab rats with mirrors affects their grooming habits. His presentation looked at how dogs self-esteem is affected by doggie outfits. His results showed that male dogs were more sensitive to their body image than female dogs. Robert would like to collaborate on a project to see if this is also true for lab rats. This is good timing because you were just about to start your next project and you could easily design it to include information about the sex of the rat. You express interest in Robert's ideas and exchange contact information. Unfortunately, three months later, when you are ready to start the new experiment, you cannot find his contact information and do not remember his name. Do you still go ahead with your experiment including information about the sex of the rat, or would that be stealing Robert's idea?

How would you advise your friend?

Your friend is in the process of writing her comprehensive examination on "Curing the insomnia of the Coffee Berry Borer Beetle" and wants some advice. She is on her third draft because her supervising professor is still concerned that she has not cited enough sources. Finally she gets a break and finds a great literature review on her topic. If she refers to that paper and tracks down the articles/books the literature review references for additional information she could add another 10 citations and fill in some gaps in her literature review that she has been concerned about. The only problem is that she cannot find 5 of the original sources listed in the literature review. She was able to find some previews of some of the pages that she required through Google books, but was not able to find the complete source. One page she found on Google books even had one of the quotations she needed. The literature review did contain quotations of most of the material she wanted to include. She wants to know if she can reference the information from the quotations and cite it as the original source instead of citing the literature review. What would you tell her?

APPENDIX E – COMMUNITY OF INQUIRY CODING SCHEME

The charts below are a modified version of Shea et al. 2010 tables that outlined the coding scheme for the presence of a Community of Inquiry. This coding scheme is referenced throughout the thesis.

Teacher Presence

Categories	Indicators	Code	Definition
Design & Organization	Setting curriculum and communicating assessment methods	DE1	Communicates important course outcomes, including course goals, topics, rubrics and instructor expectations
	Designing methods	DE2	Provides clear instructions about how to participate in course learning activities
	Establishing time parameters	DE3	Communicates important due dates/time frames for learning activities to help students keep pace with the course
	Utilizing medium effectively	DE4	Assists students to take advantage of the online environment to enhance learning using LMS features for learning activities and resolving technical problems
	Establishing netiquette	DE5	Helps students understand and practice the kinds of behaviors that are acceptable in online learning
	Making macro-level comments about course content	DE6	Provides rationale for assignment/topic
Facilitating Discourse	Identifying areas of agreement/disagreement	FD1	Helps to identify areas of agreement and disagreement on course topics
	Seeking to reach consensus	FD2	Assists in guiding class toward agreement about course topics
	Encouraging, acknowledging or reinforcing student contributions	FD3	Acknowledges student participation in the course
	Setting climate for learning	FD4	Encourages students to explore concepts in the course and promotes the exploration of new ideas
	Drawing in participants, prompting discussion	FD5	Helps keep students engaged and participating in productive dialog
	Presenting follow-up topics for discussions (ad hoc)	FD6	Presents content or questions tangential or related
	Re-focusing discussion on specific issues	FD7	Helps focus discussion on relevant issues to keeps participants on topic
	Summarizing discussion	FD8	Reviews and summarizes discussion to highlight key concepts and relationships to further facilitate discourse

Direct Instruction	Providing analogies	DI1	Attempts to rephrase/reformulate course material in ways that highlight similarities between content assumed to be understood and new content
	Offering illustrations	DI2	Attempts to make course content more comprehensible by providing examples that are substantive and advance understanding
	Conducting supportive demonstrations	DI3	Attempts to make course content more comprehensible through the exhibition of processes
	Supplying clarifying information	DI4	Attempts to reduce confusion or misconceptions about course content by providing additional explanations.
	Making explicit reference to outside material	DI5	Provides useful information from a variety of outside material sources
Assessment	Giving formative feedback for discussions	AS1	Explicitly evaluates discussion/offers feedback OR diagnoses misconceptions
	Providing formative feedback for other assignments	AS2	Explicitly evaluates other assignment types/offers feedback OR diagnoses misconceptions
	Delivering summative feedback for discussions	AS3	Provides post mortem feedback on discussions, including grades
	Supplying summative feedback for other assignments	AS4	Provides post mortem feedback on other assignments, including grades
	Soliciting formative assessment on course design and learning activities from students and other participants	AS5	Seeks feedback upon completion of modules or during mid-course
	Soliciting summative assessment on course design and learning activities from students and other participants	AS6	Seeks meta-level feedback at close of course

Social Presence

Categories	Indicators	Code	Definition
Affective	Expressing emotions	SP-AF-1	Conventional expressions of emotion
	Use of humor	SP-AF-2	Teasing, cajoling, irony, understatements, sarcasm
	Self-disclosure	SP-AF-3	Presents details of life outside of class, or expresses vulnerability; includes expressions of likes, dislikes and preferences
	Use of unconventional expressions to express emotion	SP-AF-4	Unconventional expressions of emotion. Includes repetitious punctuation, conspicuous capitalization, emoticons
	Expressing value	SP-AF-5	Expressing personal values, beliefs and attitudes
Open Communication	Continuing a thread	SP-OC-1	Using reply feature of software, rather than starting a new thread
	Quoting from others' messages	SP-OC-2	Using software features to quote others' entire message or cut and passing selections of others' messages
	Referring explicitly to others' messages	SP-OC-3	Direct references to contents of others' posts
	Asking questions	SP-OC-4	Students ask questions of other students or the moderator
	Complimenting, expressing appreciation	SP-OC-5	Complimenting others or contents of others' messages
	Expressing agreement	SP-OC-6	Expressing agreement with others or contents of others messages
	Expressing disagreement	SP-OC-7	Expresses disagreement with other or contents of others messages
	Personal advice	SP-OC-8	Offering specific advice to classmates
Group Cohesion	Vocatives	SP-CH-1	Addressing or referring to the participants by name
	Addresses or refers to the group using inclusive pronouns	SP-CH-2	Addresses the group as we., us, our, group
	Phatics, salutations and greetings	SP-CH-3	Communication that serves a purely social function; greetings or closures
	Social sharing	SP-CH-4	Sharing information unrelated to the course
	Course reflection	SP-CH-5	Reflection on the course itself

Cognitive Presence

Phase	Descriptor	Code	Indicator	Socio-Cognitive Process
Triggering Event	**Evocative (inductive)** - Stimulates one's curiosity - Core organizing concept/problem - Dilemma/problem that learners can relate to from their experience or previous studies - Framing the issue and eliciting questions or problems that learners see or have experienced - Assessing state of learners knowledge and generating unintended but constructive ideas	CP-TE-1	Recognize problem	Presenting background information that may culminate in a question or presents a problem/issue
		CP-TE-2	Sense of puzzlement	Asking questions or messages that take discussion in a new direction
Exploration	**Inquisitive** - Understanding the nature of the problem and then search for relevant information and possible explanation - Group activities – brainstorming - Private activities – literature searches	CP-EX-1	Exploration within the online community	Unsubstantiated agreement or disagreement/contradiction of previous ideas. Includes "good point" or "I agree" with or without unsubstantiated elaboration
		CP-EX-2	Exploration within a single message	Many different ideas/themes presented in one message (including pro/cons)
		CP-EX-3	Information exchange	Personal narratives, description, or facts. Adds points but does not systematically defend/justify
		CP-EX-4	Suggestions for consideration	Author explicitly characterizes message as exploration
		CP-EX-5	Leaps to conclusions	Offers unsupported opinions
		CP-IN-1	Integration among group members	Reference to previous message followed by substantiated agreement or disagreement building on or adding to others ideas
Integration	**Tentative** - Focused and structured phase of making meaning - Decisions are made about integration of ideas - Teacher must probe for understanding and misconceptions	CP-IN-2	Integration within a single message	Justified, developed, defensible, yet tentative hypotheses
		CP-IN-3	Connecting ideas, synthesis	Integrating information from one or more sources – textbook, articles, personal experience, other posts, etc.
		CP-IN-4	Creating solutions	Explicit characterization of message as a solution by participant
		CP-RE-1	Vicarious application to real world testing solutions	Providing examples of how problems were solved

Resolution/Application	- Resolution of the dilemma or problem - Reducing complexity by constructing a meaningful framework or discovering a contextually specific solution - Confirmation or testing phase may be accomplished by direct or vicarious action	CP-RE-2	Defending Solutions	Defending why a problem was solved in a specific manner

Tables Adapted from:
Shea, P., Hayes, S., Vickers, J., Gozza-Cohen, M., Uzuner, S. & Mehta, R. (2010). A re-examination of the Community of Inquiry framework: Social network and content analysis. *The Internet and Higher Education*, *13*(1), 10-21.