IMPROVING ONLINE PROGRAMS AND COMMUNITY OF INQUIRY THROUGH ANALYSIS OF DISCUSSION BOARDS, INSTRUCTOR SELF-EFFICACY, AND STUDENT SATISFACTION

A Dissertation

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Major Professor: Linda Taylor, Ph.D.

Authorization to Submit Dissertation

This dissertation of Brett Yadon, submitted for the degree of Doctorate of Education with a Major in Education and titled: "Improving Online Programs and Community of Inquiry Through Analysis of Discussion Boards, Instructor Self-efficacy, and Student Satisfaction" has been reviewed in final form. Permission, as indicated by signatures and dates below, is now granted to submit final copies to the College of Graduate Studies for approval.

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Abstract

This Professional Practice Doctorate three article dissertation utilized a group format, focused on issues surrounding technology and online learning in higher education. The purpose of this dissertation was to conduct research to advise the stakeholder of instructor, course and program level practices that could be used to enhance the overall quality of online education in order to produce highly trained graduates ready for the 21st century workforce. The first article was an exploratory study that investigated the relationship between online instructor self-efficacy and student satisfaction at a private university in the northwestern United States. The second article was a quantitative analysis of discussion board best practices and the relationship of the use of discussion board best practices to student satisfaction and student perceived learning in an online capstone course. This involved the development and validation of the Discussion Board Best Practices Rubric. Using the rubric, discussion board best practices were also correlated to the Community of Inquiry survey. The third article was a concept paper for the stakeholders highlighting the results of the studies with recommendations for the stakeholder. The last chapter provides a rich, blended perspective of online education that the stakeholders can use to understand and improve the quality of education. These studies suggest that course design for online courses could be improved by implementing best practices into the design of discussion boards. Instructors can also be trained on how to better use best practices to engage students in the discussion. Additional focus on teacher experience and how it affects their engagement in online courses is also warranted.

Keywords: online learning, self-efficacy, Community of Inquiry, higher education, andragogy, student satisfaction, student perceived learning, discussion board best practices, discussion board rubric

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I am grateful to members of my cohort and in particular to members of my research team. We have debated, commiserated and celebrated together and I consider each to be my friend. Likewise, I am grateful for Bryan Maughan for his willingness to pilot the airplane under construction and see us all through to completion. It has been a labor of love and I am grateful for his dedication on my behalf.

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Dedication

Kim, you are my angel. Thank you!

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Chapter 1: Introduction to the Professional Practices Doctorate

This study was designed to fulfill the purpose of the University of Idaho Professional Practices Doctorate in Education (PPD), resulting in an Ed.D. degree, meaning it focused on understanding, developing, and implementing solutions to local problems. PPD programs are distinguished from traditional doctorates in that they incorporate "practice-rooted research, work-based learning, employment-related skills and cohort-driven pedagogies" (Willis, Inman, & Valenti, 2010, p. 99). The characteristics of PPD programs are thus included in PPD dissertations. This introduction compared the purposes and outcomes of PPD programs with traditional Ph.D. programs. Specifically, it focused on the Ed.D. degree as a type of PPD, examined PPD dissertation options, and explored the collaborative nature of this research study.

PPD programs are usually characterized by building content and skills that are broader and more interdisciplinary than traditional Ph.D. programs. Since the students in these programs are often older and working in their chosen professions, the PPD allows students to focus on problems within their professional workplace, rather than on academic philosophies and theories (Green & Powell, 2005). The PPD prioritizes professional knowledge over academic knowledge, its goal being to address real and often localized problems, rather than developing academic theories (Willis et al., 2010). While some scholars have debated the validity of PPD programs (Le Belle, 2004; Willis et al., 2010), founders of the Carnegie Project on the Education Doctorate endorse the PPD doctorate program in Education, and uphold the idea that this "new degree can help restore respect for the excellent work of education practitioners and leaders" (Shulman, Golde, Bueschel, & Garabedian, 2006, p. 28).

Historically, educators have debated the purposes and outcomes of Ph.D. programs in Education compared to Ed.D. objectives and outcomes. The first doctorate of education (Ed.D.) was offered from the University of Toronto in 1881, and later in the United States at Harvard in 1920 (Green & Powell, 2005, p. 87). The purpose of the Ed.D. is to prepare practitioners, as opposed to scholars and researchers in traditional Ph.D. programs.

Institutions such as the University of Illinois and the University of Idaho focus the Ed.D. dissertation around solving problems rather than discovering universal knowledge. The University of Illinois characterizes their Ed.D. dissertation as a "synthesis of experiences that is the hallmark of a highly qualified professional. The demonstration of these qualities may take a variety of forms such as: (a) a field study; (b) a scholarly, original paper; . . .or (c) an analytic report" (College of Education at Illinois, 2013, para. 1). In addition, Clark University, Harvard Graduate School of Arts and Sciences, Louisiana State University, and the University of Alabama support the three-article dissertation format used by the University of Idaho PPD program (University of Idaho, 2011; Willis et al., 2010).

The three-article dissertation format incorporates five elements in the dissertation, including an introduction that explains the three articles contained in the dissertation, followed by three publishable articles, and a conclusion that ties together findings from the articles and proposes both solutions to problems of practice and implications for future scholarship (Willis et al., 2010, p. 46). Overall, the purpose of the PPD dissertation is to prepare leaders who have the requisite skills to identify an authentic, researchable issue or problem related to their practice and to conduct disciplined inquiry that can identify promising solutions (T. Brown-Ferrigno, personal communication, September 5, 2012).

Table 1.1 summarizes the similarities and differences between the three types of dissertations.

Table 1.1

Types of Dissertations

Chapter	Traditional	3 Article (TAD)	PPD
1	Introduction	Introduction	Problem
2	Literature Review	Article 1	Context of Research
3	Methodology	Article 2	Action Research
4	Results	Article 3	Results
5	Discussion	Conclusion	Reflective Analysis

Finally, it must be noted that, "PPD dissertations tend to be done collaboratively rather than by a lone researcher, because most of the significant issues of professional practice call for collaboration" (Willis et al., 2010, p. 39). The research in this study was cohort-based. The first article presented in this dissertation was collaborative, and as such, some overlap is expected. Individual articles may share the same theoretical framework, methodologies, or gathering method (Willis et al., 2010, p. 25). In this dissertation, each researcher's individual study, as well as the group study, focused on a current issue with technology in education. This research will inform online learning at Brigham Young University-Idaho (BYU-I), a private university located in the northwestern United States.

While traditional research seeks to generalize findings, action research focuses on specific situations and localized solutions (Stringer, 2007). Therefore, the foci of the researchers' various studies identified problems of practice that were worthy, marketable, and original (Willis et al., 2010). Participatory Action Research (PAR) is suited to developing and implementing solutions to local problems, and fulfills the purpose of the PPD program in its objective of practice-driven research. In a similar manner, some of the individual qualitative studies utilized the Rapid Assessment Process (RAP) and used cohort

members as junior researchers and analysts (Beebe, 2001). The PPD's focus on work-related learning and employment-driven skills were inherent in both the group and individual studies.

The research team for the group study included Jeffrey Hochstrasser, an instructor at BYU-I, Heather Carter, an online instructor and administrator at BYU-I, Rachel Huber, a BYU-I online instructor and former online student, and Brett Yadon, an online administrator at BYU-I. This research team in the cohort focused their research on current technology issues in the classroom and organization. The study's stakeholders included both online students and students in traditional face-to-face classrooms at BYU-I, online and campus faculty at the same university, BYU-I online learning departments and administration, online servant leadership programs, and the University of Idaho.

In addition to the collaborative study, each member of the research team conducted individual research to complete two of the three articles for the three-article dissertation. The individual studies employed various types of research, and all focused on understanding and improving online learning or technology use in higher education. This dissertation included the development of a rubric for measuring the use of discussion board best practices along with a quantitative analysis of discussion board best practices in a capstone course at a private inland Northwest university. Analysis sought to determine if the use of discussion board best practices correlated with student satisfaction, student perceived learning along with teaching presence, cognitive presence and social presence (as measured by the Community of Inquiry).

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Chapter 2: Self-efficacy in Online Teaching: How Instructor Confidence affects Student Satisfaction

Abstract

Online learning is the most rapidly growing area in higher education. This study explored the correlation between instructor self-efficacy and student satisfaction with online courses. Instructor self-efficacy in online teaching was examined in terms of the instructor's confidence in online teaching pedagogy, use of technology, and subject matter expertise (as measured by the Online Instructor Self-efficacy Survey). Instructors with over three semesters of teaching experience at BYU-I were found to have significantly higher self-efficacy than instructors who had been teaching less than three semesters.

Student satisfaction levels were measured by end-of-semester student evaluations, and examined level of satisfaction with their course, instructor, and perceived learning. A slight negative correlation was found between instructor self-efficacy in technological online instruction and student satisfaction with non-matriculated (Pathway) students. Statistical analysis also revealed that more advanced students were less satisfied with their instructors, the amount they have learned and their online courses. In addition, the more confident an instructor was in his/her technological skills, the lower the student satisfaction was with the online course (Pathways students). Finally, the Pathway program is a new and expanding program at BYU-Idaho. Analysis of data from these students revealed significant differences from the traditional students in this study. Suggestions for future research were discussed.

Keywords: higher education, online learning, self-efficacy, student satisfaction, students, technology

Introduction

Online learning is an increasing part of the landscape of higher education in the United States. Enrollments in online courses have increased steadily since 2005 (Bolliger & Wasilik, 2009). A recent survey indicated 50% of college presidents believe that ten years from now a majority of students will be taking classes online (Parker, Lenhart, & Moore, 2011). In 2012, almost seven million students in the United States, or 32% of all higher education students, were taking courses online (Allen & Seaman, 2013).

Despite this high rate of growth in online enrollments, in 2012 over two-thirds of faculty members at American universities reported that they did not accept the value and legitimacy of online learning (Allen & Seaman, 2013). This same rate of acceptance, or non-acceptance, has been relatively consistent for the last ten years, and shows no sign of changing (Allen & Seaman, 2011, 2013). Even acceptance of online education by students is in question. In a study consisting of counseling and school psychology graduate students, Taylor and Huang (2010) found a significant preference toward face-to-face teaching when compared with hybrid and strictly online courses. This could be due to the fact that certain personality types prefer the online environment over face-to-face learning (Harrington & Loffredo, 2010). Specifically, students who preferred online classes based their preferences on convenience, enjoyment of computer technology, and interest in innovation (Harrington & Loffredo, 2010).

Online programs are less expensive and offer more flexibility for students. Even without considering student preferences, online courses are being offered at a rate that exceeds the growth of traditional courses in higher education (Allen & Seaman, 2013; Harrington & Loffredo, 2010). Increasing enrollments, accompanied by a consistent

questioning of the value of online education, justify a need to examine ways the quality of the online student experience might be improved while maintaining escalating growth rates.

Problem Statement

Brigham Young University-Idaho (BYU-I), located in the northwestern United States, is among those institutions of higher education experiencing exponential growth in online learning (see Figure 2.1). In Fall Semester 2009, when BYU-I first developed a separate online program, 67 remote adjunct instructors were hired to teach within 35 different online courses. By Fall Semester 2013, four years later, the number of online instructors had increased by 683% (Routson, 2013). The university hired 525 instructors to teach 142 different online courses, spread across 732 sections. In Fall 2013, on the first day of registration, the number of enrollments reached 30,742 (Routson, 2013).

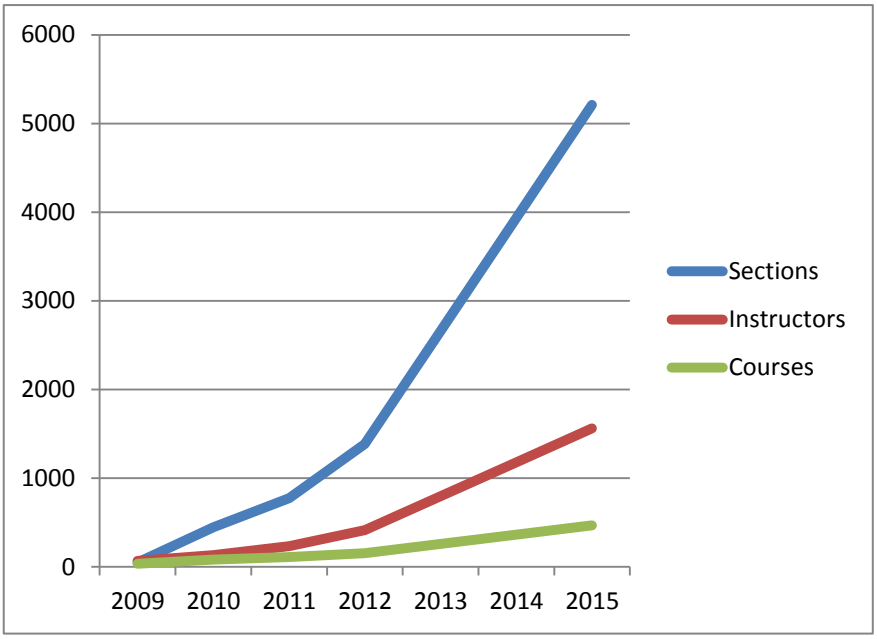

Figure 1.1. *Current and projected growth in Online Learning at BYU-Idaho*

From Fall 2013 to Winter 2014, the online program increased its number of instructors yet again, by 29%. Since the online courses at BYU-I are staffed almost

exclusively by remote hires, escalating online enrollments mean more remote adjunct faculty to hire, train, and develop each year.

The rapid growth in online students and online hires necessitates increased training for the university's remote adjunct instructors. Not only must new instructors be trained on the technicalities of teaching, they must learn a new online teaching pedagogy. This growth has also forced the online department to continually adapt management procedures as data is gathered comparing online student satisfaction levels to student satisfaction in the same on-campus courses. The university faces challenges of improving the quality of online education and increasing student satisfaction ratings, while supporting high levels of accelerated growth.

Purpose Statement

This study explored the correlation between instructor self-efficacy in teaching online and student satisfaction levels from end-of-semester evaluations. Specifically, online teaching self-efficacy was examined in terms of instructors' confidence in online teaching pedagogy, use of technology, and knowledge of the subject matter. This study identified correlations between self-efficacy and student satisfaction in order to enable the university to improve satisfaction, develop better hiring strategies, and improve instructor training and professional development.

Significance of the Study

BYU-Idaho has three main imperatives from Kim B. Clark, its current President: lower the cost of education, serve more students, and improve students' learning experience (Clark, 2005). The university's online program has helped fulfill two of these missions, by lowering the cost of education and serving more students than ever before. Still, the

university continues to explore ways to improve student satisfaction, especially in the online learning program. Examining instructor self-efficacy as it correlates with student satisfaction is significant because of the potential impact an instructor's self-efficacy may have on students' experience and satisfaction (Bandura, 2005).

In addition, this study may provide additional guidelines for hiring and training online faculty members who, in the end, will help improve the online learning experience for students. Finally, students' experience with the online platform at this particular university can be generalized and found applicable to other online institutions throughout the United States.

Literature Review

Students are considered the main stakeholders in the educational process. One way to measure quality in online education is to look at student satisfaction with courses and instructors (Astin, 1993; Donald & Denison, 1996; Katiliute & Kazlauskiene, 2010; Schuh & Upcraft, 2002). Self-efficacy theory has its roots in social cognitive theory, and is built on a constructivist framework, which has implications for online learning. This review of the literature examined research concerning domains of online instructor self-efficacy and how they relate to student experiences in online learning.

Student Satisfaction

Student satisfaction in higher education is often used as a key indicator of institutional effectiveness and success (Donald & Denison, 1996; Katiliute & Kazlauskiene, 2010; Schuh & Upcraft, 2002). Satisfaction has been found to have a larger impact on grades than grades have on student satisfaction (Bean & Bradley, 1986). In addition, student

satisfaction has been related to increased retention and enrollment, along with improved academic performance (Beil & Shope, 1990; Beltyukova & Fox, 2002; Tinto, 1993).

One of the factors linked to increased student satisfaction with online learning is interaction with instructors. Students connect to instructors in online courses through the presence of quality, plentiful interaction in the use of technology, online-specific pedagogy, and course competency. In general, the more frequent and instructive the interaction with faculty, the more satisfied students are with their experience in online classes (Ali & Ahmad, 2011; Astin, 1993; Jackson, Jones, & Rodriguez, 2010; Kuh, 2003; NSSE, 2005).

A quantitative study of 917 undergraduate students identified several predictors of student satisfaction in online learning (Sahin, 2007). Personal relevance was found to be the strongest predictor of student satisfaction. This involves linking course content with personal experiences of the students and creating courses that are learner-centered, and involve students' out-of-school knowledge and skills. Instructor support was identified as the second most significant predictor of student satisfaction in the online learning environment. This includes timely help, useful feedback, and easy communication. Active learning, which allowed students to involve their own learning strategies, problems, and solutions to the course, was the third strongest variable in predicting student satisfaction. Addressing these predictors of student satisfaction when developing online courses increases "student motivation, participation, and ultimately, learning" (Sahin, 2007, p. 6).

Mixed results were found in studies researching the relationship between gender and student satisfaction. Using a survey that employed a data set of 1185 students from 27 online courses, one study found female students significantly more positive about e-learning than male students (Gonzalez-Gomez, Guardiola, Rodriguez, & Alonso, 2012). This contradicted

previous studies, which revealed greater e-learning valuation and satisfaction and a more positive perception of online learning among male students (Lu & Chiou, 2010; Ong & Lai, 2006). Still other studies indicate no gender effect on attitudes towards online learning (Cuadrado-Garcia, Ruiz-Molina, & Montoro-Pons, 2010; Hung, Chou, Chen, & Own, 2010). All of these studies used similar quantitative data-gathering methodologies, involving participant surveys gathered from a significant number of university students. Ong and Lai (2006) is the exception, which utilized participants employed at six international companies that implement their own e-learning programs. Though the results from these studies show mixed results concerning gender as a variable influencing student satisfaction with online learning, one may still conclude that gender is a variable that should continue to be monitored in future research.

Theoretical Framework

Self-Efficacy Theory is a component of Social Cognitive Theory, which is founded in Constructivism. Having at its foundation the concept of constructing knowledge through experience and social interaction, Constructivism provides a framework for understanding, predicting, and changing human behavior (Crotty, 1998; Paul, 2005). As it relates to education:

> Constructivist principles…help designers and teachers create learner-centered, collaborative environments that support reflective and experimental processes. Students and instructors can then build meaning, understanding, and relevant practice together and go far beyond the mere movement of information from instructors' minds to students' notebooks. (Jonassen, Davidson, Collins, Campbell, & Haag, 1995, p.1)

Since online learning is also founded on the principle of constructivism, many research studies of online instruction are associated with constructivist theory (Jonassen et al., 1995; LeNoue, Hall, & Eighmy, 2011).

Self-efficacy Theory

Self-efficacy theory describes an individual's belief about his or her perceived ability to accomplish certain tasks and/or succeed in a particular situation (Bandura, 2005). It can also be viewed as an individual's self-judgment of personal capabilities, and is often required to begin and successfully complete various tasks at a certain level (Shazadi, Khatoon, Aziz, & Hassan, 2011). For example, an individual with high self-efficacy in angling would feel comfortable handling a fishing rod and confident about his or her ability to land a catch during a fishing trip. However, when fishing in a new situation or with different equipment, this same individual may have lower self-efficacy, especially if initial attempts were not successful. Likewise, teacher efficacy is context-specific and a teacher's level of self-efficacy may change from one class period to another (Goddard et al., 2000). Therefore, a teacher may have high self-efficacy teaching geography in a traditional classroom setting. However, when teaching a different subject, or in an online environment or with new technology, the teacher's self-efficacy may be lower.

Self-efficacy and outcome expectations can be described in terms of their relationship with motivation to learn (Bandura, 1977). Individuals will engage in learning if they believe in their ability to learn (efficacy expectations) and they also believe their efforts at learning will be rewarded (outcome expectations). Figure 2.2 depicts Bandura's theory of self-efficacy.

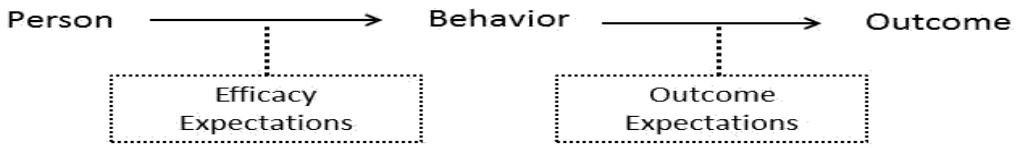

Figure 2.2. Efficacy and Outcome Expectations (Bandura, 1997, p. 193).

Self-efficacy theory has implications for andragogy, the theory of adult learning developed by Malcolm Knowles. Some of the elements influencing adult learners are their tendency to draw from past experiences, self-directed learning, internal motivation, and a readiness to learn (Chan, 2010). Adults tend to learn what they believe they need to know, and to learn for immediate action rather than for future use (Chan, 2010; Knowles, Holton, & Swanson, 2012).

Domains of Online Teacher Self-efficacy

Goddard, Hoy, and Hoy (2000) suggested that one way for school administrators to improve student achievement "is by working to raise the collective efficacy beliefs of their faculty" (p. 502). They concluded, "it is not enough to hire and retain the brightest teachers—they must also believe they can successfully meet the challenges of the task at hand" (Goddard et al., 2000, p. 503). High teacher self-efficacy has been found to correlate with increased student learning, student test scores, student motivation, and student achievement (Goddard et al., 2000; Henson, 2001). These findings are consistent across a broad range of demographics, but are limited to the face-to-face classroom. This review of the literature focused on research in terms of self-efficacy in online learning pedagogical skills, technological skills (Hung & Blomeyer, 2012), and course subject matter knowledge (Tschannen-Moran & Woolfolk-Hoy, 2001; Wright, 2010). These three domains were selected for two reasons. First, they correlated to the areas that have been shown to influence

student satisfaction (Jackson et al., 2010). Secondly, the relationship between content, pedagogy, and technology had been examined for several years.

The knowledge base teachers need to effectively teach with technology has previously been conceptualized in terms of Technological Pedagogical Content Knowledge (TPACK) (Koehler & Mishra, 2005; Schmidt et al., 2009). According to this framework, technology knowledge refers to knowledge about various technologies such as the Internet, interactive whiteboards, and software programs. Content knowledge refers to knowledge about course subject matter. Pedagogical knowledge is knowledge of the "methods and processes of teaching," including assessment, student learning, and classroom management (Schmidt et al., 2009). It is important to note that while TPACK examines knowledge in these three domains, it does not measure self-efficacy.

Research has found that instructors' self-efficacy in online teaching influences and is influenced by their confidence in online pedagogies, technology, and subject matter. Self-efficacy is context-specific, and may be high in one area and low in another (Bandura, 2005; Tschannen-Moran & Woolfolk-Hoy, 2001). For example, an online learning instructor may have high self-efficacy in terms of skills with technology and in terms of subject matter, but low self-efficacy in terms of online teaching pedagogy.

The importance for teachers to develop unique pedagogical knowledge and skills to teach in the online environment has been established in primary and secondary education (Deubal, 2008), as well as in higher education (Baran, Correia, & Thompson, 2013). A correlation has also been found between high teacher technological self-efficacy and years of experience in teaching online, as well as pedagogical training in the use of technology (Lee & Tsai, 2010). In relation to content, a teacher's self-efficacy is neither consistent

across activities nor across subject matter (Bandura, 1997; Tschannen-Moran & Woolfolk-Hoy, 2001).

Figure 2.3 depicts the relationship of self-efficacy with the three domains of the online instructor (Carter, Hochstrasser, Huber, & Yadon, 2013). It should be noted that although Online Instruction Pedagogy is found at the top of the circle, this does not suggest that one aspect of self-efficacy is more important than another.

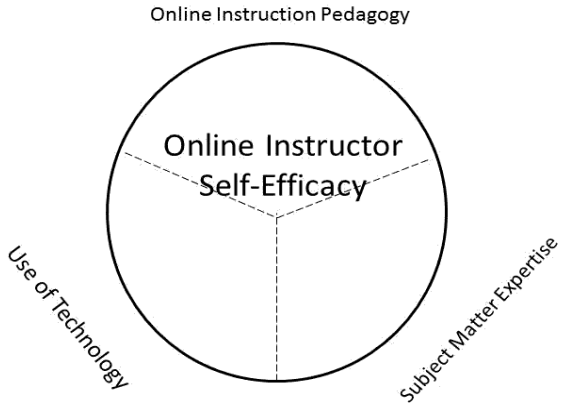

Figure 3.3. Constructs of Online Instructor Self-Efficacy.

If instructors believe they have subject matter expertise, as well as competence in the use of technology and in online instruction pedagogy, they will provide a better learning environment for students to build their understanding and knowledge of the course material. Research indicates that when this occurs, the results are reflected in increased student satisfaction (Sahin, 2007).

Research Question and Hypotheses

This descriptive study explored the relationship between instructor self-efficacy and student satisfaction for online courses using a quantitative analysis of survey responses.

Research Question: What is the relationship between self-efficacy in online teaching and the level of student satisfaction with their online class? Because self-efficacy is always described as being specific to a certain area, this study examined which aspects of instructor self-efficacy are most significant in impacting online student satisfaction—technology, pedagogy, or content.

H_1 – There is a correlation between instructor self-efficacy *overall* and student satisfaction.

H_2 – There is a correlation between instructor self-efficacy in their *use of technology* and student satisfaction.

H_3 – There is a correlation between instructor self-efficacy in their *pedagogical skill* and student satisfaction.

H_4 – There is a correlation between instructor self-efficacy in their *subject matter expertise* and student satisfaction.

Methodology

This was a descriptive study, measuring the correlation of instructor self-efficacy with student satisfaction. This study was conducted with remote instructors currently teaching online for BYU-I. Demographic data in terms of age, gender, teaching experience and subjects taught was gathered from the Demographic Information Form, which each survey participant was asked to complete (see Appendix A for the complete form). In addition, this study used two survey instruments: one for instructors measuring online instructor self-efficacy, entitled Online Instructor Self-efficacy Survey (see Appendix B); and the other for students indicating satisfaction with course and instructor, as measured by

the BYU-Idaho Course Evaluation administered at the end of each semester (see Appendix C).

Research was conducted following approval of the Institutional Review Board (IRB) from both BYU-I and the University of Idaho. IRB approvals can be found in Appendix D and E. Researchers were trained in and followed the general ethical principles and code of conduct of the American Psychological Foundation (APA, 2010, p. 5-7) and completed certification from the National Institutes of Health (NIH). The nature of the surveys did not require identifying students or instructors individually. The data was analyzed in aggregate. To help protect the identity of instructors and enhance their comfort with taking the survey, all instructors were assigned a participant number by the researchers. This participant number was used to link instructors to the course satisfaction results. The researchers did not share individual self-efficacy scores with BYU-I; rather, all data was presented in aggregate.

Assessments

The Online Instructor Self-efficacy Survey (OISS) was adapted by the researchers, using as their model the Online Educator Self-Efficacy Scale (Hung & Blomeyer, 2012), the Online Technologies Self-Efficacy Scale (Miltiadou & Yu, 2000), Lee's Self-efficacy Instrument (Lee, 2003), and the Teacher Efficacy Construct (Tschannen-Moran & Woolfolk-Hoy, 2001). The OISS contained 38 questions designed to assess the self-efficacy of online teachers' pedagogical skills, technological skills, and subject matter expertise. It used a semantic differential scale, ranging from 1 (very confident) to 4 (not confident at all). It also included two open-ended questions for each of the three categories, allowing instructors to elaborate on what added to or diminished their confidence. See Appendix B for the complete instrument. It should be noted that while elements of the OISS were

identified in TPACK, the OISS was not designed to mirror TPACK. The focus of the OISS was to assess self-efficacy, and therefore the questions in the survey separate application of technology skills from other pedagogical techniques, whereas in the TPACK, all pedagogy is in one category. OISS design allowed researchers to combine understanding and application of technology into one category, and separate application of technological knowledge from other elements of pedagogy.

The second instrument used was the BYU-Idaho Course Evaluation, administered to students at the end of each semester for all courses at BYU-I. This survey contained 43 questions about each student's performance and expectations in the class, as well as perceptions of the course and instructor. It used a five point rating scale about student satisfaction for the course in relation to other college courses the student had taken. The course evaluation used in this study has been administered at BYU-Idaho since 2008.

Data Collection

Researchers used the Qualtrics survey software to collect data. Prior to this research, data collection was in place for the student satisfaction measures, since each semester BYU-I administers a student survey for every course. The two quality measures of course and instructor ratings were already part of the survey. The correlation for these two quality measures was calculated for each self-efficacy question and for the three general categories of technological skill, knowledge of subject matter, and skill in online teaching pedagogy, as well as overall teaching self-efficacy.

Data Analysis

A Spearman rho correlation was conducted for all hypotheses. Analysis looked for a correlation between student satisfaction and instructor self-efficacy in terms of technological

skill, pedagogical skill, subject matter knowledge, and overall online teaching self-efficacy. It must be noted that 44% of the instructors taught classes in a Pathway program, which is a year-long program of general study skills and academic start courses designed to help non-matriculated students become college-ready. Because these are not traditional courses or traditional students, an analysis was conducted both with and without their data.

Phase I: Instrument Validation

The study had two phases. The goal of the first phase was to improve the content validity of the OISS. Ten Caucasian professionals (male = 8; female = 2) between the ages of 28 and 43 were asked to review and critique the OISS. Eight (80%) agreed to critique the OISS. Two of the professional reviewers held Ph.Ds in Instructional Design and six held Masters Degrees. All were either directors in research and development (n = 3) or managers of online instructors at BYU-I (n = 5). All reviewers were either from BYU-Idaho's Research and Development team or Online Course Improvement Department, and routinely develop and administer BYU-I assessments. In addition, they were all stakeholders in this research project.

The eight participants were asked for specific feedback on improving the instrument from a research and development perspective, as well as from the viewpoint of stakeholders. Four participants gave detailed and comprehensive feedback through email, and two participants shared their feedback in person. The other two participants said they wouldn't change anything.

As a result of stakeholder feedback, the two open-ended questions that were at the end of each category of the OISS were reduced to just one open-ended question asking about the biggest impact on the instructor's feelings of confidence in the specific topic of the

section. In addition, the demographic survey was changed to require instructors to select one primary course and teaching area, rather than allowing them to check multiple boxes. The survey then reminded instructors of their initial teaching area choice as they began the subject matter area of the survey. The revised survey also requested instructors to reflect on their own confidence levels, regardless of course design, class size, and other variable factors. Other minor changes to wording, punctuation, and grammar improved overall clarity.

Phase II: Study

Using the revised survey instrument, the final study was conducted in Fall 2013. Due to the relative ease of surveying all members of the populations, the survey was sent to all online instructors and all students in online courses. Therefore, all 486 instructors teaching online at BYU-I in the 2013 Fall Semester were invited to participate in the study by completing the OISS. The student population included all students enrolled in online courses at BYU-I during the same semester (n = 18,336). Instructors were invited to respond to the OISS prior to students completing the end-of-semester surveys. Because the data collection procedures were already in place for students, researchers were able to obtain survey results for all online students who completed the end-of-semester survey.

Results

Participants

Instructors. All remote adjunct instructors (N = 486) from the Fall 2013 semester were invited to participate in the OISS. Of the remote instructor population who identified their ethnicity, the majority were Caucasian (54%), with 2.7% identifying themselves as Hispanic, 1.4% Asian and .02% African American and the same percentage (.02%)

identified as East Indian (H. Hall, personal communication, January 31, 2014). From the total online instructor population, 265 instructors (54.5%) completed the survey. Of those responding, 50.6% were female and 49.4% were male.

Because the population of Pathway students was markedly different than traditional college students, the analysis was split into three datasets: one including all responses (All Instructors), another with only Pathway students (Pathway), and the last with non-Pathway students (Non-Pathway). Pathway courses were separate from other online courses at BYU-Idaho and therefore the datasets were easily categorized. The majority of instructors (n = 168) taught non-Pathway courses (63.4%), followed by 117 instructors (44.2%) who taught Pathway courses. Some overlap existed, since 20 instructors taught both Pathway and non-Pathway courses. Female respondents (n = 134; 50.6%) were only slightly higher than male respondents (n = 131; 49.4%).

When asked about experience teaching online at BYU-Idaho, 65 were in their first semester teaching (24.5%), 23 had previously taught one to two semesters (8.7%), 84 had three to five semester's experience (31.7%), and 93 had over five semesters of online experience at BYU-Idaho (35.1%). Seventy-two instructors (27.2%) taught online for other universities. Of those, 13.9% had one or two semesters of experience teaching online at other universities, ten (13.9%) had three to five semesters of experience, and the remaining 72.2% had over five semesters (n = 52) of experience teaching online at other universities.

Students. Survey responses were collected from 18,336 online students. The majority of U.S. students in Fall 2013 were Caucasian (89.5%) with 6.02% identifying themselves as Hispanic, 1.4% Asian, and 3.1% identifying themselves as "other" (BYU-Idaho, 2014). However, since only 54.5% of instructors responded to the OISS, only 9,179

student responses could be utilized in this analysis. To clarify, only the responses from students who had classes from instructors responding to the OISS were used to test the hypotheses presented in this study. Females accounted for 66.5% of the population (n = 6,102), and 33.5% were male (n = 3,077).

Freshmen constituted 16.3% of the student participants (n = 1,492); 17.8% of the students were sophomores (n = 1,637); 15.5% were juniors (n = 1,419); and 17.3% were seniors (n = 1,592). The remaining third of the students, 33.1%, were not matriculated into BYU-Idaho (n = 3,039). These were students enrolled in the Pathway program.

Students who completed the survey were taking courses in a variety of areas, with the largest category of students (42.4%) taking General Education courses (n = 3,890). Students who were taking courses in their major accounted for 30.2% of the students (n = 2,774), while 4.4% of the students were enrolled in online courses for their minor (n = 403), and 5.6% of the students completed the survey as part of an elective online course (n = 510). The remaining students either categorized their course as "other" (16.2%; n = 1,490) or did not identify a category for their course (1.2%; n = 112).

Measurements

Student Evaluations. Annual student evaluations asked questions about student performance (including their level of commitment and expected grade), instructor, course, and course core values. The evaluation also asked for students' perceived learning and satisfaction in comparison to other courses they had taken, along with overall ratings of the course and instructor. Students were asked to rate their level of satisfaction in the course compared to other courses completed on a scale from -2 (meaning much less satisfied as compared to other courses) to +2 (meaning a great deal more satisfied as compared to other

courses). When students felt their satisfaction was the same as other college courses they had taken, it was rated as zero.

Student Satisfaction. The majority of students (97.2%) rated their level of satisfaction in the course compared to other courses (n = 8,918), with a mean of 0.97 (SD = 1.13); median of one; and a mode of two, which is a positive response. It must be noted that a chi-squared test of independence between students' year in school and satisfaction with their online course in comparison to other courses they had taken was significant, $X^2(16, N = 17931) = 2493.513$, $p < .001$, Cramer's V = .186. Freshmen responded in the neutral range (-1 to 1); the sophomores and juniors responded more negatively (-2 to 1); and seniors were the most negative (responding -2 to 0), meaning at the most negative response they were "a great deal less" satisfied with their online courses than other college courses they had taken. Significantly more (.01 level) juniors and seniors than one might expect by chance responded with a -2 rating (a great deal less satisfied). In addition, significantly fewer (.01 level) students than one might expect by chance, rated their learning as a 2 (a great deal more satisfied). This was true for freshmen, sophomores, juniors, and seniors. This means that fewer freshmen, sophomores, juniors, and seniors, (than one might expect by chance) were a great deal more satisfied with their online course as compared to other courses.

The opposite was true for the Pathway students. Significantly fewer (.01 level) Pathway students than one might expect by chance rated their satisfaction with the online course as compared to other courses between -2 to 1 (-2 = 0.2%; -1 = 0.9%; 0 = 3.0%; 1 = 6.1%). In addition, significantly more Pathway students than one would expect by chance, indicated they were a great deal more satisfied with their online course compared to

other courses (2) they had taken (21.9%). Overall, Pathway students were more satisfied with their online courses than traditional university students.

Perceived learning. Students were also asked how much they had learned in the course compared to other courses completed. They were given a scale from -2 (much less satisfied as compared to other courses) to +2 (a great deal more satisfied as compared to other courses). When students compared how much they learned in relation to other college courses they had taken, 98.1% responded (n = 9,009). The mean was 1.07 (SD = 1.04); median was one; and mode was two. This represents an overall positive response.

With respect to students' perceived learning, a chi-squared test of independence between students' year in school and perceived learning compared to other courses was significant, $X^2(16, N = 18120) = 1859.416$, $p < .001$, Cramer's V = .160. Freshman and sophomore students responded in the neutral range (-1 to 1), meaning most felt they learned as much in their online course as they had learned in other university courses they had taken. Juniors responded more negatively (-2 to 1), indicating that they learned anywhere from a "great deal less" to only a little more in their online course than in other classes they had taken. Finally, seniors responded the most negatively (responding -2 to 0). The most positive rating from any senior (a zero score) indicated that he or she learned about the same in his or her online course as in other courses he or she had taken. Significantly more juniors and seniors (.01 level) than one might expect by chance responded with a -2 rating, meaning they felt they had learned 'a great deal less' in their online course than from their other courses.

Data indicated the more schooling students received, the less learning they felt they acquired from their online courses compared to others they had taken. In addition,

significantly fewer students (.01 level) than one might expect by chance rated their learning as a two. This was true for freshmen, sophomores, juniors, and seniors. In other words, no class of students indicated that they had learned ‘a great deal more’ in their online class than in other classes they had taken.

Once again, the opposite was true for Pathway students. Significantly fewer Pathway students (.01 level) than one might expect by chance rated their perceived learning compared to other courses between -2 to 1 (-2 = 0.4%; -1 = 0.6%; 0 = 3.2%; 1 = 7.0%). In addition, significantly more Pathway students than one would expect by chance indicated they were a great deal more satisfied with the amount of information learned in their online course compared to other courses (2) they had taken (21%). Overall, Pathway students felt they learned more in their online courses than traditional university students.

Course rating. Students were asked to rate their instructor and how much they believed they had learned from the course. They were given a seven-point scale ranging from very poor (1) to exceptional (7). Ninety-eight percent of the students (n = 8,994) rated their perception of how much they had learned in the online course, with a mean of 5.55 (SD = 1.43); median of six; and mode of seven. This represented a very positive response. Moreover, when students were asked to give their overall rating of their instructor using the same scale, the mean was 5.94 (SD = 1.27)—also a very strong rating, with 98.6% (n = 9,046) of students responding.

Online Instructor Self-efficacy Survey (OISS). The OISS measured the self-efficacy of online instructors in terms of online pedagogy, subject matter expertise, and technological skills (Carter et al., 2013). It used a semantic differential scale, ranging from 1 (very confident) to 4 (not confident at all). Ninety-five percent of the instructors (n = 251)

completed the assessment. Inter-item reliability was measured by Cronbach's alpha and found to be high (.87).

Overall, instructors' self-efficacy (n = 251) as measured by the OISS ranged from 1.0 to 2.11, and had a mean of 1.34 (*sd* = .21), indicating confidence in their online teaching ability. Instructors' self-efficacy in their pedagogical skills (n = 259) ranged from 1.0 to 2.58, with a mean of 1.57 (*sd* =.316). Though instructors were less confident in their ability with online teaching pedagogy, they still generally reported confidence. Instructors' self-efficacy in their technological skills (n = 259) ranged from 1.0 to 2.17 and had a mean of 1.195 (*sd* = .228), showing that instructors felt more confident about their technological skills in teaching online than with their online pedagogy. Finally, instructors' self-efficacy in the subject matter ranged from 1.0 to 2.38 with the mean score of 1.34 (*sd* = .33). The mean for subject matter self-efficacy was interestingly the same as instructor self-efficacy for online pedagogical skills. Taken altogether, these results show that remote instructors at the university felt confident about their online pedagogy, technological skills, knowledge of subject matter, and overall online teaching, with their highest self-efficacy in their technological skills, as rated by the OISS.

Experience and self-efficacy. With respect to self-efficacy and experience teaching online, a significant difference was found in instructors' self-efficacy depending on how long they had been teaching at BYU-Idaho. An ANOVA revealed that teachers who had taught for BYU-Idaho for over three semesters were significantly higher in self-efficacy for online pedagogy than teachers who were in their first semester teaching (as identified by the Games-Howell post hoc test), $F(3, 255) = 3.364$, $p = .019$, $eta^2 = .038$ (medium-small). This was also true for instructors' self-efficacy with online teaching technology, $F(3, 255) =$

5.359, $p = .001$, $eta^2 = .059$ (medium), and overall self-efficacy, $F(3, 247) = 6.052$, $p = .001$, $eta^2 = .073$ (medium). However, there was no significant difference in the instructors' self-efficacy of their subject matter knowledge with respect to the amount of time they had taught at BYU-Idaho, $F(3, 255) = 1.819$, $p = .144$, $eta^2 = .021$ (small). Analysis of the data in Table 2.1 identified that experience teaching at BYU-Idaho increased instructors' self-efficacy with both online teaching technology and online pedagogy, but knowledge of subject matter was something instructors brought to their teaching with little influence from university experience or professional development programs.

Table 2.1

ANOVA: OISS by Experience Teaching at BYUI

	SS	***df***	***MS***	***F***	***p***	**eta^2**	**Effect size**
Pedagogy SE							
Between groups	.983	3	.328	3.364	.019	.038	Medium-small
Within groups	24.839	255	.097				
Total	25.822	258					
Technology SE							
Between groups	.797	3	.266	5.359	.001	.059	Medium
Within groups	12.643	255	.05				
Total	13.441	258					
Subject SE							
Between groups	.605	3	.202	1.819	.144	.021	Small
Within groups	28.2877	255	.111				
Total	28.892	258					
Overall SE							
Between groups	.745	3	.248	6.052	.001	.073	Medium
Within groups	10.13	247	.041				
Total	10.1874	250					

Analysis

H_1 – There is a correlation between instructor self-efficacy *overall* and student satisfaction.

H_2 – There is a correlation between instructor self-efficacy in their *use of technology* and student satisfaction.

H_3 – There is a correlation between instructor self-efficacy in their *pedagogical skill* and student satisfaction.

H_4 – There is a correlation between instructor self-efficacy in their *subject matter expertise* and student satisfaction.

A Spearman Rho correlation was conducted for all four hypotheses to identify if there was a correlation between instructor self-efficacy in online instruction and student satisfaction in their online courses. See Table 2.2 for complete statistical analysis of the correlations. The effect size for correlational studies most commonly used is the correlation coefficient itself (Kotrlik & Williams, 2003). Hopkins (1997) suggests using the following criteria to interpret the correlation coefficients: less than .10 as trivial, .10 to .30 as small, .30 to .50 as moderate, .50 to .70 as large, and .70 as very large.

Table 2.2

Spearman Rho Correlation of self-efficacy with student satisfaction

	Pedagogy		**Technology**		**Subject**		**Overall**	
	r	*p*	*r*	*p*	*r*	*p*	*r*	*p*
All Students	0.021	0.740	0.130	0.035	0.092	0.137	0.085	0.167
Pathway	0.041	0.663	0.185	0.046	0.055	0.558	0.110	0.239
Non-Pathway	-0.128	0.099	0.056	0.470	-0.084	0.277	-0.080	0.305

A significant correlation was found (All Students: $p = .035$; Pathway: $p = .046$) between high instructor self-efficacy with technology and decreased student satisfaction with the class. This indicated the more confident an instructor was in their technological skills, the lower the student satisfaction was with the course. These findings were significant, primarily for the Pathway student population. However, it must be noted that the

effect size was small. The correlation was so slight that any relationship between the two data sets should be more rigorously studied before drawing any conclusions or recommending action.

Additional Analysis

In addition to the original hypotheses examined in this study, data was also available to run correlations between the instructor's self-efficacy and the student's perceived learning along with an overall rating of the instructor and course. With respect to the student's rating of the course, the only significant correlation ($p = .02$) was between the Pathway students' and the instructors' self-efficacy in technology. Pathway students rated courses where the instructor had high self-efficacy with technology lower than those where the instructor had a lower self-efficacy with technology. However, it must be noted that the effect size shown was small ($r = .216$). The correlation was so slight that any relationship between the two data sets should be more rigorously studied before drawing any conclusions or recommending action. Complete statistical analysis can be found in Table 2.3.

Table 2.3

Spearman Rho Correlation of self-efficacy with course rating

	Pedagogy		**Technology**		**Subject**		**Overall**	
	r	*p*	*r*	*p*	*r*	*p*	*r*	*p*
All Students	-0.013	0.834	0.115	0.061	0.046	0.454	0.041	0.511
Pathway	-0.019	0.841	0.216	0.020	0.007	0.944	0.063	0.502
Non-Pathway	-0.133	0.086	0.011	0.892	-0.111	0.152	-0.125	0.107

No significant correlation was found between the instructor's self–efficacy in online instruction and the student's rating of the instructor. See Table 2.4 for the complete statistical analysis.

Table 2.4

Spearman Rho Correlation of self-efficacy with instructor rating

	Pedagogy		**Technology**		**Subject**		**Overall**	
	r	*p*	*r*	*p*	*r*	*p*	*r*	*p*
All Students	0.002	0.980	0.072	0.245	0.107	0.084	0.022	0.725
Pathway	-0.048	0.608	0.146	0.116	0.071	0.445	0.012	0.901
Non-Pathway	-0.076	0.325	-0.022	0.774	0.006	0.943	-0.086	0.270

In analyzing instructors' self-efficacy and students' perception of how much they learned compared to other courses, the only significant correlation found ($p = .021$) was between all students in respect to the instructors' self-efficacy with technology. The more confident the instructor felt with his or her technological skills, the less the students perceived they learned from the course compared with other courses. Again, the correlation was so slight ($r = .141$) that any relationship between the two data sets should be more rigorously studied before drawing any conclusions or recommending action. See Table 2.5 for complete statistical analysis.

Table 2.5

Spearman Rho Correlation of self-efficacy with student perceived learning

	Pedagogy		**Technology**		**Subject**		**Overall**	
	r	*p*	*r*	*p*	*r*	*p*	*r*	*p*
All Students	-0.010	0.871	0.141	0.021	0.076	0.218	0.072	0.241
Pathway	-0.047	0.614	0.169	0.069	0.025	0.786	0.043	0.648
Non-Pathway	-0.135	0.081	0.090	0.248	-0.113	0.146	-0.071	0.365

Satisfaction and instructor experience. Student evaluations were also analyzed with respect to amount and location of instructors' teaching experience. Small but significant correlations were found. The more experience an instructor had teaching for BYU-Idaho, the less satisfied (Satisfaction) students were with his or her course as

compared to other courses they had taken (p = .029, r = -.134). Analysis revealed similar results for student perceived learning (Learning) and course rating (Course), with a significance of .009 and .027 respectively. In contrast, the rating of BYU-I experience to instructor rating (Instructor) did not reach a significant threshold (p = .093). Table 2.6 depicts the complete correlational results between teaching experience and the student evaluations. Again, the correlations were so slight that any relationship between the two data sets should be more rigorously studied before drawing any conclusions or recommending action.

Due to the significant relationship between BYU-I teaching experience and student satisfaction, additional analysis was conducted by separating instructors who had experience only at BYU-Idaho (n = 206) and those with experience at other universities (n = 79). Note that when these populations were combined, they were slightly higher than the 265 instructors used for self-efficacy analysis. This is because there were 20 instructors who completed the demographic information, who did not complete the remainder of the survey. Correlations were conducted for each of these groups, and a significant correlation was found between student satisfaction and semesters of experience for instructors with only BYU-Idaho experience (p = .001, r = -.*231*). The more experience teaching at BYU-I (only) the less satisfied the students were in the online course. In comparison, no significant correlation was found for those who had taught at other universities (p = .192, r = .148). As with course satisfaction, analysis revealed a significant correlation between teaching experience and student ratings for the instructor, course, and student perceived learning in courses taught by instructors whose only teaching experience was at BYU-Idaho. The same correlation with experience did not exist for those who had taught at other universities. The

more experience teaching at BYU-I (only), the lower students rated the online course and instructor. In addition, the more experience teaching at BYU-I (only), the less satisfied students were with the online course and how much they had learned compared to other courses. See Table 2.6 for complete statistical analysis.

Table 2.6

Teaching Experience Correlations to Student Evaluations

	All BYU-I Instructors		**Other Universities**		**BYU-Idaho Only**	
	r	*p*	*r*	*p*	*r*	*p*
Course	-0.161	.009	0.160	.159	-0.177	.011
Instructor	-0.104	.093	0.207	.067	-0.173	.013
Learning	-0.136	.027	0.132	.246	-0.262	<.001
Satisfaction	-0.134	.029	0.148	.192	-0.231	.001

Analysis of the descriptive data with respect to teaching experience reveals a slightly different story for student satisfaction in online courses compared to other courses taken.

All Instructors

A one-way analysis of variance test was calculated to identify if there was a significant difference between instructors (All BYU-I Instructors) based on the amount of teaching experience at BYU-I. The analysis found significance. The courses of instructors with over five semesters of experience at BYU-I were rated significantly lower than the courses of instructors teaching their first semester at BYU-I. The more teaching experience at BYU-I, the less satisfied the students were with the course in comparison to other courses they had taken, $F(3, 281) = 3.742$, $p = .012$, $\text{eta}^2 = .038$ (medium-small). Table 2.7 presents the source table from this analysis.

Table 2.7

ANOVA: Course Rating by Experience (all BYU-I Instructors)

	SS	***df***	***MS***	***F***	***p***	**eta^2**	**Effect size**
Between groups	4.698	3	1.566	3.742	.012	.038	Medium-small
Within groups	117.581	281	.418				
Total	122.279	284					

In addition, instructors with over three semesters of teaching experience at BYU-I were rated significantly lower than instructors teaching their first semester at BYU-I. The more teaching experience at BYU-I, the lower the students rated the instructor, $F(3, 281) = 4.907$, $p = .002$, eta^2 = .05 (medium). See Table 2.8 for the source table of this analysis.

Table 2.8

ANOVA: Student Instructor Ranking by Instructor Experience (all BYU-I Instructors)

	SS	***df***	***MS***	***F***	***p***	**eta^2**	**Effect size**
Between groups	4.262	3	1.421	4.907	.002	.05	Medium-small
Within groups	81.342	281	.289				
Total	85.603	284					

With respect to how much the students perceived they learned compared to other courses taken, the same pattern was found. Students perceived learning significantly less from courses taught by instructors with over three semesters of experience at BYU-I than from courses taught by instructors teaching their first semester at BYU-I. The more teaching experience at BYU-I, the lower the students rated the amount they learned in the online class compared to other courses, $F(3, 281) = 7.128$, $p < .001$, eta^2 = .071 (medium-large). Table 2.9 presents the source table from this analysis.

Table 2.9

ANOVA: Student Perceived Learning by Instructor Experience (all BYU-I Instructors)

	SS	***df***	***MS***	***F***	***p***	**eta^2**	**Effect size**
Between groups	4.338	3	1.446	7.182	<.001	.071	Medium-large
Within groups	56.578	281	.201				
Total	60.916	284					

Accordingly, students were significantly less satisfied with their online course compared to other courses from instructors with over three semesters of experience at BYU-I and rated the amount of their satisfaction (compared to other courses) from instructors teaching their first semester at BYU-I significantly higher. The more teaching experience at BYU-I, the lower the students rated their satisfaction as compared to other courses, $F(3, 281) = 6.445$, $p < .001$, $\text{eta}^2 = .064$ (medium). See Table 2.10 for the source table from this analysis.

Table 2.10

ANOVA: Student Course Satisfaction by Instructor Experience (all BYU-I Instructors)

	SS	***df***	***MS***	***F***	***p***	**eta^2**	**Effect size**
Between groups	6.067	3	2.022	6.445	<.001	.064	Medium
Within groups	88.18	281	.314				
Total	94.247	284					

BYU-I Only Teaching Experience

An independent samples t-test was conducted to identify if there was a significant difference between course rating for instructors who only taught at BYU-I (only) and those with teaching experience at other universities and found significance. Effect size was measured by Cohen's d with the following analysis: small (.20); medium (.50); large (.80). Courses taught by instructors who had only taught at BYU-I were rated significantly higher than courses taught by instructors with experience at other universities, $t(283) = -2.103$, $p = .036$, $d = .28$ (small). In addition, instructor ratings for those who had only taught at BYU-I

were significantly higher than instructor ratings with experience at other universities, $t(283) = -1.911$, $p = .036$, $d = .26$ (small).

With respect to how much the students perceived they learned compared to other courses taken, the same pattern was found. Students perceived they learned significantly less from courses taught by instructors with teaching experience at other universities. The students rated the amount they learned (compared to other courses) from instructors who had only taught at BYU-Idaho significantly higher than the instructors with experience at other universities, $t(283) = -2.643$, $p = .009$, $d = .359$ (medium-small).

Accordingly, students were significantly less satisfied with their online course with instructors with teaching experience at other universities compared to other courses taught by instructors who had only taught at BYU-I. The students rated their satisfaction with the online class compared to other courses they had taken significantly higher when the teacher had taught only at BYU-I compared to instructors who had experience teaching at other colleges, $t(283) = -2.103$, $p = .036$, $d = .34$ (medium-small).

Teaching Experience at Other Universities

A one-way analysis of variance test was calculated to identify if there was a significant difference in course ratings between courses taught by instructors who had teaching experience at other universities (Other Universities) based on the amount of teaching experience. There was no significant difference in how students rated courses taught by instructors with teaching experience at other institutions based on their level of experience, $F(2, 76) = 2.386$, $p = .099$, $\text{eta}^2 = .06$ (medium). Table 2.11 presents the source table from this analysis.

Table 2.11

ANOVA: Course Rating by Instructor Experience (Other Universities)

	SS	***df***	***MS***	***F***	***p***	**eta^2**	**Effect size**
Between groups	1.731	2	.865	2.386	.099	.06	Medium
Within groups	27.563	76	.363				
Total	29.294	78					

In contrast, instructors with over five semesters of experience teaching were rated significantly higher than instructors with less than two semesters of teaching experience at other universities. The more teaching experience at other universities, the higher the students rated the instructor, $F(2, 76) = 3.598$, $p = .032$, eta^2 = .087 (medium). Table 2.12 presents the source table from this analysis.

Table 2.12

ANOVA: Student Rating of Instructor by Instructor Experience (Other Universities)

	SS	***df***	***MS***	***F***	***p***	**eta^2**	**Effect size**
Between groups	1.638	2	.819	3.598	.032	.087	Medium-large
Within groups	17.299	76	.228				
Total	18.937	78					

With respect to how much the students perceived they learned compared to other courses taken, there was no significant difference in relation to the amount of experience the instructor had teaching at other universities, $F(2, 76) = 2.216$, $p = .116$, eta^2 = .055 (medium). Table 2.13 presents the source table from this analysis.

Table 2.13

ANOVA: Perceived Learning by Instructor Experience (Other Universities)

	SS	***df***	***MS***	***F***	***p***	**eta^2**	**Effect size**
Between groups	.752	2	.376	2.216	.116	.055	Medium
Within groups	12.901	76	.170				
Total	13.653	78					

Accordingly, there was no significant difference in students' satisfaction with their online course compared to other courses with respect to the amount of experience the instructor had teaching at other universities, $F(2, 76) = 2.611$, $p = .080$, $eta^2 = .055$ (medium). Table 2.14 presents the source table from this analysis.

Table 2.14

ANOVA: Student Course Satisfaction by Instructor Experience (Other Universities)

	SS	***df***	***MS***	***F***	***p***	**eta²**	**Effect size**
Between groups	1.430	2	.715	2.611	.08	.06	Medium
Within groups	20.817	76	.274				
Total	22.247	78					

Table 2.15 includes the complete descriptive statistics of teaching experience with respect to student satisfaction.

Table 2.15

Teaching Experience and Student Evaluation: Descriptive Statistics

	All Instructors		**BYU-I Only**		**Other Universities**	
	M	*SD*	*M*	*SD*	*M*	*SD*
Course	5.628	0.656	5.678	0.667	5.496	0.613
Instructor	5.999	0.549	6.038	0.566	5.899	0.493
Learning	1.153	0.463	1.197	0.473	1.037	0.418
Satisfaction	1.062	0.576	1.115	0.584	0.923	0.534

Self-efficacy and experience. Correlation results between instructor self-efficacy in online pedagogy and experience teaching online revealed that the more experience an instructor had teaching for BYU-I, the more confident he or she felt about his or her online pedagogical abilities ($p = .010$). Even stronger correlations were found between instructors' confidence in using online teaching technologies (email, discussion boards, attaching images, creating hyperlinks, sharing video files, etc.) and instructor experience at BYU-I

($p < .001$). As Table 2.16 shows, the longer an instructor had taught for BYU-I, the higher self-efficacy he or she reported in these areas. In contrast, there was no significant correlation found between instructor self-efficacy with subject knowledge and teaching experience at BYU-I ($p = .089$).

However, the correlation was significantly different if the remote instructor had experience teaching at other universities. The more experience an instructor had teaching at another university, the lower his or her self-efficacy in their online pedagogy ($p < .001$, $r = .213$). Still, this correlation is small enough that any relationship between the two data sets should be more rigorously studied before drawing any conclusions or recommending action.

Table 2.16

Teaching Experience Correlations to Instructor Self-efficacy

	BYU-I Experience		**Other Universities**	
	r	*p*	*r*	*p*
Pedagogy	-0.159	.010	0.213	<.001
Technology	-0.224	<.001	0.015	.802
Subject	-0.105	.089	0.120	.051
Overall	-0.198	.001	0.153	.013

Summary

This study explored the relationship between instructor self-efficacy and student satisfaction levels from end-of-semester student evaluations. Specifically, instructor self-efficacy in online teaching was examined in terms of the instructor's confidence in online teaching pedagogy, use of technology, and subject matter expertise. A significant correlation was found with the Pathway students ($p = .046$), identifying that the more confident an instructor was in his or her technological skills, the lower the Pathway student's satisfaction was with the course. However, it must be noted that the effect size was small.

In addition, Pathway students had a significantly positive response pattern (.01 level). Pathways students, significantly more than one might expect by chance, reported feeling they had learned more from their online course than other courses they had taken (21.1%) and were more satisfied with their online course than other courses they had taken (21.9%). It must be noted that Pathway is a special BYU-I program targeted toward individuals who are not traditional students and who have an opportunity they would not otherwise have expected. It is possible that because they have been excluded from the traditional college path, they value it more highly than traditional students. Overall, the scores of Pathway students for satisfaction have historically been higher than traditional university students (Routson, 2013). Higher satisfaction ratings might also be attributed to the fact that Online Operations purposefully assigned higher-rated instructors to Pathway courses in the past. Finally, Pathway courses are the first experiences many Pathway individuals have with university courses. Pathway students typically do not have as much experience with university courses, and might have lower expectations and hence higher satisfaction with their instructors and courses.

Statistical analysis also revealed a unique response pattern in terms of student satisfaction with respect to class standing. The less higher education experienced, the higher the course satisfaction rating. The more education a student experienced (senior-standing), the less satisfaction with online courses. This is an important piece of information for BYU-I to address.

The analysis also found relatively few satisfaction ratings at either extreme (a great deal less satisfied or a great deal more satisfied) with traditional students (non-Pathway students). This confirmed previous findings by the university noting that in comparison to

on-campus course offerings, online courses experienced fewer extremely high and extremely low satisfaction ratings (Young, 2014).

Correlation results between instructor self-efficacy in online pedagogy and experience teaching online revealed a correlation between the amount of experience an instructor had teaching for BYU-Idaho and his or her confidence in his or her online pedagogical abilities. The longer the instructor had taught for BYU-I, the higher his or her self-efficacy in online pedagogy.

Even stronger correlations were found between instructors' confidence in using online teaching technologies (email, discussion boards, attaching images, creating hyperlinks, sharing video files, etc.) and instructor experience at BYU-Idaho. The longer instructors had taught for BYU-Idaho, the more self-efficacy they reported in these areas.

However, a significant difference was found regarding student satisfaction and instructors' experience teaching at other universities. Remote instructors who only taught at BYU-I had significantly higher student course ratings ($p = .036$) along with perceived learning ($p = .009$) and satisfaction ($p = .012$), with their online course (compared to other courses) than instructors who had experience teaching at other universities.

Statistical analysis of all of the remote instructors teaching at BYU-I for over five semesters were rated significantly lower in their course evaluations than instructors teaching their first semester at BYU-I. ($p = .012$). Moreover, instructors with over three semesters of teaching experience at BYU-I were rated significantly lower than instructors teaching their first semester at BYU-I ($p = .002$). Students perceived they learned significantly less than other courses from instructors with over three semesters of experience at BYU-I and rated

the amount they learned (compared to other courses) from instructors teaching their first semester at BYU-I significantly higher ($p < .001$).

Discussion and Conclusion

Online education is the most rapidly growing area in higher education (Wasilik & Bolliger, 2009). Among these institutions, BYU-Idaho has experienced rapid and continual growth in their online program in recent years. This study explored the relationship between instructor self-efficacy and student satisfaction levels as determined from end-of-semester evaluations. Self-efficacy in online teaching was examined in terms of an instructor's confidence in online teaching pedagogy, use of technology, and subject-matter expertise.

This study revealed that no significant correlations exist at BYU-Idaho between student satisfaction and online instructors' self-efficacy with online pedagogy. Neither were any correlations found between satisfaction and instructors' subject-matter expertise or overall online self-efficacy. Only very small, reverse correlations were identified between instructors' efficacy in teaching technology and student satisfaction ratings. Therefore, this research was unable to support any of the four original hypotheses. This is discrepant to the literature indicating that high teacher self-efficacy correlates with increased student learning and satisfaction (Goddard et al., 2000; Henson, 2001). However, this study did reveal positive correlations between instructor self-efficacy and length of experience teaching online.

Interestingly, this study also indicated that students were less satisfied with their learning experience in courses taught by instructors with experience teaching online at other universities in comparison to instructors who only had experience teaching online for BYU-Idaho. In general, the more experience instructors had teaching, the less satisfied students

were with their learning experience. Accordingly, the longer BYU-I instructors taught for the university, the higher their self-efficacy, but also the lower their students' satisfaction levels. Student satisfaction and perceived learning appeared highest in those courses where instructors had taught only for BYU-Idaho and were in their first semester teaching. A possible explanation for this dynamic could be that training for new instructors has improved. Another explanation could be burnout of some kind among veteran instructors, as well as more enthusiasm and involvement from new instructors. More research is needed in order to uncover the meaning of these relationships and to discover strategies for improving student satisfaction ratings while retaining BYU-I instructor experience.

Another interesting finding revealed that student satisfaction in online courses diminished as students progressed in their education. A possible explanation for this dynamic is that the more classes students have experienced, as in the case of seniors, the higher the satisfaction expectation level becomes for future courses. It could also be due to the maturity of the online program at BYU-I as indicated by the online course list (http://www.byui.edu/online/courses/course-list), indicating that upper division online courses are newer to the program. Seniors and juniors in Fall 2013 might have been the first to encounter new online courses that may yet require In addition, senior-level courses and students might need or prefer a different format than what online courses traditionally offer (i.e. hybrid).

Finally, a significant correlation was found with Pathway students ($p = .046$), identifying that the more confident an instructor was in his or her technological skills, the lower Pathway students' satisfaction was with the course. These findings were significant, primarily for the Pathway student population. This data could represent a dislike for the

course content or the course instruction. It could also represent the possible use of technology by Pathway instructors beyond the comfort level of non-matriculated students, since Pathway students represent a population of non-traditional students taking college-preparation courses, rather than traditional university courses. The students may also be surprised at the amount of extra work college courses require compared to high school courses. This study did not corroborate Sahin's studies, which indicated that the higher an online instructor's competence with technology, the better the learning environment they will provide to their students (Sahin, 2007). However, it must be noted that the effect size was small. The correlation was so slight that any relationship between the two data sets should be more rigorously studied before drawing any conclusions or recommending action.

Limitations

This study was conducted at a private, religious, undergraduate, four-year university in the Northwest. The results of this study are limited to this demographic, and can neither be generalized to graduate students and instructors, nor to other institutions. In addition, because 45.5% of instructors did not take the self-efficacy survey, the researchers' ability to correlate with all students was limited. Instructors who chose to respond to the survey might be a more involved population and naturally more self-confident about their online teaching abilities. Limitations could be greatly reduced in a future study by being more sensitive to instructor needs, and taking extra measures to be certain instructors knew their confidentiality would be maintained. For instance, an independent contractor could conduct the self-efficacy survey, rather than an administrator from the online program.

Gender, though noted and reported for students, was not treated as a variable in this study. The gender of remote online instructors was also not treated as a variable, but could possibly affect the satisfaction ratings of students.

Pathway students represented another limitation, due to the unique nature of the program and the students' lack of educational experiences. Pathway students are non-traditional university students, which make results less relatable to other institutions. In addition, the newness of the Pathway program makes Pathway results less reliable. It is difficult to determine whether results relate to the newness of the program or are a realistic expression of Pathway participants. This study attempted to address the Pathway limitation by separating the data into all-student groups, non-Pathway groups, and Pathway-only groups.

Finally, this study was limited to the duration of one semester. Results would prove more reliable over longer periods of time and across a greater sample of online instructors. During Fall 2013, the Pathway program welcomed more new students than in any other semester. These students in particular would have little to no experience with college or college courses.

Perhaps significant factors other than teacher self-efficacy presented the largest threat to validity in the study. To address this concern, additional variables were also measured and tested using statistical analysis. The following variables were tested:

- Demographics of instructors and students
- Overall teaching experience of the instructor
- Instructor teaching experience online
- Instructor teaching experience online at BYU-I

• Department/subject area of instruction

• Instructor preference for teaching online or face-to-face courses

Another potential threat to validity was the applicability to student populations outside of BYU-I. While the nature of action research is concerned more with solutions to local problems, researchers were careful to structure the survey instruments in a way that other institutions using asynchronous online instruction, could repeat the study in order to increase the validity of the results.

Implications for Practice

The findings of this study indicate online teaching self-efficacy may not be a significant consideration when hiring online instructors. In fact, high self-efficacy, especially in terms of technology, may actually be a negative factor in facilitating online courses. Online learning programs may benefit from looking more at other factors, such as personality, training, and mentoring as indicators of future instructor success.

Another finding that merits consideration is lack of student satisfaction with online courses as students' year in school increases. If higher level courses are newer and therefore of lower quality, then more time needs to be invested in course development, or newer courses should receive more improvement focus than current practice. If students increasingly experience lower satisfaction because they have more courses for comparison, perhaps more experienced students should be engaged to find ways to improve online courses.

The finding that a decrease in student satisfaction also appears to correlate with an increase in instructor experience seems to be the result with the most promise for practice implications. This finding needs to be confirmed and more deeply understood through

additional analysis over multiple semesters. If it is confirmed, it could lead to significant changes in practice. For example, teacher experience may need to be eliminated or even considered as a contra indicator when selecting remote leadership for adjunct instructors. Perhaps more recent training and mentoring offered to less experienced instructors needs to be encouraged or required for more experienced instructors.

Recommendations for Future Research

Though gender was noted and reported, it was not treated as a variable in this study with regard to students or instructors. Future studies should include this variable as part of the analysis to see if gender is a factor relating to student satisfaction with online courses at BYU-Idaho. The gender of the online instructor should also be treated as a possible variable in future studies.

Results of this study suggest further exploration into student perceived learning and student satisfaction levels. A needs assessment to see how the university might obtain improved satisfaction ratings, particularly among more experienced, traditional students may provide helpful information to increase student satisfaction of online courses. In addition, research results merit an examination comparing the variable of online courses and hybrid courses to student satisfaction and learning among senior-level students.

An analysis of Technological Pedagogical Content Knowledge (TPACK) in online courses could also reveal significant differences between instructor knowledge and instructor self-efficacy with regard to student satisfaction and learning. Stronger relationships, for instance, might be found between student satisfaction and instructor knowledge, rather than with instructor self-efficacy.

Finally, future studies exploring the effectiveness of professional development for instructors with respect to student satisfaction would be informative. Since no significant correlations were identified between satisfaction levels and instructor self-efficacy, similar correlations could be done with instructors who received professional development in specific online teaching skills, such as increasing instructor presence and contact with students. Future research may also garner different results if an independent party conducted the self-efficacy surveys rather than an administrator from the online program.

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Chapter 3: Analyzing Discussion Board Best Practices in Relationship to Students Satisfaction, Perceived Learning and an Online Community of Inquiry

Abstract

This quantitative study explored the use of discussion board best practices at a private university in the Northwestern United States and its relationship to student satisfaction and student perceived learning. Six sections of an online course were analyzed for usage of discussion board practices. The six sections were facilitated by four different instructors, and had a combined enrollment of 181 students. Twenty discussion board best practices were assigned a value of low, medium or high, according to a discussion board rubric that was developed and validated for the study. Discussion board practices were categorized into Social Presence, Cognitive Presence, and Teaching Presence to correspond with the Community of Inquiry framework. A fourth category of discussion board management practices was also included in the rubric. Student satisfaction ($r = .829$, $p = .042$) and student perceived learning ($r = .943$, $p = .005$) were significantly correlated with the use of discussion board best practices in the Cognitive Presence domain of the rubric. The more instructors used discussion board best practices when designing and implementing courses, the more students enjoyed the course and perceived they had learned.

This study also examined how the discussion board best practices rubric correlates to the Community of Inquiry framework. Best practices categorized into Teaching Presence within the discussion board rubric correlated to Community of Inquiry measures for Teaching Presence ($r = .956$, $p = .003$) and Social Presence ($r = .828$, $p = .042$).

Keywords: Discussion board best practices, Community of Inquiry, student satisfaction, student perceived learning, discussion board rubric, online learning

Introduction

In September 2009 a private university in the Northwest began a distance education program designed for students who cannot or choose not to attend classes on campus, but who desired an education and the opportunities provided by higher education. Those who directed the program were encouraged by the heartwarming stories from students about how the program had already improved their lives. These reports left those responsible for developing and operating the online program with a strong desire to continue to protect and develop the program. In protecting this program from disparagement or abandonment due to quality concerns the Institution needed to establish integrity of instruction and assessment. Accreditation is contingent on online education programs showing that they have quality, integrity, and effective assessment as foundational principles. These requirements are outlined in Higher Education accrediting standards, which call for:

> … integrated course of study that helps students develop the breadth and depth of intellect to become more effective learners and to prepare them for a productive life of work, citizenship, and personal fulfillment. The institution demonstrates that … degree programs … have identifiable and assessable learning outcomes that are stated in relation to the institution's mission and learning outcomes for those programs. Accreditation Standards (NWCCU 2.C.9 - 2.C.10, 2012)

One ubiquitous type of formative assessment in online courses is the use of discussion boards. A majority of instructors use asynchronous discussion boards as the primary discourse method in online education (Chaudry, 2009). While there are many rubrics to grade students on discussion board participation, there is no known rubric for measuring the use of online discussion board best practices. Nor is there a discussion board

rubric which defines discussion board practices to correlate with the Community of Inquiry (CoI) framework of: teaching presence, cognitive presence and social presence. Moreover, known assessments that measure the effectiveness of online learning like the CoI (Arbaugh, et al., 2008), typically apply to an entire course rather than a specific teaching method used in a course (i.e., discussion boards or subset of a course). Based upon theory and research, the use of these discussion board techniques should measure the effectiveness of discussion boards in facilitating meaningful interactions with students and quality learning experiences.

Literature Review

This review of the literature explores a theoretical framework that supports online instruction and assessment, along with current research on best practices of discussion boards. Distance education is an increasing part of the landscape of higher education in the United States. A recent survey indicated 50% of college presidents believe ten years from now, the majority of students will be taking classes online (Parker, Lenhart, & Moore, 2011). With such highly anticipated growth, it is important to understand which online education assessments facilitate the best educational opportunities.

Assessment is core to education (Gikandi, Morrow, & Davis, 2011). Effective assessment in distance education differs greatly from face-to-face contexts because of the asynchronous nature of online learning, and requires educators to reevaluate the assessment methods used in online courses (Gikandi, et al, 2011). For distance education to achieve enhanced learning experiences, the feedback process needs to be more explicit than in face-to-face education (Wang, 2010). Alternatives to provide this kind of feedback include e-portfolios, projects, writing in discussion boards, non-proctored quizzes, and non-proctored exams. Many of these assessment techniques are driven by the constructivist

epistemological perspective that knowledge is created through the learner's interpretation, processing and experience with the content, and that learning requires active participation by the student (Sherer-Bassani, 2011). Use of discussion boards is one instructional technique that encourages sharing and processing of new information, personal experience, and understanding in online courses.

Theoretical Framework

The theoretical framework outlines the approach of this research to understanding reality, construction of knowledge and online instruction. It is one of many potential lenses in which to view education. This research submits that online pedagogy is founded in constructivism, more specifically in connectivism, and social learning theories. These theories all interweave components of self-directedness, experiential learning, along with adult learning and social learning (social cognitive theory). It is important to outline the ontology, epistemology, and theoretical perspective as the foundation of online learning in order to understand how to improve education through research.

The theoretical perspective in this research for assessment of online instruction in higher education is founded in an understanding of ontology and epistemology. "Ontology is the study of being. It is concerned with 'what is' with the nature of existence, with the structure of reality as such" (Crotty, 1998, p. 10). One ontological concept is "realism (an ontological notion asserting that realities exist outside the mind)" (Crotty, 1998, p. 10). This description of reality fits with online instruction in that reality exists independent of individuals. While construction of meaning is the process whereby reality is understood, it does not change the nature of the reality that exists independent of those who learn it.

Growing out of the ontology of realism, the epistemology at the foundation of this

research asserts that meaning and reality exist separate from any operation of consciousness (Crotty, 1998). This means that true knowledge is real and exists independent of human thought, consciousness, construction or relativism.

These concepts have evolved from the post-positivism era of research, which Paul (2005) describes as science "progressively getting closer to the truth" (p. 52). Giere (as cited in Paul, 2005) indicated that in post-positivism:

Science does not deliver to us universal truths underlying all natural phenomena; but it does provide models possessing various degrees of scope and adequacy…One goal shared by most scientists is to choose among the available alternatives the model that best fits the real world (p. 52).

The foundation behind constructivism is that knowledge is constructed through experience and social interaction. Constructivism is rooted in scientific theory which has been tested and proven rather than being rooted in personal opinion as promoted by other theorists (Kamii, 1984). Constance Kamii, a proponent of constructivism, asserted that:

> The details of Piaget's theory continue to be modified, but constructivism – the fundamental concept in his theory – has never been disproved. The idea that children acquire moral values and knowledge by construction from within – by putting things into relationships – still stands, as does the idea that social interactions are essential for this construction to take place (Kamii, 1984, p. 415).

People learn from putting things into relationships and through social interactions (Kamii, 1984). Social interactions are important in online courses since it is a way to construct meaning (Shea & Bidjerano, 2009). Constructivism can be viewed as a way to make meaning out of knowledge and reality that exist independent of the individual, rather

than something that develops only within an individual. This is an important distinction, because it means humans are all in the process of constructing and approaching a reality and truth that is constant and external to the individual, rather than constructing an internal knowledge that is independent, and therefore different from all others.

Constructivism and social learning theory support online instruction since it encourages students to construct knowledge, often through discussion board dialogue, that helps students describe, clarify, interpret, and understand truth. The theoretical framework for this research unites the ontology of realism, objectivist epistemology, and post-positivist theoretical perspective with constructivist learning theories. These constructivist theories are models that incorporate the real-world dynamics of how individuals learn.

Constructivism is also founded in social learning theory, which suggests that behavior is learned from the environment through a process of observational learning (McLeod, 2011). Motivation to learn can be described in terms of efficacy and outcome expectations (Bandura, 1977). Individuals engage in learning if they believe in their ability to learn (efficacy expectations) and they also believe their efforts at learning will be rewarded (outcome expectations).

These learning theories relate to online discussion boards. For example, if in online courses students believe they will learn through engaging in the discussion board and they believe their learning will be rewarded by an outcome they value, students will engage in meaningful discussion board dialogue that will build their understanding and knowledge of the course material.

Connectivism

Connectivism is an emerging learning theory that builds upon efficacy expectations. This theory aligns with the concepts of constructivism and social cognitive theory by positing that knowledge is constructed through social networks. According to Siemens (2005), Connectivism is a learning theory that describes knowledge acquisition as a network of nodes where it is more important to know-where than to know-what or know-how (Downes, 2007). Connectivism is described as, "… the thesis that knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks" (Downes, 2007, para 1).

Connectivism correlates with the learning format of online discussion boards, since students who actively engage in discussion boards, learn how to find answers to questions they do not understand. This has more impact than memorizing what the answer is or how to perform a particular task. In addition, the social component of connectivism relates to the research conducted by Tao (2009) which indicates that an increase in social presence in online discussion boards leads to increased student motivation in the course. Motivation is critical for success in school and life. This is especially important since a recent study of junior and senior high school students revealed a lack of intrinsic motivation (O'Brien, Taylor, & Gathercoal, 2013). For students to succeed in their education, they must feel some connection to the course they are taking. Building a social connection in online courses is an important way to enhance student motivation.

Technological Pedagogical Content Knowledge (TPACK)

The theoretical ideas of realism, constructivism, social cognitive theory, and connectivism represent the foundation of best practices of online instruction that increase

motivation in students. These theoretical constructs support the application of the Technological Pedagogical Content Knowledge (TPACK) framework as a lens to understand and measure the effectiveness of online instruction and discussion boards. The TPACK framework looks at the interconnectedness of different types of knowledge (content, pedagogy, and technology) and how this interconnectedness facilitates learning.

Preparing teachers for instruction in face-to-face settings includes educating teachers in content knowledge (CK) and pedagogical knowledge (PK), with an emphasis on pedagogical knowledge (Shulman, 1986). Knowledge about actual subject matter is referred to as content knowledge (CK); and includes knowledge about theories, procedures, concepts and facts within a specific field (Shulman, 1986). Teaching methods for specific domains include domain specific knowledge of teaching strategies, techniques that foster meaningful understanding, and an understanding of appropriate conceptual representations that account for learner difficulties and misconceptions (Shulman, 1986). Moreover, pedagogical content knowledge (PCK) includes knowledge of what the students bring to the learning situation, knowledge that might either help or hinder in a given learning task. This knowledge of students includes their strategies, prior conceptions, and misconceptions that they may have for a particular topic.

Online instruction requires an additional type of knowledge, technological knowledge (TK), which is skill and understanding of how to facilitate online applications. Good online instruction demands an understanding of how technology content and pedagogy work together (Margerum-Leys & Marx, 2002). Teacher knowledge and skill with technology is an important aspect of online education (Yurdakul et al., 2012).

Therefore, this component was added to CK (content) and PCK (pedagogical content knowledge) to create TPCK. According to Koehler and Mishra (2005),

> "Good teaching is not simply adding technology to the existing teaching and content domain. Rather, the introduction of technology causes the representation of new concepts and requires developing a sensitivity to the dynamic, transactional relationship between all three components suggested by the TPCK framework" (p. 134).

For ease of use, the acronym for TPCK was later changed by adding an "A" to the middle of the name to make what is now known as TPACK. TPACK is a continuation of the work of Shulman, who articulated the concept of pedagogical content knowledge or PCK (Graham, 2011; Koehler & Mishra, 2009). This framework supports the more recent teaching standards (e.g., International Society for Technology [ISTE]; National Council for Accreditation of Teacher Education [NCATE]; Council for the Accreditation of Educator Preparation, 1997, 2001, 2013), which moved away from a focus on traditional instructional techniques to promote a series of practices for pedagogy with technology that are important to effective online instruction (Handler & Strudler, 1997). TPACK is increasingly used "by educational technology researchers around the world who are interested in issues related to technology" (Graham, 2011, p. 57). A useful depiction of the TPACK framework can be found in Figure 3.1.

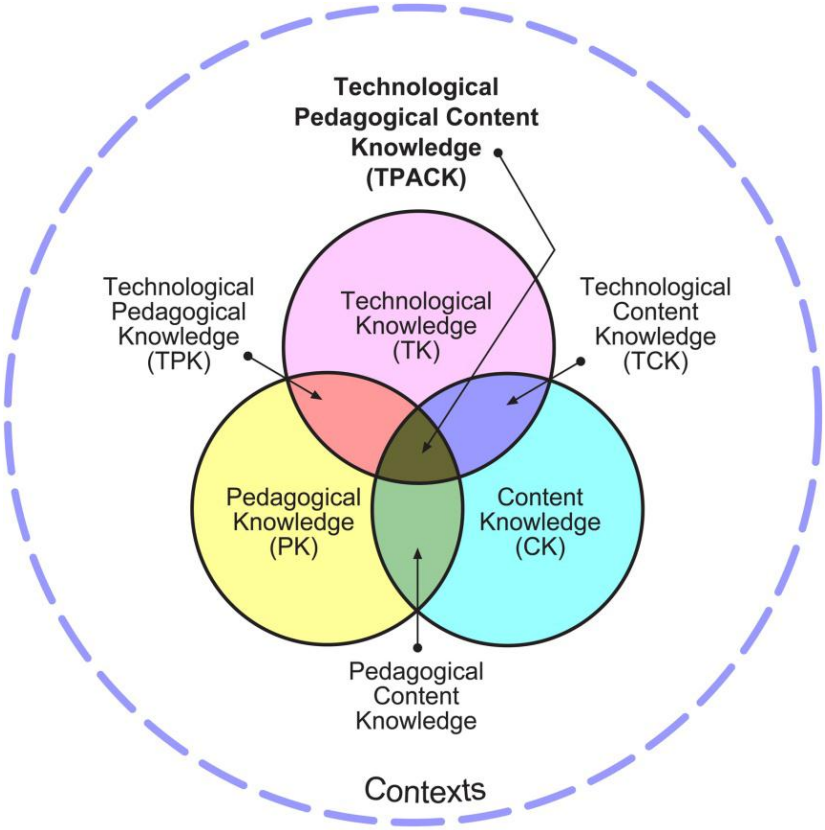

Figure 3.1. TPACK diagram (Koehler & Mishra, 2009. p. 63).

The application of the TPACK framework is a good lens to help understand online learning and discussion boards. When evaluating online instruction, there is value in searching for indicators that represent the interaction between pedagogical knowledge, content knowledge, and technological knowledge (Oster-Levinz & Klieger, 2010). These are useful criteria, particularly when assessing the content and design of a course. By examining components of discussion boards in context of pedagogy, content, and technology, researchers can better assess the overall quality of discussion board activities.

Community of Inquiry (CoI)

The effective face-to-face teaching practices (as identified through TPACK) of content knowledge, teaching practices (pedagogical knowledge) along with social presence (which has been identified as an important aspect in online courses) create the core concepts

of the Community of Inquiry framework (Social Presence, Teaching Presence, and Cognitive Presence). While online teaching effectiveness (pedagogy knowledge; teaching presence) and learning (content knowledge; cognitive presence) are desired outcomes in online learning courses, determining the learner's social engagement in the instruction, (identified as social presence), is also important to assess (Garrison, Andersen & Archer, 1999). In the CoI model, Social Presence is described as, "the ability of participants in the Community of Inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as 'real people'" (Garrison, Andersen & Archer, 1999, p.89).

In respect to the cognitive dimension of teaching and learning, TPACK uses the term content knowledge, while the CoI uses the term cognitive presence. This is because TPACK is assessing the instructor's knowledge of the content; while the CoI is assessing how much cognition (domain specific learning) is present in the online classroom and is thus termed cognitive presence.

Accordingly, TPACK uses the term pedagogy knowledge when referring to the amount of pedagogical knowledge the instructor has, while the CoI uses the term teaching presence in order to assess the amount of presence and influence the teacher has in an online course.

The social presence construct in the CoI model attempts to understand how students engage in online learning as "real people" especially in asynchronous communication (Shea et al., 2010; Garrison, Anderson, & Archer, 1999). "Ensuring that students become more equal participants in attaining learning goals requires that they become more active in and responsible for their learning" (Shea & Bidjerano, 2009, p. 544). Establishing social

presence within the CoI framework includes more than personal expression and open communication. It also addresses group interactions (Boston et al., 2009). Furthermore, trust and cohesion are important elements to social presence (Shea et al., 2010). Social Presence changes an online course from a prescribed learning experience into a learning environment.

Cognitive Presence is described as the ability of students to use discourse and reflection to construct meaning (Garrison & Arbaugh, 2007). "In the CoI model, cognitive presence is seen as developing through a series of four cyclical stages beginning with a triggering event then moving (again ideally) to exploration, integration and resolution" (Shea et al., 2010, p.11). Cognitive Presence is a process whereby meaning and understanding are constructed.

Teaching presence gives direction to the educational experience and uses social presence and cognitive presence together to help students learn (Bartruff & Headley, 2009). Teaching presence "refers to the instructional design and organization, facilitation of productive discourse, and direct instruction developed in online courses, ideally by both instructors and students" (Shea et al., 2010, p. 10). Teaching Presence overlaps with technology, pedagogy, content and social elements of an online course and is at the heart of effective discussion boards. It must be noted that when Teaching Presence was validated, the results suggested that teaching presence be separated into "two factors—one related to course design and organization and the other related to instructor behavior during the course" (Arbaugh, et al., 2008, p. 133). A summary of the elements, categories, and indicators of the CoI framework is presented in Table 3.1 (Garrison & Arbaugh, 2007, p. 159).

Table 3.1

Community of Inquiry Components (Garrison & Arbaugh, 2007, p. 159)

ELEMENTS	**CATEGORIES**	**INDICATORS** (examples only)
Social Presence	Open Communication Group Cohesion Affective Expression	Risk-free expression Encourage collaboration Emoticons
Cognitive Presence	Triggering Event Exploration Integration Resolution	Sense of puzzlement Information exchange Connecting ideas Apply new ideas
Teaching Presence	Design & Orientation Facilitating Discourse Direct Instruction	Setting curriculum & methods Sharing personal meaning Focusing discussion

Student Satisfaction and Perceived Learning

Effective instruction has historically been correlated with increased learning and increased student satisfaction in courses. In addition, student engagement and learning have been found to be central components in the educational process and student satisfaction. Emphasizing perceived student satisfaction in online courses can lead to greater student engagement in courses and more self-directed learning (Liaw & Huang, 2013). Understanding what improves student satisfaction in online courses increases "student motivation, participation, and ultimately, learning" (Sahin, 2007, p. 6).

An often used measure of institutional effectiveness and success is student satisfaction surveys (Donald & Denison, 1996; Katiliute & Kazlauskiene, 2010; Schuh & Upcraft, 2002). It must be noted that a student's satisfaction with his or her education is more often a predictor of student grades than student grades are a predictor of student satisfaction (Bean & Bradley, 1986). Moreover, improved student enrollment, student academic performance, and student retention have all been found to be related to student

satisfaction with education (Beil & Shope, 1990; Beltyukova & Fox, 2002; Tinto, 1993). Student satisfaction with the instructor and course is one indicator that can be used to assess quality in online education (Astin, 1993; Donald & Denison, 1996; Katiliute & Kazlauskiene, 2010; Schuh & Upcraft, 2002).

A quantitative study of 917 undergraduate students identified several predictors of student satisfaction in online learning (Sahin, 2007) including: creating a learning environment that allows students to incorporate their own solutions to course problems; letting students use their own learning strategies; and discussing their own perspectives. Another predictor of student satisfaction with online courses was the support received from the instructor. Examples of online student support are: sound feedback from the instructor, easy communication and timely help (Sahin, 2007). Interaction with instructors (Sherer-Bassani, 2011; Liaw, 2008), instructor use of multimedia instruction, interactive learning activities, and quality e-learning systems are also important elements correlated to student satisfaction with online courses (Liaw, 2008, p. 864).

Moreover, student satisfaction is also affected by students' motivational belief, engagement in, and perception of online courses (Timmers, Braber-van den Broek, & M. van den Berg, 2013). Students who believe they can engage in and learn from an online course are more likely to be active in the course and have improved satisfaction. Moreover, a student's perceived self-efficacy influenced his or her perception of the course (Liaw, 2008).

While these predictors are valuable, the strongest predictor of student satisfaction with online courses is the personal relevance of the course. This encourages creating

learner-centered courses and inspiring students to connect course content with personal experiences and circumstances outside of their schooling (Sahin, 2007).

Discussion Board Practices

A typical pedagogical technique in online courses is the use of discussion boards. These are used to provide students the opportunity to create a social environment, discuss course content, connect with the teacher, and build knowledge in the subject matter for the course. The idea is to have students engage in a meaningful dialogue that builds and enriches understanding.

One local stakeholder for this study was the Associate Academic Vice President – Academic Development at a private, northwestern university. He described online discussion board postings as "… often shallow, with students often saying they like something they read and others agreeing" (R. Eaton, personal communication, May 13, 2013). The challenge of student participation in online discussion boards is not unique to this institution. Hew, Cheung and Ng (2010) report that limited involvement or surface-level thinking in asynchronous online discussion boards are a persistent and widespread problem.

Research examining discussion board practices (Berry, 2008; Bliss & Lawrence, 2009; Hew, et al., 2010; Thompson, 2006) identify many factors that contribute to rich discussion; however, they generally conclude with the need to empirically study the impact of the recommendations for best practices on student learning. Development of a rubric to measure use of discussion board practices is helpful in that "rubrics make expectations and criteria explicit, which also facilitates feedback and self-assessment" (Jonsson & Svingby, 2007, p. 130).

A qualitative study of online discussion boards indicated that controversial questions in the discussion board "led to discussions and articulations of different perspectives and views, which in turn brought about newly gained insights into concepts" (Wang, 2010, p. 270). One student reflected, "Now looking back at the exchanged messages, I realize how much I learned from the discussions. There are areas to improve upon, such as skills to critique, but isn't that one of the objectives of the course, to continuously improve one's skills and capabilities?" (p. 270). These comments indicate discussion boards use higher order learning objectives of evaluation, synthesis and analysis according to Bloom's taxonomy of learning objectives (Overbaugh & Schultz, 2012).

In addition, instructor structuring of discussion boards was found to be important for effective online discussions (Berry, 2008; Hew, et al., 2010; Thompson, 2006). Instructors can prompt students to respond to each other using a contrarian point of view and using scholarly sources to increase student learning (Andrews, 2010).

The effectiveness of the role of the instructor in discussion board facilitation has been contradictory. Sherer-Bassani (2011) found that instructor participation in the discussion was highly important to the quality of learning, while other studies revealed that moderating or facilitation of discussion boards by instructors was counterproductive to more in-depth learning by students (Hew et al., 2010). Moreover, it was found that student facilitation of discussion boards, rather than instructor facilitation, increased the rate of critical thinking of students in discussion board responses (Hew et al., 2010). Scripting, or assignment of facilitation roles, was also found to enhance discussion board participation. Student moderators can identify the lack of interconnectivity among participants; and through scripting can effectively lead participants to achieve cognitive presence (Joannidou

& Sime, 2012). Students were found to be particularly adept at summarizing discussions when they were the facilitators (Wang, 2008).

Use of groups and the number of participants in discussion boards are an important aspect of effective discussion boards. Small groups generated more educationally valuable talk and more non-content related posts in online discussion boards compared to discussion boards that were comprised of the entire class (Bliss & Lawrence, 2009).

Research of online instruction identified the need for increased development of instruments to measure the effectiveness of online teaching (Oster-Levinz & Klieger, 2010). While there are many rubrics to grade students on discussion board participation, there is no known rubric for measuring the use of online discussion board best practices. Nor is there a discussion board rubric which defines discussion board practices to correlate with the CoI framework of: teaching presence, cognitive presence and social presence. Moreover, known assessments that measure the effectiveness of online learning, such as the CoI (Arbaugh, et al., 2008), typically apply to an entire course rather than a specific teaching method used in a course (i.e., discussion boards or subset of a course). Based upon theory and research, the use of these discussion board techniques should predict the effectiveness of discussion boards.

In order to identify the veracity of this, it was first necessary to develop a rubric to assess the extent to which the architecture and administration of discussion boards reflect known best practices. This is important because many students have and will continue to be part of purely online or hybrid courses in higher education. Technology is too powerful of a tool to be left behind in the pursuit of good education and therefore its use must be consistently evaluated and improved for the benefit of students.

After developing the rubric, the validity and reliability of the instrument must be assessed to ensure that the rubric is measuring what it purports to measure (validity), and that it is consistent in its measurements (reliability). Finally, the discussion board rubric needs to be implemented to assess how the scores relate to student satisfaction, perceived learning and community of inquiry measures. This will enable educators to have another valuable tool to assess and hopefully improve instruction and learning.

Research Question and Hypotheses

The purpose of this study was to develop a rubric to assess the degree to which discussion boards utilize best practices and explore the correlation between the use of discussion board best practices with student satisfaction and perceived learning in online courses. This study used a quantitative analysis of survey responses. In addition, the study examined the use of discussion board practices and its relationship to Community of Inquiry measures of online teaching.

Research Question One: What is the correlation between discussion board practices and the level of student satisfaction and perceived learning with their online course? Discussion board practices are broadly categorized into activities that promote cognitive presence, social presence, and teaching presence, along with effective discussion board management techniques.

H_1 There is a correlation between use of discussion board best practices and student satisfaction.

H_{01} –There is no correlation between discussion board best practices and student satisfaction.

H_2 There is a correlation between use of discussion board practices and student perceived learning.

H_{02} There is no correlation between discussion board best practices and student perceived learning.

Research Question Two: What is the correlation between discussion board best practices and the Community of Inquiry (CoI) framework? Similar to discussion board practices, the CoI framework includes categories for cognitive presence, social presence, and teaching presence.

H_3 There is a correlation between the use of discussion board best practices and the Community of Inquiry framework (as measured by the Community of Inquiry Survey).

H_{03} There is no correlation between discussion board best practices and the Community of Inquiry framework.

Methodology

This study was conducted in two phases. The first phase of the study was the identification of best practices in online discussion boards and the development of a rubric to measure the best practices used with online discussion boards. The correlation of the research with the corresponding rubric measurement represents the content validity of the discussion board rubric.

The second phase of the study measured the use of discussion board best practices then correlated it with student satisfaction, student perceived learning and the Community of Inquiry. This study was conducted with six online capstone sections from an inland northwest private university during the Fall Semester of 2013. This study used three assessments: the first being the discussion board rubric (see Appendix F), which measured the use of 20 discussion board best practices. The second assessment measured student satisfaction and perceived learning for the course, as measured by the BYU-Idaho Course

Evaluation administered at the end of each semester (see Appendix C). The last measurement used in this study was the Community of Inquiry Survey (see Appendix G).

Research was conducted following approval of the Institutional Review Board (IRB) from both the participating university and the University of Idaho. IRB approvals from both universities can be found in Appendices H and I. The researcher was trained and followed the general ethical principles and code of conduct of the American Psychological Foundation (APA, 2010, pp. 5-7) and completed certification from the National Institutes of Health. All data are discussed and presented in the aggregate.

Course

The researcher was provided access to six of 31sections (22.6%) of an-analytical thinking and moral judgment course for Fall Semester 2013. Course objectives stated that students were intended to learn how to apply analytical thinking and moral judgment to situations that may have no easy solutions. This course was a capstone course taken by junior and senior level students at the end of their foundation (general education) courses. The design for this course was standard for all online sections of the course. The role of the instructor was as a facilitator with little adaptation of course from section to section. Each course contained 14 discussion boards which utilized weekly asynchronous discussions. Alternating every other week, half of the discussion boards were assigned a participation grade. For the other half of the discussion boards, students were encouraged to participate, but not graded. Participations in the discussion boards made up 8% of the student's overall grade for the course.

Assessments

Discussion Board Rubric

The discussion board rubric measured the use of 20 specific discussion board best practices. The 20 items were classified into one of four categories: cognitive presence, social presence, teaching presence, and discussion board management. The discussion board best practices and measurements were included due to their commonality or poignancy in the literature (See Appendix F). Three of the four categories corresponded to the Community of Inquiry framework. Cognitive Presence practices were factors that focused students on course subject matter or the knowledge base that was to be learned in the course. Social Presence practices were factors that fostered community and facilitated student connection to the course, thereby facilitating deeper learning. Teaching Presence included practices where teachers prepared materials and facilitated situations that challenged students and encouraged deeper learning. Practices were also separated into a fourth category, titled Discussion Board Management, which included practices that set a foundation, either technical or administrative, to allow the other three areas to be implemented effectively. This section was included based on the results from the CoI validity study which suggested that teaching presence be separated into "two factors—one related to course design and organization and the other related to instructor behavior during the course" (Arbaugh, et al., 2008, p. 133).

Cognitive Presence. Cognitive Presence measures are those that relate to course content and subject matter. They focus on the knowledge base or skills students are intended to learn in the course. Discussion board best practices in this category include:

1. Select discussion topics that relate directly to the students' main curriculum (Hew, Cheung & Ng, 2010).
2. Use of controversial topics in the discussion board to stimulate discussion (Hew et al., 2010).
3. Use note starters or prompts to initiate thinking (Hew et al., 2010; Thompson, 2006).
4. Ask open ended questions where there may not be a correct answer or solution (Hew et al., 2010).
5. Number of educationally valuable content posts per discussion board (Bliss & Lawrence, 2009).
6. Use Socratic questioning to enhance student's critical thinking skills (Berry, 2008; Hew et al., 2010).

The internal consistency of an assessment may be measured by split-half or inter-item reliability. Split half reliability reflects the correlation between two halves of an instrument. Split half reliability for Cognitive Presence was calculated via Spearman-Brown (.733) and found to be acceptable. Inter-item reliability tests the consistency of respondents' answers to all the items in a measure. It is the degree that items are independent measures of the same concept and identifies how much of a correlation exists between the items. It is an average of all the possible inter-correlations. Inter-item reliability was measured by Cronbach's alpha (.772) and found to be acceptable. DeVellis (1991) indicates that a Chronbach alpha between .70 and .80 is respectable.

Social Presence. Social Presence fosters the relationship between participants and establishes a course community. Discussion board best practices in this category were measured by the:

7. Number of educationally valuable social posts per discussion board (Bliss & Lawrence, 2009).
8. Use of ground rules addressing respectful behavior in the discussion board (Hew et al., 2010).
9. Assign students to groups of 4-9 students (Berry, 2008; Bliss & Lawrence, 2009).
10. Assignment of students to the role of summarizer (Hew et al., 2010).
11. Use of a student rather than an instructor as discussion board facilitator. (Hew et al., 2010).

Due to the number of measures in this scale having zero variance, the reliability of this domain could not be calculated. This is a result of the course design, which was identical for all of the selected sessions.

Teaching Presence. Teaching Presence measures aspects of discussion board facilitation. These are practices instructors use to encourage deeper learning and engagement from the students. Discussion board best practices in this category include:

12. Number of instructor posts to a discussion board (Sherer-Bassani, 2011; Thompson, 2006).
13. Number of probing questions posed by the instructor per discussion board. (Sherer-Bassani, 2011).
14. Timeliness of instructor posts to other responses.

15. Adequately preparing students to participate with the technology (Hew et al., 2010).

Inter item reliability of Teaching Presence was measured by Cronbach's alpha (.699). DeVellis (1991) indicates that a Chronbach alpha between .70 and .80 is respectable.

Discussion Board Management. Discussion Board Management measures were those that center on discussion board design and administration. These were practices used to set guidelines for discussion board participation and assign grades to students. Discussion Board best practices in this category include:

16. Assign a grade or other incentive to discussion board participation (Hew et al., 2010; Thompson, 2006).
17. Outline a rubric for discussion board assessment (Berry, 2008; Hew et al., 2010).
18. Clearly state the purpose of the discussion board activity (Hew et al., 2010).
19. Assign deadlines for student contribution (Hew et al., 2010; Thompson, 2006).
20. Use easy navigation techniques (Hew et al., 2010; Thompson, 2006).

Inter-item reliability of the Discussion Board Management scale was measured by Cronbach's alpha (.618).

Fifteen of the 20 measures used in the rubric were recorded using a categorical scale of high, medium, or low use of the specific practice, with clear definition of the classifications. The remaining five measures were recorded on a continuous scale. Inter-item reliability of the complete Discussion Board Rubric was measured by Cronbach's alpha (.533).

University Course Evaluation

The second instrument used in this study was a University Course Evaluation, administered to students at the end of each semester. This survey contained 43 questions about each student's performance and expectations in the class, as well as perceptions of the course and instructor. However, this study used only two questions from this evaluation where students rated their satisfaction level with the course on a scale from -2 to +2 (-2 meaning much less satisfied as compared to other courses) to +2 (meaning a great deal more satisfied as compared to other courses). A rating of zero indicated that students rated their course satisfaction the same as with other college courses they have taken. The course evaluation used in this study has been administered at the participating university since 2008.

Community of Inquiry

The third instrument used in this study was the Community of Inquiry (CoI) survey. This survey contained 34 questions categorized into Cognitive Presence, Social Presence, and Teaching Presence. This was a multi-institutional developed and validated instrument for assessing the effectiveness of online learning environments (Arbaugh, et al., 2008).

The Community of Inquiry (CoI) framework and instrument have been extensively researched and applied (Arbaugh, et al., 2008; Bartruff & Headley, 2009; Boston, et al., 2009; Garrison, Anderson & Archer, 1999; Garrison & Arbaugh, 2007; Shea, 2009; Shea, et al., 2010). More specifically, the CoI was validated in a multi-institutional study designed for that purpose (Arbaugh, et al., 2008). The construct of Teaching Presence was also validated; however, the results suggested that teaching presence needed to be separated into

"two factors—one related to course design and organization and the other related to instructor behavior during the course" (Arbaugh, et al., 2008, p. 133).

Data Collection

Prior to this research, data collection was in place for the student satisfaction and perceived learning measures, since each semester the university administers a student survey for every course. For the CoI survey, Qualtrics survey software was used to collect data. Participants were made aware that the survey was optional, and informed consent was obtained.

This study was conducted in two phases. Phase one was the development and validation of the discussion board best practices rubric. The second phase included collecting and analyzing the data to answer the research questions.

Phase I: Development and Validation of Discussion Board Rubric

A rubric of twenty measures of research-based best practices in discussion boards was developed to assess the effectiveness of discussion boards in online classes. By focusing on the components of the CoI framework and adding technology-related concepts from the TPACK framework, the discussion board rubric measures theoretical and research based components of effective online learning. Based upon theory, the use of these discussion board techniques should correlate with student satisfaction with the course, perceived learning from the course, along with the amount of Cognitive Presence, Teaching Presence and Social Presence the student perceived in the course.

Construct validity of a rubric can be established by determining how the rubric was developed in relationship to a variety of other measures as specified in a theory or research. The design of this rubric was based on the CoI framework introduced by Koehler and

Mishra (2005). Since there were no other known rubrics that measure use of discussion board practices, the best practices identified by research were organized into the CoI model with an added section on discussion board management practices, since validation of the CoI revealed that Teaching Presence should be separated into "two factors—one related to course design and organization and the other related to instructor behavior during the course" (Arbaugh, et al., 2008, p. 133).

Cognitive Presence

Six discussion board practices were identified that fall into the category of Cognitive Presence. The first best practice was to select discussion topics that relate directly to the students' main curriculum (Hew, Cheung & Ng, 2010). By focusing on the course curriculum, the students were engaged in the intended learning for the course. Selecting good discussion board topics triggers the student's ability to make meaning of the material and lead to substantive exploration of the content.

A second factor was the use of controversial topics in the discussion board to stimulate discussion (Hew et al., 2010). This follows the Cognitive Presence concept of encouraging a sense of puzzlement and applying new ideas to concepts from the curriculum. It could also act as a triggering event to stimulating students to think about a topic differently than they might have considered before.

A similar cognitive process that could be encouraged in discussion boards was to use note starters or prompts to initiate thinking (Hew et al., 2010; Thompson, 2006). By using prompts, students could be encouraged to think and explore critically, rather than simply replying with a rote recitation of some concept taught in the course.

A continuation of this same cognitive theme was to question students in a way that encouraged connecting ideas and exchanging information in terms of lived experience with other students. This could be accomplished by using another discussion board best practice of asking open-ended questions where there may not be a correct answer or solution (Hew et al., 2010). This reinforces exploration of the course material and ultimately leads to integration of related ideas and concepts in the course.

Another way to measure the cognitive effectiveness of a discussion board is to count the number of educationally valuable content posts per discussion board (Bliss & Lawrence, 2009). This consisted of determining if a post by a student or instructor related to the curriculum and objectives of the course, and more specifically to the discussion board topic at hand. This assesses whether or not the student progressed in their posts from triggering and exploration to integration and resolution of course content into new meaning and understanding.

Finally, the last cognitive presence factor in effective discussion boards was the use of Socratic questioning to enhance students' critical thinking skills (Berry, 2008; Hew et al., 2010). This practice again followed the concepts of cognitive presence by determining if students were encouraged to challenge assumptions, explore and apply news ideas, connect related concepts, and resolve competing ideas into a new construct within their own understanding.

Social Presence

Social Presence was measured by determining the extent to which the participants in a community of inquiry were able to construct meaning through sustained communication (Garrison, Andersen & Archer, 1999). This section of the discussion board rubric contained

five factors that considered the strength of social presence in an online discussion board. One way to measure social presence was to count the number of educationally valuable social posts per discussion board (Bliss & Lawrence, 2009). These are posts where students encouraged or congratulated one another, thereby creating a social environment where students can feel more comfortable in expressing their online persona.

A second measure of effective social presence in a discussion board was to determine if ground rules addressing respectful behavior were set and enforced in the discussion board. This was a concept recommended as a useful practice for discussion boards (Hew et al., 2010). An important part of social presence is the idea of risk-free expression and open communication which can be encouraged by having guidelines for respectful communication. Ground rules further help establish social presence by creating an environment that encourages collaboration.

Assigning students to small groups of 4-9 students was another identified effective discussion board practice (Berry, 2008; Bliss & Lawrence, 2009). Students who connect socially in small groups together build meaning from their own experience and the experience shared by their peers. This develops more group cohesion and interaction, and helps ascertain the presence of Social Presence in the discussion board.

The last two factors in the Social Presence category related to the role of students in running the discussion board. Use of students rather than instructors as discussion board facilitators was identified as a practice that encouraged discussion board participation (Hew et al., 2010). Another related practice encouraged in the literature was to assign a student the role of summarizer for the discussion board (Hew et al., 2010). These practices encouraged students to take ownership for the discussion and allowed for an increased sense of

community for the participants. These two practices support the Social Presence framework as indicators of open communication, collaboration, group cohesion and effective expression.

Teaching Presence

Validation of Teaching Presence in the CoI framework revealed that teaching presence needed to be separated into "two factors—one related to course design and organization and the other related to instructor behavior during the course" (Arbaugh, et al., 2008, p. 133). Because course design and grading functions could be separated from the instructor or facilitator of a course, the best practices rubric categorized design functions under discussion board management and included only facilitation related measures in the teaching presence category.

A simple and effective way to measure teaching presence in a discussion board was to count the number of instructor posts to a discussion board. This was suggested as a useful measure of an effective discussion board (Sherer-Bassani, 2011; Thompson, 2006). When instructors were not engaged in a discussion, students could assume that the discussion was not important to the objectives of the course. By simply posting frequently to the discussion board, an instructor could achieve the CoI Teaching Presence indicators of focusing discussion and modeling how to share personal meaning.

Another way to measure effective teaching presence in the course was to determine the number of probing questions posed by the instructor (Sherer-Bassani, 2011). These were questions that do not have a yes or no answer and require students to explore their thoughts and articulate concepts.

A third way to effectively measure teaching presence in a course is to measure the timeliness of instructor posts to other responses in the discussion board (Sahin, 2007). Timely responses encourage students to remain engaged in a discussion. When instructors remained engaged in a discussion, it could focus the discussion which was one of the indicators of Teaching Presence in the CoI framework. It could also facilitate sharing personal meaning, as students feel their discussion had an audience rather than just being offered to the void of untimely responses or no response.

A fourth factor of effective teaching presence within a discussion board is to determine if students were adequately prepared to participate with the technology. This was identified as an important technique for effective discussion boards (Hew et al., 2010). If students could not effectively participate with the technology, it stymied discussion. Instructors could provide tutorials or other posts which outline how to use the technology in the discussion board.

Discussion Board Management

The Discussion Board Management section of the rubric contains five measures. They relate to how technology could be successfully combined with pedagogy in an online discussion board. This overlap of pedagogy and technology relate conceptually to the TPACK framework (Koehler & Mishra, 2009). Often these measures are part of the course design, which is why they were better suited to this category than Cognitive Presence or Social Presence components of the CoI. A part of the Teaching Presence in the CoI addresses course design, but by separating course design decisions from other practices where instruction is present in the course, some of the vagueness of the source of instructor presence can be resolved.

The first Discussion Board Management related factor in the rubric called for the assignment of a grade or other incentive to discussion board participation. This practice was identified as a discussion board best practice (Hew et al., 2010; Thompson, 2006). While assigning a grade or other incentive to an assessment is not a new pedagogical concept, specifying discussion board participation by the student encourages interaction in the discussion rather than having the discussion as an optional venue. Understanding and using this practice falls into the category of Pedagogical Content Knowledge, which is knowledge about how to implement pedagogy into the course design.

Another discussion board management related factor is outlining a rubric for the discussion board. Assessing students and helping them understand the criteria on which they are assessed improve the quality of the discussion (Berry, 2008; Hew et al., 2010). This practice not only motivates students to engage, but it provides direction to the posts. This practice represents application of Pedagogical Content Knowledge because it identifies how to teach and assess students.

Similar to using a rubric for assessment, clearly stating the purpose for the discussion board activity improves discussions (Hew et al., 2010). When a student understands why the discussion needs to take place, they can better formulate their posts and respond to the posts of others in the discussion, thereby making the discussion a better learning experience for all participants.

A fourth best practice in this category was assigning a deadline for student contribution (Hew et al., 2010; Thompson, 2006). This is a rather poignant way in which technology overlapped with pedagogy and fit in the TPACK category of Technological Pedagogical Knowledge. When a discussion board is technologically set up as an

asynchronous discussion, deadlines are valuable to encourage dialogue and to keep the discussion alive and meaningful to students.

The fifth and final discussion board management technique that relates to technology was using easy navigation techniques. This also has been specified in literature as a discussion board best practice (Hew et al., 2010; Thompson, 2006). Without easy navigation techniques, students may become lost or frustrated in the discussion, thereby limiting their ability to engage. This practice aligns with Technological Content Knowledge since it allows the technology to promote rather than hinder the presentation of course content.

Data Analysis

A Spearman Rho correlation was conducted for all hypotheses. Analysis examined student satisfaction and student perceived learning and their relationship to discussion board best practices categories for Cognitive Presence, Social Presence, Teaching Presence and Discussion Board Management Practices. These same categories were analyzed according to their relationship to results from the CoI student survey which categorized responses into Cognitive Presence, Social Presence and Teaching Presence.

It must be noted that 25% of posts (N = 1,409) for the courses related to the introductory week discussion board where students and the instructor provided a short introduction for themselves and greeted other students online. Because these introductory discussion boards were designed exclusively to build online community, some of the discussion board best practices were not expected to be used in that context. Therefore, results were analyzed both with and without the introductory discussion boards.

Results

Participants

Students. There were 181 students **e**nrolled in the six sections; of which 76.2% (n = 138) participated in the CoI Survey and 75.1% (n= 136) participated in the Course Evaluation Survey. The participants' (n = 136) age ranged from 19 to 50, with a mean of 27.4, median of 24, and mode of 24. Females represented 63.2% of the participants (n = 86), while 38.8% (n = 50) were male. Seniors constituted 62.5% of the student participants (n = 85); 35.3% were juniors (n = 48); 1.5% were sophomores (n = 2); and 0.7% were non-matriculated (n = 1).

Instructors. For the six sections analyzed, there were four instructors. Two instructors had taught online at BYU-I for more than five semesters. Two taught online for less than five semesters. One of the instructors also had experience teaching online at other universities. Three were female and one was male, with the age ranging from 25-50. Two instructors taught online at BYUI for more than five semesters and two taught online for less than five semesters. One of the instructors also had experience teaching online at other universities.

The first instructor (T1) facilitated two of the online courses, had less than five semesters teaching experience at the participating institution, and did not have online teaching experience at other universities. The second instructor (T2) also facilitated two of the online sections, had more than five semesters teaching experience at the participating institution, and also had experience teaching online at other institutions. The third instructor (T3) facilitated only one section of the course, had less than five semesters experience teaching at the participating institution, and did not have teaching experience at other

institutions. The last instructor (T4) facilitated one of the online sections, had more than five semesters of online teaching experience at the participating institution, and did not have online teaching experience at other universities.

Measurements

Discussion Board Rubric. Each of the six sections analyzed contained 14 discussion board assignments. Fifteen of the 20 measures used in the rubric were scored as low (1), medium (2), or high (3) use of the specific best practice, with clear definition for each classification. The remaining five measures were recorded on a continuous scale and measured the number of: educational posts, social posts, instructor posts, probing questions, along with the timeliness of the instructor responses.

Cognitive Presence Discussion Board Measures. Measures of cognitive presence in the discussion board rubric reflect the selection of discussion topics that relate directly to the students' main curriculum (Hew, Cheung & Ng, 2010), the use of controversial topics in the discussion board to stimulate discussion (Hew et al., 2010), the use of note starters or prompts to initiate thinking (Hew et al., 2010; Thompson, 2006), asking open ended questions where there may not be a correct answer or solution (Hew et al., 2010), and the use of Socratic questioning to enhance student's critical thinking skills (Berry, 2008; Hew et al., 2010). These five measures were scored as low (1), medium (2), or high (3).

In addition, the number of educationally valuable content posts for each assignment (Bliss & Lawrence, 2009) was recorded on a continuous scale. The overall range for this measure was from 0 - 158, with a mean of 47.36, median of 36, and mode of 0. For the purpose of classifying the counts into the categories of low, medium, or high, a frequency

count and chi-squared analysis were run. The low, medium, and high ranges were 0 - 52 (low), 53 - 105 (medium), and 106 - 158 (high).

A chi-squared goodness of fit test $X^2(2, N = 84) = 58.357$, $p < .001$, $w = .69$ (large), revealed that significantly more than one would expect by chance had between 0 - 52 (low) educationally valuable content posts, while significantly less than one would expect by chance had a medium (53-105 posts) or high (106-158) number of educationally valuable content posts. Effect size was measured by Cohen's w and found to be large. Cohen's w is calculated as $\{x^2/[N(\#\text{ categories}-1)]\}$ and interpreted with .10 being small; .30 being medium; and .50 being large. This indicates that there were relatively few educationally valuable content posts on the discussion board. See Table 3.2 for complete statistical analysis.

Table 3.2

Chi-squared: Number of Educationally Valuable Content Posts

Count	***Observed***	%	***Expected***	***Residual***	***Standard R***	***Significance***
0 to 52	61	72.6	28	33	6.236	.01 more
53 to 105	12	14.3	28	-16	-3.024	.01 less
106 to 158	11	13.1	28	-17	-3.213	.01 less
Total	84					

With the educationally valuable content posts categorized into low, medium and high as described above, the mean, median and mode were calculated for each of the six Cognitive Presence measures. The combined mean for the six measures in Cognitive Presence was medium-high ($M = 2.35$, $SD = .46$). The highest measure was the selection of discussion board topics that related directly to the main curriculum ($M = 2.86$, SD = .56), followed by the use of prompts to initiate thinking and use of Socratic questioning in the discussion boards ($M = 2.71$, SD = .59 for both). The lowest measure was the number of

educationally valuable content posts per discussion board (*M* = 1.40, SD = .71). Complete descriptive statistics for cognitive presence are presented in Table 3.3.

Table 3.3

DB Cognitive Presence: Descriptive Statistics

	Mean	**Median**	**Mode**
Select discussion topics that relate directly to the students' main curriculum.	2.86	3	3
Use of controversial topics in the discussion board to stimulate discussion.	2.00	2	1
Use note starters or prompts to initiate thinking.	2.71	3	3
Ask open ended questions where there may not be a correct answer or solution.	2.43	3	3
Number of educationally valuable content posts per discussion board.	1.40	1	1
Use Socratic questioning to enhance student's critical thinking skills.	2.71	3	3
Cognitive presence measures combined	2.35(.46)	3	3

Social Presence Discussion Board Measures. The social presence discussion board measures incorporated the use of ground rules for respectful behavior in the discussion board (Hew et al., 2010), the assignment of students to small groups of 4 - 9 (Berry, 2008; Bliss and Lawrence, 2009), and the designation of students in the role of summarizer and facilitator (Hew et al., 2010). These measures were scored as low (1), medium (2), or high (3).

In addition, the number of educationally valuable social posts for each assignment was recorded on a continuous scale. The number of social posts ranged from 0 - 293, with a mean of 34.51, median of 12, and mode of 9. The social post counts were then categorized into low, medium, and high ranges of 0 - 98, 99 - 196, and 197 - 293 respectively.

A chi-squared goodness of fit test $X^2(2, N = 84) = 134.0$, $p < .001$, $w = .79$ (large), revealed that significantly more than expected discussion boards had relatively few social posts. Moreover, significantly less than expected discussion boards had medium or high numbers of social posts. These results indicate that students generally did not use social communication in the discussion boards. See Table 3.4 for complete statistical analysis.

Table 3.4

Chi-squared: Number of Social Posts

Count	***Observed***	%	***Expected***	***Residual***	***Standard R***	***Significance***
0 to 98	78	92.9	28	50	9.449	.01 more
99 to 196	2	2.4	28	-26	-4.914	.01 less
197 to 293	4	4.8	28	-24	-4.536	.01 less
Total	84					

After the educationally valuable social posts were categorized into low, medium and high (as described above), the mean, median and mode were calculated for each of the five measures of Social Presence. The combined mean for the five measures was low ($M = 1.42$, $SD = .09$). It must be noted that three of the five measures reflect the standardized course design in that none of the course designs assigned students to small groups of 4-9 students, used students in the role of summarizer, or used students rather than the instructor as facilitator of the discussion board. However, all of the courses set ground rules for respectful behavior in the discussion board. With the exception of establishing ground rules for respectful behavior, the standard course design did not use best practices that encourage social presence as evidenced by the number of educationally valuable social posts on the discussion board ($M = 1.12$, SD = .45). Complete descriptive statistics for social presence are presented in Table 3.5.

Table 3.5

DB Social Presence: Descriptive Statistics

	Mean (SD)	Median	Mode
Number of educationally valuable social posts per discussion board.	1.12	1	1
Use of ground rules addressing respectful behavior in the discussion board.	3.00	3	3
Assign students to groups of 4-9 students.	1.00	1	1
Assign students the role of summarizer.	1.00	1	1
Use of a student rather than an instructor as discussion board facilitator.	1.00	1	1
Social presence measures combined	1.42 (.09)	1	1

Teaching Presence Discussion Board Measures. The teaching presence discussion board measures how adequately the students felt prepared to use the technology, how quickly instructors responded to posts, how often the instructor posted to the discussion board, and if the instructors used probing question on his or her posts. Adequately preparing students to participate with technology was scored on a scale of low (1), medium (2), or high (3). The number of instructor posts, timeliness of instructor response, and number of probing questions were all scored on a continuous scale.

The number of instructor posts ranged from 0 - 47, with a mean of 3.65, median of 2, and mode of 0. The number of instructor posts was equally distributed into categories of low, medium, and high ranges of 0 - 16, 17 - 32, and 33 - 47 respectively.

A chi-squared goodness of fit test revealed that significantly more than expected discussion boards had relatively few instructor posts, $X^2(2, N = 84) = 144.857$, $p < .001$, $w = .86$ (large). Moreover, significantly fewer than expected discussion boards had medium or

high numbers of instructor posts. This suggests that a majority of discussion boards were student based with minimal on-going facilitation from the instructor. See Table 3.6 for complete statistical analysis of the number of instructor posts.

Table 3.6

Chi-squared: Number of Instructor Posts

Count	***Observed***	%	***Expected***	***Residual***	***Standard R***	***Significance***
0 to 16	80	95.2	28	50	9.827	.01 more
17 to 32	2	2.4	28	-26	-4.914	.01 less
33 to 47	2	2.4	28	-24	-4.914	.01 less
Total	84					

With respect to the use of probing questions in discussion boards, the overall range was from zero to 30, with a mean of 1.56, median of 0, and mode of 0. The number of probing questions were categorized into low, medium, and high ranges of 0 - 10, 11 - 20, and 21 - 30 respectively. A chi-squared goodness of fit test $X^2(2, N = 84) = 156.214$, $p < .001$, $w = .93$ (large), revealed that significantly more than expected discussion boards had relatively few probing questions. Moreover, significantly less than expected discussion boards had medium or high numbers of probing questions. Overall, the instructors were not using probing questions when posting on the discussion boards. See Table 3.7 for complete statistical analysis.

Table 3.7

Chi-squared: Number of Probing Questions

Count	***Observed***	%	***Expected***	***Residual***	***Standard R***	***Significance***
0 to 10	82	98.8	28	55	10.394	.01 more
11 to 20	1	0.0	28	-28	-5.292	.01 less
21 to 30	1	1.2	28	-27	-5.103	.01 less
Total	84					

The overall timeliness of instructor posts to other responses ranged from 2.83 to

123.23 hours with a mean of 36.156. It must be noted that 46 of the 84 discussion boards analyzed had no instructor posts in response to the student posts; therefore the median and mode were discussion boards that had no instructor responses at all. In respect to discussion boards that had an instructor response to student posts, the timeliness of the response rate, was categorized into low (slow response), medium, and high (fast response) ranges. The responses ranging from 83.11 - 123.23 hours were classified as low (slow response time), 42.97 - 83.10 hours as medium response time, and 2.83 - 42.96 hours as fast response times (high). However, over half (n = 46) of discussion boards did not have an instructor response to a student post.

A chi-squared goodness of fit test of response time for discussion boards which had an instructor response, $X^2(2, N = 38) = 20.895$, $p < .001$, $w = .27$ (medium-small), revealed that significantly more than expected by chance of the instructor responses to student discussion board posts were within two days (2.83 - 42.96 hours). Moreover, only one instructor had a response that was longer than three and half days (.01 significance level). In conclusion, the majority of the instructors did not post to the discussion boards. However, of the instructors that did post, the response times were within 48 hours (.01 significance evel). See Table 3.8 for complete statistical analysis.

Table 3.8

Chi-squared: Timeliness of Instructor Posts (to other responses)

Count	***Observed***	%	***Expected***	***Residual***	***Standard R***	***Significance***
83.11 to 123.23 hrs.	1	2.6	12.67	-11.67	-3.278	.01 less
42.97 to 83.10 hrs.	13	34.2	12.67	0.33	0.094	n.s.
2.83 to 42.96 hrs.	24	63.2	12.67	11.33	3.184	.01 more
No response	46					
Total	84					

Following the categorization of the number of instructor posts, number of probing questions, and timeliness of instructor posts into low, medium and high as described above, the mean, median and mode were calculated for each of the four measures of teaching presence. The combined mean for the four measures was medium-low (*M* = 1.71, *SD* = .93). It must be noted that the number of instructor posts to a discussion board and number of probing questions were low (*M* = 1.07 and 1.04 respectively, SD = .34 and .24 respectively). However, adequately preparing students to participate with the technology was high (*M* = 3.00, SD = 0). This finding was due to implementation of this best practice as part of a standardized course design. Complete descriptive statistics for teaching presence are presented in Table 3.9.

Table 3.9

DB Teaching Presence: Descriptive Statistics

	Mean	**Median**	**Mode**
Number of instructor posts to a discussion board.	1.07	1	1
Number of probing questions posed by the instructor per discussion board.	1.04	1	1
Timeliness of instructor posts to other responses.	2.378	no response	no response
Adequately prepare students to participate with the technology.	3.00	3	3
Teaching presence measures combined	1.71 (.93)	1	1

Discussion Board Management Measures. Measures of discussion board management in the discussion board rubric encompass assigning a grade or other incentive to discussion board participation (Hew et al., 2010; Thompson, 2006), outlining a rubric for discussion board assessment (Berry, 2008; Hew et al., 2010), clearly stating the purpose of the discussion board activity (Hew et al., 2010), assigning deadlines for student contribution

(Hew et al., 2010; Thompson, 2006), and using easy navigation techniques (Hew et al., 2010; Thompson, 2006). These measures were scored as low (1), medium (2), or high (3).

The mean, median and mode were calculated for each of the five measures of discussion board management. The combined mean for the measures was medium-high (*M* = 2.44, *SD* = .25). Assigning deadlines for student contribution and using easy navigation techniques were the most frequently used discussion board management techniques and were rated as high (*M* = 3.00, SD = 0 for both measures). However, it must be noted that outlining a rubric for discussion board assessment was the management technique least used in the course (*M* = 1.71, *SD* = .96). Complete descriptive statistics for discussion board management are presented in Table 3.10.

Table 3.10

DB Management: Descriptive Statistics

	Mean	**Median**	**Mode**
Assign a grade or other incentive to discussion board participation.	2.00	2	2
Outline a rubric for discussion board assessment.	1.71	1	1
Clearly state the purpose of the discussion board activity.	2.50	3	2
Assign deadlines for student contribution.	3.00	3	3
Use easy navigation techniques.	3.00	3	3
Discussion board management measures combined	2.44(.25)	3	3

University Course Evaluation

The University Course Evaluation, administered to students at the end of each semester for all courses at BYU-I contained 43 questions about each student's performance

and expectations in the class, as well as perceptions of the course and instructor. Only the results from two of the questions were used in this study.

Student Satisfaction. Students were asked to rate their satisfaction level with the course on a scale from -2 to +2 (-2 meaning much less satisfied as compared to other courses) to +2 (meaning a great deal more satisfied as compared to other courses). When students felt their satisfaction the same as other college courses they have taken, they rated it as zero. The mean was .449 (SD = 1.287), median was 1, mode was 0, with a skewness of -.487 (SE = .208), and kurtosis of -.71 (SE = .413).

A chi-squared goodness of fit test revealed significant differences in the distribution of the responses than one might expect by chance, $X^2(4, N = 135) = 21.259$, $p < .001$, $w = .04$ (very small). Fewer than expected students rated their course satisfaction as much less satisfied as compared to other college courses they have taken (.05 significance level) or less satisfied as compared to other college courses they have taken (.01 significance level). Therefore, overall the students appeared either neutral or more satisfied with this online course as compared to other college courses they had taken. Chi-squared statistics for course satisfaction are presented in Table 3.11.

Table 3.11

Chi-squared: Course Satisfaction

Rating	***Observed***	%	***Expected***	***Residual***	***Standard R***	***Significance***
-2	16	11.9	27	-11	-2.117	.05 less
-1	12	8.9	27	-15	-2.887	.01 less
0	37	27.4	27	10	1.925	n.s
1	35	25.9	27	8	1.540	n.s.
2	35	25.9	27	8	1.540	n.s.
Total	135					

It must be noted that a chi-squared test of independence of student satisfaction by instructor revealed no significant difference of student satisfaction between instructors, $X^2(12, N = 135) = 19.369$, $p = .08$, *Cramer's V* = .219 (small).

Only 20.8% of students rated the course negatively, while 51.8% rated the course positively. Responses for student satisfaction were further categorized into unsatisfied, neutral, and satisfied. A chi-squared goodness of fit was calculated based upon these revised categories and found to be significant, $X^2(2, N = 135) = 21.733$, $p < .001$, $w = .08$ (small). Significantly fewer than expected students were unsatisfied as compared to other college courses they have taken (.05 significance level) and significantly more than expected students were satisfied as compared to other college courses they have taken (.01 significance level). Chi-squared statistics for revised student satisfaction are presented in Table 3.12.

Table 3.12

Chi-squared: Re-categorized Student Satisfaction

Rating	***Observed***	%	***Expected***	***Residual***	***Standard R***	***Significance***
-2 to -1	28	20.7	45	-17	-2.534	.05 less
0	37	27.4	45	-8	-1.193	n.s.
1 to 2	70	51.9	45	25	3.727	.01 more
Total	135					

Student Perceived Learning. Students were also asked to compare how much they learned in relation to other college courses that they have taken in the past (M = .625, SD = 1.23; median = 1; mode = 2; skew = -.592, SE = .208; kurtosis = -.530, SE = .413). A chi-squared goodness of fit test revealed significant differences in the distribution of the responses, $X^2(4, N = 136) = 31.279$, $p < .001$, $w = .058$ (small). Significantly fewer than expected students rated their perceived learning as a great deal less compared to other

college courses they have taken (.01 significance level) or a little less compared to other college courses they have taken (.01 significance level). Moreover, more than expected students rated their perceived learning as a great deal more than other college courses they have taken (.01 significance level). See Table 3.13 for complete chi-squared statistics for perceived student learning.

Table 3.13

Chi-squared: Perceived Student Learning

Rating	***Observed***	%	***Expected***	***Residual***	***Standard R***	***Significance***
-2	11	8.1	27.2	-16.2	-3.106	.01 less
-1	12	8.8	27.2	-15.2	-2.914	.01 less
0	36	26.5	27.2	8.8	1.687	n.s.
1	35	25.7	27.2	7.8	1.496	n.s.
2	42	30.9	27.2	14.8	2.838	.01 more

In addition, a chi-squared test of independence of student satisfaction by instructor revealed no significant difference of student perceived learning between instructors, $X^2(12, N = 136) = 14.07$, $p = .296$, *Cramer's V* = .186 (small).

It must be noted that only 16.9% of students perceived their learning to be less than other college courses they had taken, while 56.6% perceived their learning to be more than other college courses they had taken. Responses for student perceived learning were further categorized into less learning, neutral, and more learning. A chi-squared goodness of fit was calculated based upon these revised categories and found to be significant, $X^2(2, N = 136) = 35.044$, $p < .001$, $w = .129$ (small). Significantly fewer than expected students perceived they had learned less compared to other college courses they had taken (.01 significance level) and significantly more than expected students perceived they learned more compared to other college courses they had taken (.01 significance level). Chi-squared statistics for the revised (3 category) perceived student learning are presented in Table 3.14.

Table 3.14

Chi-squared: Re-categorized Perceived Student Learning

Rating	***Observed***	%	***Expected***	***Residual***	***Standard R***	***Significance***
-2 to -1	23	16.9	45.3	-22.3	-3.313	.01 less
0	36	26.5	45.3	-9.3	-1.382	n.s.
1to 2	77	56.6	45.3	31.7	4.710	.01 more
Total	136					

Community of Inquiry Survey (CoI)

The CoI framework provides a structured guideline for the development and assessment of an effective and sustained online learning community (Arbaugh, 2008). It contains 34 questions using a five point Likert scale ranging from strongly disagree (1) to strongly agree (5). The questions are categorized into indices entitled: Cognitive Presence, Social Presence, and Teaching Presence. This is a multi-institutional developed and validated instrument for assessing the effectiveness of online learning environments (Arbaugh, et al., 2008).

One hundred thirty eight students completed the CoI survey, of which 32.6% were male (N = 45), 39.1% were female (N = 54), and 28.3% (N = 39) did not identify their gender. Juniors accounted for 29.7% of the respondents (N = 41), while seniors represented 68.8% of the respondents (N = 95), and 1.4% (N = 2) did not identify their class standing. The participants age ranged from 19 to 56 and 10% (N = 14) did not identify their age. The mean age was 27.44 (SD = 8.813), with a median and mode of 24.

Some respondents did not answer all questions on the CoI survey. For statistical analysis where the items were left blank, the average of all responses for that category was used. In one case a student did not respond to over half of the questions in a category, therefore this student's responses were deleted from the analysis.

Overall the CoI responses indicate that cognitive, teaching and social presence components were evident (M = 4.157, SD = .606). The strongest area indicated by student responses was Teaching Presence (M = 4.399, SD = .657) and the weakest area, while still positive, was social presence (M = 3.957, SD = .688). Descriptive statistics for the community of inquiry responses are presented in Table 3.15.

Table 3.15

Community of Inquiry: Descriptive Statistics

	Mean	**SD**
Community of Inquiry Overall	4.157	.606
Teaching Presence	4.399	.657
Social Presence	3.957	.688
Cognitive Presence	4.045	.718

An ANOVA was calculated to ascertain if there was a significant variation amongst instructors in their Teaching Presence, Social Presence and Cognitive Presence. While there was no significant difference between Cognitive Presence amongst instructors, significant differences were found in the area of Teaching Presence (p = .013), Social Presence (p = .037) and the overall CoI (p = .045).

A Tukey HSD post hoc test was calculated to identify where the significant differences lie between the instructors in the overall CoI. It is interesting to note that the most experienced teacher in terms of experience teaching at BYU-Idaho (T4) had the lowest overall CoI, which was significantly lower than a less experienced instructor who only taught one section (T3). Table 3.16 is the source table for the ANOVA calculated for the total CoI analyzed by instructors.

Table 3.16

ANOVA: Overall CoI by Instructor

	SS	***df***	***MS***	***F***	***p***	**eta^2**	**Effect size**
Between groups	2.925	3	.975	2.763	.045	.059	medium
Within groups	46.937	133	.353				
Total	49.862	136					

A Tukey HSD post hoc test was calculated to identify where the significant differences lie in Teaching Presence between the instructors. It is interesting to note that an instructor with less than five semesters teaching at the participating institution (T1) was significantly higher in Teaching Presence ($p = .013$, $eta^2 = .076$) than an instructor with more than five semesters teaching at the participating institution who also has experience teaching at other online universities (T2). The ANOVA source table is presented in Table 3.17.

Table 3.17

ANOVA: Teaching Presence by Instructor

	SS	***df***	***MS***	***F***	***p***	**eta^2**	**Effect size**
Between groups	4.553	3	1.518	3.726	.013	.076	medium
Within groups	54.176	133					
Total	58.729	136					

In respects to Social Presence, a Tukey HSD post hoc test was calculated to identify where the significant differences lie. It was interesting to note that again, an instructor with less than five semesters of teaching experience (T3) was significantly higher in Social Presence ($p = .037$, $eta^2 = .062$) than an instructor with more than five semesters teaching experience (T4). See Table 3.18 for the ANOVA source table.

Table 3.18

ANOVA: Social Presence by Instructor

	SS	***df***	***MS***	***F***	***p***	**eta^2**	**Effect size**
Between groups	3.972	3	1.324	2.915	.037	.062	medium
Within groups	60.4	133	.454				
Total	64.372	136					

An ANOVA revealed no significant difference between the instructors in Cognitive Presence as measured by the CoI ($p = .436$, $eta^2 = .02$). The effect size was small. See Table 3.19 for the ANOVA source table.

Table 3.19

ANOVA: Cognitive Presence by Instructor

	SS	***df***	***MS***	***F***	***p***	**eta^2**	**Effect size**
Between groups	1.417	3	.472	.914	.436	.02	small
Within groups	68.376	133					
Total	70.153	136					

Research Question One

The first research question explored the correlation between discussion board practices and the level of student satisfaction and perceived learning with their online class. Discussion board practices were broadly categorized into activities that promote: cognitive presence, social presence, and teaching presence, along with effective discussion board management techniques.

H_1 There is a correlation between use of discussion board best practices and student satisfaction (as measured by the BYUI Course Evaluation).

H_{01} –There is no correlation between discussion board best practices and student satisfaction.

A Spearman Rho correlation was calculated to identify if there was a correlation between the use of discussion board best practices and student satisfaction (as measured by the university Course Evaluation). A significant correlation was found in Cognitive Presence ($r = .862$, $p = .042$). Students were more satisfied when the cognitive presence practices of selecting discussion topics that relate directly to the students' main curriculum, using controversial topics in the discussion board to stimulate discussion, using prompts to initiate thinking, asking open-ended questions where there may not be a correct answer or solution, and using Socratic questioning to enhance student's critical thinking skills were used. Therefore we reject the null hypothesis with respect to Cognitive Presence and fail to reject the null hypothesis in terms of Teaching Presence, and Social Presence. The Spearman Rho correlation coefficient statistics are presented in Table 3.20.

Table 3.2

Correlation: Best Practices with Student Satisfaction

	r	***p***
DB - Teaching Presence	.239	.648
DB - Social Presence	.414	.414
DB - Cognitive Presence	.829	.042
DB - Management Practices	*	*
Overall	.486	.329

In addition a Kruskal Wallis test was conducted to identify if the instructor response time to posts significantly affected the student's satisfaction in the course and was found to be not significant, $X^2(3) = 3.054$, $p = .383$. The amount of time it took to respond to student posts did not correlate with student satisfaction with the course.

H_2 –There is a correlation between the use of discussion board practices and student perceived learning (as measured by the BYUI Course Evaluation).

H_{02} There is no correlation between discussion board best practices and student perceived learning.

A Spearman Rho correlation was calculated to identify if there was a correlation between the use of discussion board best practices and student perceived learning (as measured by the university Course Evaluation). A significant correlation was found in Cognitive Presence ($r = .943$, $p = .005$). Students perceived that they learned more when the Cognitive Presence practices of selecting of discussion topics that relate directly to the students' main curriculum, using controversial topics in the discussion board to stimulate discussion, using prompts to initiate thinking, asking open ended questions where there may not be a correct answer or solution, and the use of Socratic questioning to enhance student's critical thinking skills are used. Therefore we reject the null hypothesis for Cognitive Presence, and fail to reject the null for Teaching Presence and Social Presence. The Spearman Rho correlation coefficient statistics are presented in Table 3.21.

Table 3.21

Correlation: Best Practices with Student Perceived Learning

	r	***p***
DB - Teaching Presence	.359	.485
DB - Social Presence	.621	.188
DB - Cognitive Presence	.943	.005
DB - Management Practices	*	*
Overall	.543	.266

A Kruskal Wallis test was conducted to identify if the instructor response time to posts significantly affected the student's perception of learning and was found to be not significant, $X^2(3) = 3.464$, $p = .325$.

Research Question Two

The second research question explored the correlation between discussion board practices and the students' perception of the course (as measured by the Community of Inquiry survey).

H_3 There is a correlation between the use of discussion board best practices and the Community of Inquiry framework (as measured by the Community of Inquiry Survey).

H_{03} –There is no correlation between discussion board best practices and the Community of Inquiry framework.

With respect to student's identification of Teaching Presence in the course (as measured by the CoI), a significant correlation was found with the discussion board Social Presence ($r = .828$, $p = .042$) and discussion board Teaching Presence best practices ($r = .956$, $p = .003$). The Spearman Rho statistics for Teaching Presence as measured by the CoI are presented in Table 3.22.

Table 3.22

Correlation: Best Practices with CoI Teaching Presence

	r	***p***
DB - Teaching Presence	.956	.003
DB - Social Presence	.828	.042
DB - Cognitive Presence	.371	.468
DB - Management Practices	*	*

With respect to student's identification of Cognitive Presence in the course (as measured by the CoI), no correlation was found with the discussion board best practices. The Spearman Rho statistics for Cognitive Presence as measured by the CoI are presented in Table 3.23.

Table 3.23

Correlation: Best Practices with CoI Cognitive Presence

	r	***p***
DB - Teaching Presence	.598	.21
DB - Social Presence	.621	.188
DB - Cognitive Presence	.6	.208
DB - Management Practices	*	*

In respects to student's identification of Social Presence in the course (as measured by the CoI, no correlation was found with the discussion board best practices. The Spearman Rho statistics for Social Presence as measured by the CoI are presented in Table 3.24.

Table 3.24

Correlation: Best Practices with CoI Social Presence

	r	***p***
DB - Teaching Presence	.598	.210
DB - Social Presence	.621	.188
DB - Cognitive Presence	.6	.208
DB - Management Practices	*	*

Additional Analysis

Scoring of the discussion board rubric revealed that the first discussion board of each course elicited more responses (M = 234.8, SD = 35.1) than subsequent discussion boards (M = 53.2, SD = 40). The first discussion board in each course was designed for all students to post get-to-know-you information with the purpose of establishing an online community. The introductory discussion board did not contain any material directly related to the course topic. Based on this finding, it was determined that calculating additional statistics without the initial discussion boards could prove informative.

In regards to number of instructor posts, the overall range of posts was from 0 - 9, with a mean of 2.08 (SD = 2.39), median of 1, and mode of 0. The number of instructor posts was equally distributed into categories of low, medium, and high ranges of 0 - 3, 4 - 6, and 7 - 9 respectively. A chi-squared goodness of fit was calculated to see if there was a significant difference within the distribution and was found to be significant, $X^2(2, N = 78) = 67.385$, $p < .001$, $w = .433$ (medium-large). Significantly more (.01 level) than expected discussion boards had relatively low numbers of instructor posts. Moreover, significantly less than expected discussion boards had medium or high numbers of instructor posts. The

chi-squared statistics for instructor posts in discussion boards excluding the introductory lesson and using three categories are presented in Table 3.25.

Table 3.25

Chi-squared: Instructor Posts, w/o Introductory Lesson (3 categories)

Count	***Observed***	%	***Expected***	***Residu***	***Standard R***	***Significanc***
0 to 3	60	76.9	26	34	6.668	.01 more
4 to 6	12	15.4	26	-14	-2.746	.01 less
7 to 9	6	7.7	26	-20	-3.922	.01 less
Total	78					

Because of high number of discussion boards without any instructor posts, a chi-squared goodness of fit was re-calculated, using four categories instead of three, where discussion boards with no instructor posts were separated into its own category. The analysis found that there was still a significant difference within the distribution, X^2 (3, N = 78) = 24.462, $p < .001$, w = .105 (small). Significantly more (.01 level) than expected discussion boards had no instructor posts. Moreover, significantly less (.01 level) than expected discussion boards had high numbers of instructor posts. The chi-squared statistics for instructor posts in discussion boards excluding the introductory lesson and using four categories are presented in Table 3.26.

Table 3.26

Chi-squared: Instructor Posts, w/o Introductory Lesson (4 categories)

Count	***Observed***	***Expected***	***Residual***	***Standard R***	***Significance***
0	33	19.5	13.5	3.057	.01 more
1 to 3	27	19.5	7.5	1.698	n.s.
4 to 6	12	19.5	-7.5	-1.698	n.s.
7 to 9	6	19.5	-13.5	-3.057	.01 less
Total	78				

The number of probing questions the teachers posted to the discussion boards ranged from 0 - 9, with a mean of 1.13 (SD = 1.9), median of 0, and mode of 0. The number of

instructor posts was equally distributed into categories of low, medium, and high ranges of 0 - 3, 4 - 6, and 7 - 9 respectively. A chi-squared goodness of fit was calculated to see if there was a significant difference within the distribution and was found to be significant, $X^2(2, N = 78) = 98.538$, $p < .001$, $w = .632$ (large). Significantly more than expected discussion boards had relatively low numbers of probing questions. Moreover, significantly less than expected discussion boards had medium or high numbers of probing questions posts. The chi-squared statistics for probing questions in discussion boards excluding the introductory lesson and using three categories are presented in Table 3.27.

Table 3.27

Chi-squared: Probing Questions w/o Introductory Lesson (3 category)

Count	***Observed***	%	***Expected***	***Residua***	***Standard R***	***Significance***
0 to 3	67	85.9	26	41	8.041	.01 more
4 to 6	10	12.8	26	-16	-3.138	.01 less
7 to 9	1	1.3	26	-25	-4.903	.01 less
Total	78					

Because of the high number of discussion boards without any probing questions, a chi-squared goodness of fit was re-calculated, using four categories instead of three. The discussion boards with no probing questions were separated into its own category and analysis found that there was still a significant difference within the distribution, $X^2 (3, N = 78) = 63.846$, $p < .001$, $w = .273$ (medium-small). Significantly more than expected discussion boards had no probing questions. Accordingly, significantly less than expected discussion boards had a high number of probing questions. The chi-squared statistics for probing questions in discussion boards excluding the introductory lesson and using four categories are presented in Table 3.28.

Table 3.28

Chi-squared: Probing Questions, w/o Introductory Lesson (4 category)

Count	*Observed*	%	*Expected*	*Residual*	*Standard R*	*Significance*
0	48	61.5	19.5	28.5	6.454	.01 more
1 to 3	19	24.4	19.5	-0.5	-0.113	n.s.
4 to 6	10	12.8	19.5	-9.5	-2.151	.01 less
7 to 9	1	1.3	19.5	-18.5	-4.189	.01 less
Total	78					

The timeliness of instructor responses to student posts ranged from no response to 123.23 hours, with a mean of 15.6 hours (SD = 25.31), median and mode of no response. Instructor response times were equally distributed into categories of no response, slow (83.11 – 123.23 hours), medium (42.97 – 83.10 hours), and fast (2.83 – 42.96 hours). A chi-squared goodness of fit test was calculated to see if there was a significant difference within the distribution and was found to be significant, X^2 (3, N = 78) = 56.462, p < .001, w = .241 (medium-small). Significantly more than expected discussion boards had no response and significantly fewer than expected discussion boards had a quicker response time. The chi-squared statistics for response time in discussion boards excluding the introductory lesson and including a category for no response are presented in Table 3.29.

Table 3.29

Chi-squared: Response Time, w/o Introductory Lesson (4 categories)

Count	*Observed*	%	*Expected*	*Residual*	*Standard R*	*Significance*
No response	46	59	19.5	26.5	6.001	.01 more
83.11 to 123.23	19	24.4	19.5	-0.5	-0.113	n.s.
42.97 to 83.10 hrs.	12	15.4	19.5	-7.5	-1.698	n.s.
2.83 to 42.96 hrs.	1	1.3	19.5	-18.5	-4.189	.01 less
Total	78					

Analysis for instructor response time was also recalculated excluding no response as a category. A chi-squared goodness of fit was calculated to see if there was a significant difference within the distribution and was found to be significant, $X^2(2, N = 78) = 15.438$, *p*

< .001, *w* =.241 (medium-low). Significantly more than expected discussion boards had a longer response time and significantly fewer than expected discussion boards had a quicker response time. This is the opposite of the results when the introductory discussion board was included. The chi-squared statistics for response time in discussion boards excluding the introductory lesson and excluding no response are presented in Table 3.30.

Table 3.30

Chi-squared: Response, w/o Intro Lesson (excluding no response)

Count	***Observed***		***Expected***	***Residual***	***Standard R***	***Significance***
83.11 to 123.23	19	59.4	10.7	8.3	2.537	.01 more
42.97 to 83.10 hrs.	12	37.5	10.7	1.3	0.397	n.s.
2.83 to 42.96 hrs.	1	3.1	10.7	-9.7	-2.965	.01 less
Total	32					

For the number of cognitive posts, the overall range of posts was from 8 – 158, with a mean of 51 (SD = 38.78), median of 36, and mode of 26. The number of cognitive posts was equally distributed into categories of low (8 – 58), medium (59 – 108), and high (109 - 158). A chi-squared goodness of fit was calculated to see if there was a significant difference within the distribution and was found to be significant, X^2 (3, N = 78) = 59.077, p < .001, w = .379 (medium-large). Significantly more than expected discussion boards had relatively low numbers of cognitive posts. Moreover, significantly less than expected discussion boards had medium or high numbers of cognitive posts. The chi-squared statistics for cognitive posts in discussion boards excluding the introductory lesson are presented in Table 3.31.

Table 3.31

Cognitive Posts (without introductory lesson)

Count	***Observed***	%	***Expected***	***Residual***	***Standard R***	***Significance***
8 to 58	58	74.4	26	32	6.276	.01 more
59 to 108	10	12.8	26	-16	-3.138	.01 less
109 to 158	10	12.8	26	-16	-3.138	.01 less
Total	78					

An ANOVA was calculated to identify if there was a significant difference between the instructors as measured by the Discussion Board Best Practices rubric. The Social Presence section was found to be significant, $F(3, 74) = 4.941$, $p = .004$. Effect size was measured by eta squared and found to be large (.167). A Games-Howell post hoc test revealed that the instructor (T3) who had less than five semesters teaching online and was teaching only one course online (M = 1.615, SD = .17) was significantly higher in Social Presence (M = 1.46, SD = .12) than the two instructors who were teaching multiple online sections; one of which was a relatively new instructor (fewer than five semesters teaching online: T1) and the other was a seasoned teacher (T4) with over five semesters online teaching experience (M = 1.43, SD = .11). The ANOVA source table is provided in Table 3.32.

Table 3.32

ANOVA: DB Social Presence by Instructor (w/o introductory lesson)

	SS	***df***	***MS***	***F***	***p***	η^2	**Effect size**
Between groups	.275	3	.092	4.941	.004	.167	Large
Within groups	1.372	74	.19				
Total	1.647	77					

An ANOVA was also calculated to identify if there was a significant difference between the instructors in the Discussion Board best Practices rubric Cognitive Presence

section and was found to be not significant, $F(3, 74) = .831$, $p = .481$. The effect size was medium-small ($\eta^2 = .03$). See Table 3.33 for the complete ANOVA source table.

Table 3.33

ANOVA: DB Cognitive Presence by Instructor (w/o introductory lesson)

	SS	***df***	***MS***	***F***	***p***	η^2	**Effect size**
Between groups	.191	3	.064	.831	.481	.03	Medium-small
Within groups	5.667	74	.077				
Total	5.858	77					

No significant difference was found between instructors in the discussion board rubric Teaching Presence section, $F(3, 74) = .831$, $p = .934$. The effect size was medium-small ($\eta^2 = .03$). See Table 3.34 for the complete ANOVA statistics.

Table 3.34

ANOVA: DB Teaching Presence by Instructor (w/o introductory lesson)

	SS	***df***	***MS***	***F***	***p***	η^2	**Effect size**
Between groups	.071	3	.024	.1Tabl	.934	.015	Small
Within groups	4.703	28	.168				
Total	4.774	31					

A chi-squared test of independence was calculated to determine if there was a significant difference between instructors in the number of discussion board posts and was found to be significant, $X^2(6, N = 78) = 47.682$, $p < .001$, Cramer's $V = .553$. It is interesting to note that between the two instructors who taught more than one section the instructor with less experience (less than 5 semesters of online teaching) had significantly more posts (.01 level, T1) while the seasoned online instructor (over 5 semesters of online instruction) had significantly less posts (.05 level, T2). See Table 3.35 for descriptive statistics for the chi-squared test of independence.

Table 3.35

Chi-squared Test of Independence: Number of Instructor Posts

Count	T1	T2	T3	T4	Total
0 to 3	N=2 (4.3%) .01 sig less	N=24 (52.2%) .05 sig more	N=11 (23.9%)	N=9 (19.6%)	N=46 (59%)
4 to 6	N=20 (82%) .01 sig more	N=0 .01 sig less	N=1 (4%)	N=4 (16%)	N=25 (32.1%)
7 to 9	N=4 (51%)	N=2 (28.6%)	N=1 (14.3%)	N=0	N=7 (9%)

A Kruskal Wallis test was also calculated to determine if there was a significant difference in the number of posts and was found to be significant, $X^2(3) = 37.97$, $p < .001$. A Tukey HSD post hoc test was calculated and confirmed that the difference was between T1 and T2.

In respects to the number of probing questions, s chi-squared test of independence was calculated to determine if there is a significant difference between instructors and was found to be significant, $X^2(6, N = 78) = 13.963$, $p = .03$, Cramer's V = .299. It is interesting to note the instructor with relatively little experience (less than 5 semesters) and teaching multiple online sections (T1) had significantly more probing questions (.05 level medium range) while the rest of the instructors had the lowest number of probing questions. See Table 3.36 for descriptive statistics for the chi-squared test of independence.

Table 3.36

Chi-squared Test of Independence: Number of Probing Questions

Count	T1	T2	T3	T4	Total
0 to 3	N=16 (61.5%)	N=24 (92.3%)	N=11 (84.6%)	N=11 (84.6%)	N=62 (79.5%)
4 to 6	N=10 (38.5%) 0.5 sig more	N=1 (3.8%)	N=2 (15.4%)	N=1(7.7%)	N=14 (17.9%)
7 to 9	N=0	N=1(3.8%)	N=0	N=1 (7.7%)	N= 7(9%)

Summary

The purpose of this study was to develop a rubric to assess the degree to which discussion boards utilize best practices and explore the correlation between the use of discussion board best practices and student satisfaction and perceived learning in online courses. In order to accomplish this, the study was conducted in two phases. The first phase of the study was the development of a rubric measuring the use of discussion board best practices. Practices were identified from the literature and classified into corresponding components of the Community of Inquiry framework: Cognitive Presence, Social Presence and Teaching Presence. Because the validation of Teaching Presence in the CoI framework revealed that teaching presence needed to be separated into "two factors—one related to course design and organization and the other related to instructor behavior during the course" (Arbaugh, et al., 2008, p. 133), a section on discussion board management practices was also incorporated into the rubric. Internal consistency of the rubric was measured via inter-item reliability and found to be acceptable for Cognitive Presence (Chronbach's alpha = .772), Teaching Presence (Chronbach's alpha = .7) and management (Chronbach's alpha = .618). A Chronbach alpha was unable to be calculated for Social Presence due to the limited variability of responses, partially due to the course design not implementing Social Presence best practices.

Construct validity for the discussion board rubric was founded on the research of proven best practices along with the TPACK and CoI theoretical framework. In addition, convergent validity was ascertained by correlating the discussion board rubric results with the student's perception of Cognitive Presence ($r = .371$, $p = .468$), Teaching Presence ($r = .956$, $p = .003$) and Social Presence ($r = 828$, $p = .042$), as measured by the CoI. Convergent validity was ascertained between the CoI and the discussion board rubric for Teaching

Presences and Social Presence. No correlation could be calculated for the management section of the rubric since the courses reviewed in this study utilized the same course design and therefore little variation between the sections (the standard deviation for three of the five measures were zero).

Applying the Discussion Board Best Practices rubric to the analytical thinking and moral judgment course revealed that some best practices were clearly present and others were not. With respect to Cognitive Presence, the most applied best practice was the selection of discussion board topics that related directly to the main curriculum (M = 2.86, SD = .56), followed by the use of prompts to initiate thinking and use of Socratic questioning in the discussion boards (M = 2.71, SD = .59 for both). The least applied best practice was the number of educationally valuable content posts per discussion board (M = 1.40, SD = .71).

In respects to Social Presence, three of the five measures reflect the standardized course design in that none of the course designs assigned students to small groups of 4-9 students, used students in the role of summarizer, or used students rather than the instructor as facilitator of the discussion board. However, all of the courses set ground rules for respectful behavior in the discussion board. With the exception of establishing ground rules for respectful behavior, the standard course design did not use best practices that encourage social presence as evidenced by the number of educationally valuable social posts on the discussion board (M = 1.12, SD = .45).

The course best practice most used in Teaching Presence was adequately preparing the students to participate with technology (M = 3, Md = 3, Mo = 3). It must be noted that the instructors did not post much to the discussion boards ($p < .001$, w = .86), nor did they ask many probing questions ($p < .001$, w = .93). In addition, 54% of the discussion boards did not have an instructor's response to the student posts (.01 significance level). However,

of the instructors who did respond, they did so predominantly within two days ($p < .001$, $w = .27$).

In respects to discussion board management best practices, assigning deadlines for student contribution and using easy navigation techniques were the most frequently used discussion board management techniques and were rated as high ($M = 3.00$, SD = 0 for both measures). However, it must be noted that outlining a rubric for discussion board assessment was the management technique least used in the course ($M = 1.71$, $SD = .96$).

Analysis of the course evaluations revealed that the students (56%) significantly ($p < .001$, $w = .08$) rated the course positively compared to other courses they had taken. In addition 56.6% indicated that they believed they had learned more in this course than other courses they had taken ($p < .001$, $w = .129$). It was interesting to note that there was no relationship between the amount of time it took for instructors to respond to student posts and student satisfaction with the course $X^2(3) = 3.054$, $p = .383$.

The second phase of the study utilized the discussion board rubric to explore the correlation between the use of discussion board best practices and student course satisfaction and perceived learning. A significant correlation was found in Cognitive Presence with both student satisfaction ($r = .862$, $p = .042$) and student perceived learning ($r = .943$, $p = .005$). The more Cognitive Presence discussion board best practices used, the more student perceived learning and satisfaction increased. Students were more satisfied ($r = .862$, $p = .042$) when the cognitive presence practices of selecting of discussion topics that relate directly to the students' main curriculum, using controversial topics in the discussion board to stimulate discussion, using prompts to initiate thinking, asking open ended questions where there may not be a correct answer or solution, and using Socratic questioning to enhance student's critical thinking skills, were used.

During the data collection period it was noted that the introductory discussion board usage was different from the rest of the semester, since the first posts focused primarily on establishing an online community in the course. To better understand the data, the introductory discussion board data were removed and the data was then re-analyzed. Statistical analysis revealed that significantly more discussion boards than should be expected by chance had low numbers of instructor posts (.01 level), probing questions (.01 level), cognitive posts (.01 level), and timeliness of instructor response (.01 level). All four of these results were driven primarily by discussion boards where the posts were absent, indicating that after the introductory lesson, the instructors were more absent from the discussion than should be expected by chance.

With respect to difference between the instructors in the use of discussion board best practice areas of Cognitive Presence, Social Presence and Teaching Presence, statistical analysis revealed the instructor (T3) who had less than five semesters teaching online and was teaching only one course online ($M = 1.615$, $SD = .17$) was significantly higher in Social Presence ($M = 1.46$, $SD = .12$) than the two instructors who were teaching multiple online sections; one of which was a relatively new instructor (fewer than five semesters teaching online: T1) and the other was a seasoned teacher (T4) with over five semesters online teaching experience ($M = 1.43$, $SD = .11$).

It was interesting to note that between the two instructors who taught more than one section, the instructor with less experience (less than 5 semesters of online teaching) had significantly more posts (.01 level, T1) while the seasoned online instructor (over 5 semesters of online instruction) had significantly less posts (.05 level, T2). In addition, this instructor with relatively little experience (less than 5 semesters) and teaching multiple

online sections (T1) had significantly more probing questions (.05 level medium range) while the rest of the instructors had few probing questions.

Implications for Practice

The first implication for practice is to provide professional development or incorporate other practices to encourage more instructor engagement in the discussion boards, as many of the indicators in this area show the instructors were significantly less involved in the course that should be expected by chance. Specifically, the number of instructor posts to discussion boards, the number of probing questions, and the timeliness of instructor response to other posts, all have room for improvement and can be part of instructor training.

Analysis of the discussion board rubric reveals there are many discussion board best practices that course designers and instructors should consider when designing and facilitating courses. Of the 20 items identified, eight scored as either medium use or below which leaves room for improvement. In particular, the university can encourage more use of practices to help students establish Social Presence in the course where three of the six rubrics score at the bottom of the scale. Specifically, they can encourage assigning students to small groups within the discussion board, assigning students the role of summarizer, and using students rather than instructors as discussion board facilitator.

BYU-Idaho can continue to use and develop the discussion board rubric. By doing this BYU-Idaho or other institutions can measure and refine what practices lead to genuine improvement in the quality of learning, thereby making this tool a standard for measuring effective learning in discussion boards.

The university should also continue to emphasize what it does well in terms of Cognitive Presence. By selecting discussion topics that relate directly to the students' main

curriculum, using prompts to initiate thinking, and using Socratic questioning to enhance student's critical thinking skills, the discussion boards appear to have had an impact on greater student satisfaction and perceived learning within the courses.

With regard to other institutions of higher learning that intend to use discussion boards as part of online or hybrid courses, they should consider using the discussion board rubric to assess effectiveness of course design and facilitation of instruction. It can be used as a guide to establish or measure effective practice.

Discussion

The purpose of the study was to examine the use of discussion board best practices and their relationship to student satisfaction and student perceived learning. A significant correlation was found in the Cognitive Presence section of the discussion board rubric for both student satisfaction ($r = .862$, $p = .042$) and student perceived learning ($r = .943$, $p = .005$) identifying that the more Cognitive Presence practices used, the more students perceived they learned in the course and found the course satisfying. This supports the continued use of Cognitive Presence practices in online courses.

The discussion board Cognitive Presence best practices of using controversial topics (Hew et al., 2010) and asking open ended questions (Hew et al., 2010) were used intermittently in the discussion boards ($M = 2.00$, $SD = .93$ and $M = 2.43$, $SD = .62$ respectively). Similarly, it was difficult to determine what effect the number of educationally valuable posts (Bliss & Lawrence, 2009) had on student satisfaction and perceived learning due to their relative low use in the discussion boards ($M = 1.40$, $SD = .71$).

With respect to Social Presence, students did not use the discussion board to communicate socially as evidenced by the relatively low use of discussion board

practices in the Social Presence category (M = 1.42, SD = .09). This suggests that course design and facilitation for the courses examined in the study, did not encourage a social environment by use of recommended best practices in this category. Despite this finding, students did perceive they learned a great deal more than in other college courses they had taken, and student course satisfaction was also significantly higher (.01 level) compared to other college courses they had taken. These findings could suggest that connectivism and social networks (Downes, 2007, Siemens, 2004) may not be as important as other research has asserted. The practices of assigning students to small groups (Berry, 2008; Bliss & Lawrence, 2009), assigning students to the role of summarizer (Hew et al., 2010), and using students rather than instructors as discussion board facilitators (Hew et al., 2010) were all not used in the discussion boards analyzed in this study (M = 1.00 and SD = 0 for all measures). The number of educationally valuable social posts (Bliss & Lawrence, 2009) to the discussion board were also infrequently present in the discussion boards (M = 1.12, SD = .45).

It must be noted that the degree to which the use of Teaching Presence affects student satisfaction and student perceived learning proved to be inconclusive (not significant) due to the apparent mixed use of these techniques in the discussion boards. For example, the use of probing questions (Sherer-Bassani, 2011) and number of instructor posts were low (M = 1.04, SD = .24 and M = 1.07, SD = .34 respectively), but timeliness of instructor response (Sahin, 2007) and adequately preparing students to participate in technology (Hew et al., 2010) were rated as medium and high (M = 2.38, SD = 1.31 and M = 3, SD = 0 respectively). With these mixed results, the effect of the practices for Instructor Presence on student satisfaction and student perceived learning is difficult to determine.

As it pertains to the relationship between the use of discussion board practices for Cognitive Presence, Social Presence, and Teaching Presence as measured by the discussion board rubric and the corresponding categories in the CoI framework, a significant correlation was found between the discussion board rubric scoring of Social Presence ($p = .042$) and Teaching Presence ($p = .003$) best practices with the student's perception of Teaching Presence in the online course.

However, it must be noted that no correlation was found between the discussion board rubric category for Cognitive Presence and the corresponding category within the Community of Inquiry framework. The reasons for this disconnect is unclear and merits further investigation.

In regards to the Teaching Presence category of the CoI framework, the discussion board rubric separated Teaching Presence into two categories--Teaching Presence and Discussion Board Management practices. The reasoning for this separation was to recognize the difference between facilitation of discussion boards and course setup. Best practices of number of instructor posts (Sherer-Bassani, 2011; Thompson, 2006), number of probing questions (Sherer-Bassani, 2011), timeliness of instructor responses (Sahin 2007), and adequately preparing students to participate in technology (Hew et al., 2010) are all related to facilitation that is unique for each course and discussion board and reflect facilitation more than course design. In contrast, best practices for assigning a grade or other incentive to discussion board participation (Hew et al., 2010; Thompson, 2006), outlining a rubric for discussion board assessment (Berry, 2008; Hew et al., 2010), clearly stating the purpose of the discussion board activity (Hew et al., 2010), assigning deadlines for student contribution (Hew et al., 2010; Thompson, 2006), and using easy navigation techniques. (Hew et al., 2010; Thompson, 2006) are all course design decisions and may or may not vary amongst

discussion boards or even courses. Therefore, these later practices should be studied and measured separately from course facilitation practices.

Conclusion

Limitations

This study was exploratory in nature. The discussion board practices rubric was developed as part the study, and therefore was not validated by prior research. In addition, the data was analyzed only for one semester, which means that preliminary findings could not be used to lead to stronger control of variables in the final study. This is a threat to internal validity inherent to studies conducted in professional practice.

The study was further limited because of the selection of data from one course with a common course design. This makes it harder to generalize research findings to other courses or other modes of online instruction. Related to this limitation is the finding that many of the measurements in the discussion board management sections were focused on course design and institutional policy decisions. This lead to some results that were identical for all discussion boards in the study. With no variation in some areas, data correlations or other relational measures could not be determined.

Moreover, another limitation to the study is inherent to professional practice doctorates which are conducted in practice rather than a more controlled experimental setting. This threatens the internal validity by introducing more variables that can affect the dependent variable other than the independent variable that is being measured.

Part of the study included reading discussion board posts from students. Due to institutional desire to protect student privacy and confidentiality, access for research was granted to fewer sections than requested. This made comparison of results and additional analysis more limited than desired.

One limitation or threat to validity of the results is that one researcher scored all the discussion boards. This leaves the data exposed to researcher bias in interpreting results. It also means that no inter-rater reliability procedures could be used to make the study more robust.

Moreover, there was no randomness in selection of participants or courses. This also exposes the results to the threat of bias in participant selection. For example, because of the non-random selection of a capstone course, the participants were all junior and senior level students. This biases findings away from underclass and non-traditional students and makes findings more difficult to generalize to all students. Similarly, the selection of a philosophical course focused on analytical thinking and moral judgment can bias the results as compared to other types of courses.

Another limitation to the study is that it was conducted at one institution which is limited geographically and demographically. The institution is in a rural, inland community in the Northwestern United States. It is located several hundred miles from any major metropolitan area. In addition, the institution has a religious affiliation which leads to a more homogenous student body. These limitations can affect the external validity of the research and make it less generalizable to other student experiences or populations.

Recommendations for Future Research

A potential for future research for discussion boards and online learning in general is to revise the Community of Inquiry framework to separate the Teaching Presence category into course design and facilitation sections. While online course design decisions can and often are made by instructors, they are also often heavily influenced by institutional policy, instructional design professionals, and the capability of the instructional software. Furthermore, the instructor who influences the design of a course is not always the same

instructor that facilitates a discussion board or a course. Separately measuring and analyzing course design from course facilitation might better identify which techniques and practices can most improve discussion boards and courses.

Conducting an experimental research project with a control group and experimental group in order to determine the effect of professional development on discussion board best practices and course outcomes would be enlightening. Prior to collecting data, in-service training for instructors which reviews all of the recommended discussion board best practices would be helpful. A particular focus could be placed on use of discussion board metrics that were seldom used in the course design related to this study. For example, courses in this study did not use small student groups or student facilitation in the discussion boards. It would be interesting to observe how implementation of these best practices might affect course outcomes. By using a control group and an experimental group, results from the two groups could be compared to more clearly identify the impact of the practices being emphasized and studied.

Future research could implement procedures that make the data more anonymous to the researchers, thereby enhancing confidentiality for both students and instructors and reducing institutional risk for privacy. This could lead to more extensive data sets, thereby strengthening the value of results. Involving more than one researcher in rubric scoring could also reduce researcher bias. If more than one researcher is involved in recording results, researchers could be trained in scoring of the rubric and conduct other procedures to strengthen inter-rater reliability.

In addition, research on discussion board practices should be expanded to more courses, including courses that place varying degrees of emphasis on discussion boards. Courses that include students early in their academic career should be included. Where possible, research internal validity of research could be enhanced by randomly selecting

courses and student participants. Likewise, future research could be expanded to multiple and diverse institutions thereby enhancing external validity of any findings.

Discussion board best practice measures for educationally valuable posts and socially valuable posts require detailed analysis in order to score them for the rubric. This detailed analysis is quite time-consuming to conduct; therefore, future research may consider separating these measures into their own study. The reasoning for this is because to score these sections of the rubric, researchers have to read each post in detail. Others that were also time consuming to measure and could potentially be eliminated from future research are practices for counting umber of probing questions and number of Socratic questions. With fewer time-consuming metrics to score, the number of research results could be substantially increased. Separate studies focusing specifically on these time-consuming measures could be conducted.

Another study could investigate technological solutions that can be incorporated into the online learning management system which can record data such as number of instructor posts, and timeliness of instructor response thereby allowing this data to be easily analyzed for large data sets, or all courses at a given institution.

Future research could examine potential reasons for the discussion board rubric not correlating to the CoI framework in the area of Cognitive Presence. Resulting changes could enhance the validity of the rubric.

Another way to enhance the value of findings and lead to improved courses is to measure the use of practices in the discussion board rubric against other factors that indicate quality instruction or student achievement. Examples of these measures could include instructor ratings (by students, self-evaluations and by other instructors), grades, graduation rates, acceptance to graduate schools, employment rates, and measures of future employer satisfaction.

Significance of the Study

With the continued and prospective growth of online courses in higher education and the use of discussion boards as a prevalent instructional activity within those courses, it is important to evaluate and improve course design and instructional techniques. Online instruction and related pedagogy is relatively new compared to decades or even centuries of development of more traditional education. By creating a rubric to evaluate the use of discussion boards, educators can more easily identify areas that need improvement. This could lead to better design of courses and improved instructional techniques within those courses.

Using the discussion board rubric to improve discussion boards can address the concern of stakeholders that discussion boards are "… often shallow, with students often saying they like something they read and others agreeing" (R. Eaton, personal communication, May 13, 2013). The discussion board rubric builds on constructivist principles and the CoI and TPACK frameworks to identify which practices educators can focus on to improve online courses.

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Chapter 4: Strategies for Enhancing Discussion Board Effectiveness and Building Community in Online Courses

Overview

What can be done to improve the quality of online education? How can instructors and students effectively build community in an online setting? What instructional techniques prove most helpful when working in a distance education setting? How are educational practices being used and how do students feel about what they experience in online settings? These are questions that are increasingly being posed by instructors and administrators in higher education today.

Despite rapid growth in online learning, students and faculty remain skeptical about the quality of instruction. Recent studies show that some graduate psychology and counseling students still significantly prefer face-to-face teaching over online and hybrid courses (Taylor & Huang, 2010). In addition, over two-thirds of faculty at American universities expressed the opinion that they did not accept the value or legitimacy of online learning (Allen & Seaman, 2013).

This skepticism comes amid findings that online learning is used extensively and is expected to grow significantly in the near future. Online course enrollments have grown steadily since 2005 (Bolliger & Wasilik, 2009). A survey conducted in 2012 revealed that 32%, or nearly seven million students in the United States were enrolled in online courses (Allen & Seaman, 2013). Moreover, a 2011 survey of college presidents, reports that they expect within a decade, most college students will be enrolled in online courses (Parker, Lenhart, & Moore, 2011). The growth of enrollment in online courses exceeds that of traditional higher education (Allen & Seaman, 2013; Harrington & Loffredo, 2010).

Why the projected growth amid skepticism about quality? Perhaps one answer is that online programs can be less expensive and offer more flexibility for students. Research indicates that students prefer online classes due to convenience, enjoyment of computer technology, and interest in innovation (Harrington & Loffredo, 2010).

Online education provides opportunities to a student population that has not traditionally had access to higher education. In addition, it expands the modes of delivery of education to students who do have access to higher education. This concept paper explores how to deliver effective online education to these student populations. For example, in September 2009 BYU-Idaho began offering a distance education program. The program was designed for students who cannot or choose not to attend classes on campus, but still value the opportunities provided by higher education.

Increasing enrollments, in this and similar programs, accompanied by a persistent questioning of the quality of online education, justify examining ways to promote quality while accommodating increasing growth. This demand for rigorous quality is more than just an institutional goal. It is also reflected in accrediting standards which require:

> … integrated course of study that helps students develop the breadth and depth of intellect to become more effective learners and to prepare them for a productive life of work, citizenship, and personal fulfillment. … The institution demonstrates that … degree programs … have identifiable and assessable learning outcomes that are stated in relation to the institution's mission and learning outcomes for those programs. Accreditation Standards (NWCCU 2.C.9 - 2.C.10, 2012)

The demand for increased quality combined with rapid growth in online enrollment creates an acute need for increased training of instructors and other architects of online

education. Instructors need to be trained not only on the technicalities of teaching, but also informed about online teaching pedagogy. Furthermore, it is important for online course designers and online program administrators to understand what tools and resources need to be made available in order for instructors to create, and students to engage in, a positive online learning environment.

Creating a positive online environment can be promoted by focusing on course design, pedagogy employed by the instructor, and characteristics of students and instructors. Through instructor evaluation and professional development, online courses can be improved.

In order to promote quality online education it is important to explore the relationship between an instructor's self-confidence or self-efficacy and his/her ability to create an environment that leads to satisfied and well educated students. Self-efficacy theory (Bandura, 2005) relates to how instructors perform in the online environment since teacher's with high self-efficacy have been found to correlate with increased student learning, student test scores, student motivation, and student achievement (Goddard et al., 2000; Henson, 2001). However, while these findings are consistent across a broad range of demographics, they are limited to the face-to-face classroom. Investigation of teacher self-efficacy in specific areas of online pedagogy and it's correlation to student satisfaction in the online environment is needed in order to develop effective professional development training. This will then provide students with quality online educational experiences.

Since the use of discussion boards are often a prominent component of online instruction (Chaudry, 2009) it is important to identify and measure how discussion board best practices are employed in online courses and its relationship to student satisfaction in the course and student perception of how much they learned. This will enable appropriate professional

development to occur which will enhance the online instructor's self-efficacy and increase student engagement and learning in the online environment.

Background

There are many potential lenses in which to view online education. This research submits that online learning has constructivism at its foundation with social cognitive theory, connectivism, andragogy (theory of adult learning), and self-efficacy as important components of the online learning environment. The concept of connectivism is an important part of the facilitation of online learning and how discussion boards work. Through discussion boards, students work together to construct and deepen their knowledge in an online environment. Self-efficacy theory suggests that individuals will engage in an activity if they believe in their ability to perform the activity (efficacy expectations) and believe their efforts will be rewarded (outcome expectations). Self-efficacy theory has implications for andragogy (theory of adult learning) in that the elements influencing adult learners is the tendency to draw from past experiences, self-directed learning, internal motivation, and a readiness to learn (Chan, 2010).

Connectivism is a learning theory that describes knowledge acquisition as a network of nodes where it is more important to know-where than to know-what or know-how (Siemens, 2004). It is an emerging learning theory that builds upon efficacy expectations. Connectivism and social learning theories all interweave components of self-directedness, experiential learning, along with adult learning and social learning (social cognitive theory). This theory aligns with the concepts of constructivism and social cognitive theory by positing that knowledge is constructed through social networks. The foundation behind constructivism is that knowledge is constructed through experience and social interaction.

People learn from putting things into relationships and through social interactions (Kammi, 1984). Social interactions are very important in online courses since it is a way to build community and construct meaning (Shea et al., 2010). Constructivism can be viewed as a way to make meaning out of knowledge and reality that exist, independent of the individual, rather than something that develops only within an individual. This is an important distinction because it means humans are all in the process of constructing and approaching a reality and truth that is constant, external to the individual, rather than constructing an internal knowledge that is independent, and therefore, different from all others.

This theoretical framework relates to online instruction since it encourages students to construct knowledge, often through discussion board dialogue that helps students describe, clarify, interpret, and understand truth. This unites the ontology of realism, objectivist epistemology, and post-positivist theoretical perspective with constructivist learning theories. These constructivist theories are models that incorporate the real world dynamics of how individuals learn.

Connectivism correlates with the learning format of online discussion boards, for students who actively engage in discussion boards, learn how to find answers to questions they do not understand more than memorizing what the answer is or how to perform a particular task. In addition, the social component of connectivism indicates that an increase in social presence in online discussion boards leads to increased student motivation in the course (Tao, 2009). This is important as motivation is critical for success in school and life. Unfortunately, a recent study in Northern Idaho revealed a lack of intrinsic motivation in junior and senior high school students (O'Brien, Taylor, & Gathercoal, 2013).

These learning and behavior theories relate to online discussion boards. For example, if students believe they will learn through engaging in online discussion boards and they believe their learning will be rewarded by an outcome they value, students will engage in meaningful discussion board dialogue. This will increase the student's understanding and knowledge of the course material.

Framework of Online Instruction and Assessment

The information teachers need to effectively teach with technology has previously been conceptualized in terms of the Technological Pedagogical Content Knowledge (TPACK) model (Koehler & Mishra, 2005; Schmidt et al., 2009). According to this framework, technological knowledge refers to knowledge about various technologies such as the Internet, interactive whiteboards, and software programs while content knowledge refers to knowledge about course subject matter. Pedagogical knowledge is defined as the "methods and processes of teaching," which includes assessment, student learning, and classroom management techniques (Schmidt et al., 2009). The application of the TPACK framework as a lens to understand online learning and discussion boards is important. When evaluating online instruction, there is value in searching for indicators that represent the interaction between pedagogical knowledge, content knowledge, and technological knowledge (Oster-Levinz & Klieger, 2010). These are useful criteria particularly when assessing the content and design of a course. By examining components of discussion boards in context of pedagogy, content and technology, researchers can better holistically assess the quality of discussion board activities.

A useful depiction of the TPACK framework can be found in Figure 4.1

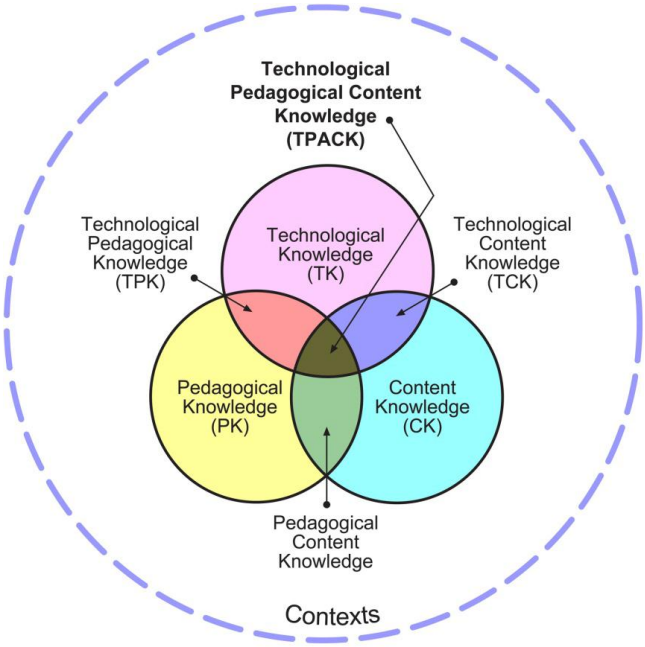

Figure 4.1. *TPACK diagram (Koehler & Mishra, 2009. p. 63)*

It is important to note that while TPACK examines knowledge in these three domains, it does not measure self-efficacy. Instructors' self-efficacy in online teaching is influenced by confidence in online pedagogies, technology, and subject matter. It must be noted that self- efficacy is context-specific, and may be high in one area and low in another (Bandura, 2005; Tschannen-Moran & Woolfolk-Hoy, 2001). For example, an online learning instructor may have high self-efficacy in terms of subject matter, but low self-efficacy in terms of online teaching pedagogy and technology.

A correlation has been found between high teacher technological self-efficacy and years of experience in teaching online, as well as pedagogical training in the use of technology (Lee & Tsai, 2010). However, no known correlation between teacher self-efficacy has been found in respects to content, activities or subject matter (Bandura, 1997; Tschannen-Moran & Woolfolk- Hoy, 2001). Research indicates that when instructors

believe they have subject matter expertise, as well as competence in the use of technology and in online instruction pedagogy there is increased student satisfaction (Sahin, 2007).

Figure 4.2 depicts the relationship of self-efficacy with the three domains of the online instructor. It should be noted that although Online Instruction Pedagogy is found at the top of the circle, this does not suggest that one aspect of self-efficacy is more important than another.

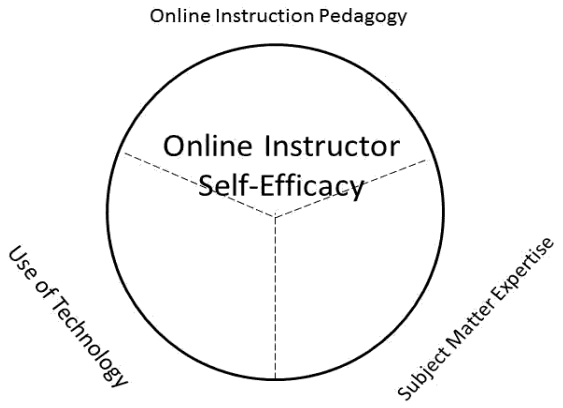

Figure 5.2. *Constructs of Online Instructor Self-Efficacy (Carter, Hochstrasser, Huber, & Yadon, 2013)*

The theoretical ideas of realism, constructivism, social cognitive theory, and connectivism represent the foundation of best practices of online instruction. Therefore, when developing an assessment to measure the effectiveness of online instruction the constructivist principles found in TPACK provided an appropriate framework for the Community of Inquiry (CoI). However, research revealed that student social engagement in the instruction, (identified as social presence), was also important aspect of the online learning experience (Garrison, Andersen & Archer, 1999). In the CoI model Social Presence is described as, "the ability of participants in the Community of Inquiry to project their

personal characteristics into the community, thereby presenting themselves to the other participants as 'real people'' (Garrison, Andersen & Archer, 1999, p. 89).

TPACK and the CoI have similar constructs but different titles for each domain. This is because TPACK assesses the instructor's knowledge, while the CoI is assesses how much is present in the online classroom. For example, in the cognitive dimension of teaching and learning, TPACK uses the term Content Knowledge, while the CoI uses the term Cognitive Presence. Accordingly, TPACK uses the term Pedagogy Knowledge when referring to the amount of pedagogical knowledge the instructor has, while the CoI uses the term Teaching Presence in order to assess the amount of influence and presence the teacher has in an online course.

Cognitive Presence is the ability of students to use discourse and reflection to construct meaning (Garrison & Arbaugh, 2007). It is a process whereby meaning and understanding are constructed. Online cognitive presence progresses through four cyclical stages beginning with a triggering event, then moving onto exploration, integration and resolution (Shea et al., 2010).

Teaching presence is the instructional design and organization, facilitation of productive discourse, and direct instruction developed in online courses (Shea et al., 2010). It gives direction to the educational experience and uses Social Presence and Cognitive Presence together to help students learn (Bartruf & Headley, 2009). Teaching Presence overlaps with technology, pedagogy, content and social elements of an online course and is at the heart of effective discussion boards. It must be noted that when the CoI was validated; the results suggested that Teaching Presence be separated into "two factors—one related to

course design and organization and the other related to instructor behavior during the course" (Arbaugh, et al., 2008, p. 133).

The social presence construct in the CoI model attempts to understand how students engage in online learning, especially in asynchronous communication (Shea et al., 2010; Garrison, Anderson, & Archer, 1999). Social Presence changes an online course from a prescribed learning experience into a learning environment.

The effective face-to-face teaching practices (as identified through TPACK) of Content Knowledge, teaching practices (Pedagogical Knowledge) along with Social Presence (which has been identified as an important aspect in online courses) create the core concepts of the Community of Inquiry framework (Social Presence, Teaching Presence, and Cognitive Presence). Figure 4.3 depicts the Community of Inquiry model, which describes the relationship of Teaching Presence, Social Presence, and Cognitive Presence in the online classroom.

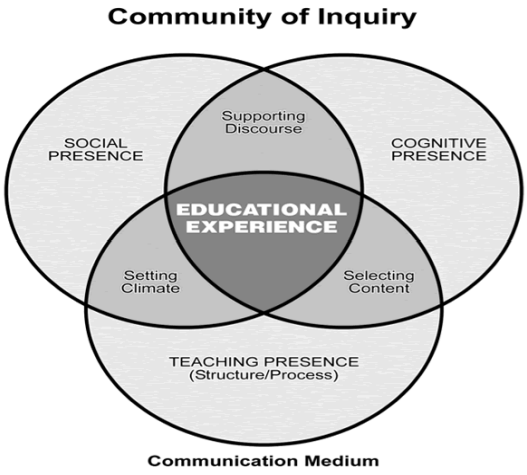

Figure 6.3 - *Community of Inquiry Model from "Critical inquiry in a text-based environment: Computer conferencing in higher education," by D. R. Garrison, T. Anderson, and W. Archer, 2000, The Internet and Higher Education, 2(2-3), p. 87-105.*

The CoI is commonly used to assess the effectiveness of online instruction. Therefore, it is not surprising that when developing a rubric to measure the effectiveness of discussion boards it was developed and categorized within the CoI framework. While there are many rubrics to assess student usage of discussion boards and for grading discussion boards there is no known rubric for assessing the effectiveness of discussion boards and usage of research based best practices. In addition there is no known studies of teacher self efficacy in online instruction and student evaluations of the course. More research in needed in these areas in order to hire and train the most effective online instructors and to provide students with quality online learning experiences.

Studies on Online Teaching

Exploratory studies were designed to determine the correlation of instructor self-efficacy and student satisfaction, along with the use of best practices in the development of discussion boards and the correlation of discussion board best practices with student satisfaction in the course. These studies were conducted with remote instructors currently teaching online for Brigham Young University – Idaho (BYU-I). The nature of the surveys did not require identifying students or instructors individually. The data was analyzed in aggregate. To help protect the identity of instructors and enhance their comfort with taking the survey, all instructors were assigned a participant number. This participant number was used to link instructors to the course satisfaction results.

In addition the use of discussion board best practices and relationships with student satisfaction and student perceived learning was investigated. Six of 31sections (22.6%) of FDCNC 350: Analytical Thinking and Moral Judgment for Fall 2013 were analyzed. The

course description found in the BYU-Idaho course catalogue describes this course as the following:

> In this course students will learn how to make difficult decisions well. They will apply analytical thinking and moral judgment to problems with no easy solutions. Students will learn to identify important factors to consider, understand and articulate opposing viewpoints, analyze factual claims for accuracy, spot logical weaknesses in arguments, anticipate consequences of possible solutions, and think strategically. They will also discover how writing and preparing to present substantive positions can further sharpen their analytical skills. (BYU-Idaho, 2013)

This course is a capstone course taken by junior and senior level students at the end of their foundation (general education) courses. The design for this course is standard for all online sections of the course. The role of the instructor is as a facilitator with little adaptation of course from section to section. Each course contains 14 discussion boards which are weekly discussions. Half of the discussion boards were graded for participation.

The researcher developed a rubric of discussion board best practices, coded 15 of the 20 measures into categories of low, medium, or high use of the discussion board practice. Four of the remaining five categories counted different classifications of discussion board posts. The final discussion board measure was calculated as the time between instructor response and the time of the original post. This measure was represented in terms of hours.

Research was conducted following approval of the Institutional Review Board (IRB) from both BYU-I and the University of Idaho. IRB approvals can be found in Appendices D, E, H and I. The researchers were trained and followed the general ethical principles and code of conduct of the American Psychological Foundation (APA, 2010, pp. 5-7) and completed certification from the National Institutes of Health.

Assessments

Four assessments were used to gather information for these studies; a measure of the online instructors' self efficacy (OISS), BYU-Idaho student course evaluations, a measure of the student's perception of the teacher's presence in the online course, their learning (cognitive presence) and sense of community in the course (as measured by the CoI), along with a rubric to analyze the amount of implementation of discussion board best practices in the design of the course.

Online Instructor Self efficacy Survey (OISS)

To measure the instructor's self-efficacy in teaching online a merging of multiple self-efficacy assessments were combined to create the Online Instructor Self-efficacy Survey (OISS). It combined questions from: the Online Educator Self-Efficacy Scale (Hung & Blomeyer, 2012), a Self-efficacy Instrument (Lee, 2003), the Online Technologies Self-Efficacy Scale (Miltiadou & Yu, 2000), and the Teacher Efficacy Construct (Tschannen-Moran & Woolfolk-Hoy, 2001). The OISS contained 38 questions designed to assess the self-efficacy of online teachers' pedagogical skills, technological skills, and subject matter expertise. It used a semantic differential scale, ranging from 1 (very confident) to 4 (not confident at all). It also included two open-ended questions for each of the three categories, allowing instructors to elaborate on what added to or diminished their confidence. See Appendix B for the complete instrument. It should be noted that while elements of the OISS were identified in TPACK, the OISS was not designed to mirror TPACK. The focus of the OISS was to assess self- efficacy, and therefore the questions in the survey separate application of technology skills from other pedagogical techniques, whereas in the TPACK, all pedagogy is in one category. The OISS design allowed researchers to combine

understanding and application of technology into one category, and separate application of technological knowledge from other elements of pedagogy.

BYU-Idaho Course Evaluation

The second instrument used was the BYU-Idaho Course Evaluation, administered to students at the end of each semester for all courses at BYU-I. This survey contained 43 questions about each student's performance and expectations in the class, as well as perceptions of the course and instructor. It used a five point rating scale about student satisfaction for the course in relation to other college courses the student had taken. Only a few specific questions from this survey were used in the studies. The course evaluation used in this study has been administered at BYU-Idaho since 2008.

Discussion Board Best Practices Rubric

The discussion board rubric measures the use of 20 specific discussion board practices divided into categories corresponding to the CoI. The 20 items were classified into one of four categories: Cognitive Presence, Social Presence, Teaching Presence, and Discussion Board Management. Cognitive Presence included practices that focused students on course subject matter or the knowledge base that is learned in the course. Social Presence practices encompass those that help foster community and facilitate student connection to the course thereby allowing for deeper learning. Teaching Presence consists of the practices where teachers prepare materials and facilitate situations that challenge students and encourage deeper learning. Practices were also separated into a fourth category, titled Discussion Board Management practices, which included practices that set a foundation, either technical or administrative, that allowed the other three areas to function as designed. Fifteen of the 20 measures used in the rubric were recorded using a categorical scale of high,

medium or low use of the specific practice, with clear definition of the classifications. The remaining five measures were recorded on a continuous scale.

Community of Inquiry Survey (CoI)

The last instrument used was the Community of Inquiry Survey. This survey contains 34 questions categorized into Cognitive Presence, Social Presence, and Teaching Presence. The Community of Inquiry framework and instrument have been extensively developed, researched, and applied (Arbaugh, et al., 2008; Bartruf & Headley, 2009; Boston, et al., 2009; Garrison, Anderson & Archer, 1999; Garrison & Arbaugh, 2007; Shea, 2009; Shea, et al., 2010; Swan, 2002). More specifically, the CoI was validated in a multi-institutional study designed for that purpose (Arbaugh, et al., 2008). The results for the construct of Teaching Presence revealed that this construct should be separated into "two factors—one related to course design and organization and the other related to instructor behavior during the course" (Arbaugh, et al., 2008, p. 133).

New Instrument Validation

Two new assessments were developed for these studies: the Online Instructor Self-Efficacy Survey (OISS) and the Discussion Board Best Practices Rubric. In order to ascertain the veracity of assessment results the reliability and validity of an assessment must be investigated.

Online Instructor Self-Efficacy Survey (OISS)

Construct validity for the OISS originates from the four assessments that were combined to create the OISS, namely: the Online Educator Self-Efficacy Scale (Hung & Blomeyer, 2012), a Self-efficacy Instrument (Lee, 2003), the Online Technologies Self-Efficacy Scale (Miltiadou & Yu, 2000), and the Teacher Efficacy Construct (Tschannen-

Moran & Woolfolk-Hoy, 2001). To improve the validity of the OISS, ten Caucasian professionals (male = 8; female = 2) between the ages of 28 and 43 were asked to review and critique the OISS. Eight (80%) agreed to critique the OISS. Two of the professional reviewers held Ph.Ds in Instructional Design and six held Masters Degrees. All were either directors in Research and Development (n = 3) or managers of online instructors at BYU-I (n = 5). All reviewers were either from BYU-Idaho's Research and Development team or Online Course Improvement Department, and routinely develop and administer BYU-I assessments and were all stakeholders in this research project.

The participants were asked for specific feedback on improving the instrument from a research and development perspective, as well as from the viewpoint of stakeholders. As a result the original two open-ended questions that were at the end of each category of the OISS were reduced to one open-ended question asking about the biggest impact on the instructor's feelings of confidence in the specific topic of the section. In addition, the demographic survey was changed to require instructors to select one primary course and teaching area, rather than allowing them to check multiple boxes. The revised survey also requested instructors to reflect on their own confidence levels, regardless of course design, class size, and other variable factors. Other minor changes to wording, punctuation, and grammar improved overall clarity. Ninety-five percent of the instructors (n = 251) completed the assessment. Inter-item reliability was measured by Cronbach's alpha and found to be high (.87).

Discussion Board Best Practices Rubric

It was necessary to develop a rubric to assess the extent to which the architecture and administration of discussion boards reflect known best practices. This is important because

many students have and will continue to be part of purely online or hybrid higher education courses.

A rubric of twenty measures of researched based discussion board best practices was developed to assess the effectiveness of discussion boards in online classes. The discussion board rubric arranged the components using the CoI and TPACK models classifying the 20 items into one of four categories: Cognitive Presence, Social Presence, Teaching Presence, and Discussion Board Management. Three of the four categories corresponded to the Community of Inquiry framework. In addition, practices were also separated into a fourth category, titled Discussion Board Management, which included practices that set a foundation, either technical or administrative to allow the other three areas to be implemented effectively. Construct validity and reliability information is provided below for each category of the Discussion Board Best Practices rubric.

Cognitive Presence. Cognitive Presence measures are those that relate to the subject matter and focus on the content students should acquire in a course. Discussion Board best practices in this category include:

1. Selection of discussion topics that relate directly to the students' main curriculum (Hew, Cheung & Ng, 2009).
2. Use of controversial topics in the discussion board to stimulate discussion (Hew et al., 2010).
3. Use of note starters or prompts to initiate thinking (Hew et al., 2010; Thompson, 2006).
4. Asking open ended questions where there may not be a correct answer or solution (Hew et al., 2010).

5. Number of educationally valuable content posts per discussion board (Bliss & Lawrence, 2009).
6. Use of Socratic questioning to enhance student's critical thinking skills (Berry, 2008; Hew et al., 2010).

The internal consistency of an assessment may be measured by split-half or inter-item reliability. Split half reliability for Cognitive Presence was calculated via Spearman-Brown (.733) and found to be acceptable. Inter item reliability was measured by Cronbach's alpha (.772) and found to be acceptable. DeVellis (1991) indicates that a Chronbach alpha between .70 and .80 is respectable.

Social Presence. Social Presence practices are those that encourage establishing a learning community and strengthen relationships between instructors and students within a course. The best practices related to social presence in a course include:

7. Number of educationally valuable social posts per discussion board (Bliss & Lawrence, 2009).
8. Use of ground rules addressing respectful behavior in the discussion board (Hew et al., 2010).
9. Assigning students to groups of 4-9 students (Berry, 2008; Bliss & Lawrence, 2009),
10. Assignment of students to the role of summarizer (Hew et al., 2010).
11. Use of a student rather than an instructor as discussion board facilitator. (Hew et al., 2010).

Due to the number of measures in this scale having zero variance, the reliability of this domain was not able to be calculated. This is a result of the course design which was identical for all of the selected sessions.

Teaching Presence. Teaching Presence best practices outline how instructors can encourage students to engage more completely in a course. Discussion board best practices in this category include:

12. Number of instructor posts to a discussion board (Sherer-Bassani, 2011; Thompson, 2006).
13. Measurement of the number of probing questions posed by the instructor per discussion board. (Sherer-Bassani, 2011).
14. Measure of the timeliness of instructor posts to student responses.
15. Adequately preparing students to participate with technology (Hew et al., 2010).

Inter item reliability of Teaching Presence was measured by Cronbach's alpha (.699). DeVellis (1991) indicates that a Chronbach alpha between .70 and .80 is respectable.

Discussion Board Management. Discussion Board Management best practices focus on course design and administrations. Practices in this domain include:

16. Assigning a grade or other incentive to discussion board participation (Hew et al., 2010; Thompson, 2006).
17. Outline a rubric for discussion board assessment (Berry, 2008; Hew et al., 2010).
18. Clearly stating the purpose of the discussion board activity (Hew et al., 2010).
19. Assigning deadlines for student contribution (Hew et al., 2010; Thompson, 2006).
20. Use of easy navigation techniques (Hew et al., 2010; Thompson, 2006).

Inter item reliability of the Discussion Board Management scale was measured by Cronbach's alpha (.618). Inter item reliability of the complete Discussion Board Rubric was measured by Cronbach's alpha (.533).

Data Collection

The Qualtrics survey software was used to collect data. Prior to this research, data collection was in place for the student satisfaction measures, since each semester BYU- I administers a student survey for every course. Participants were given the option to take the surveys and informed consent to have their responses used for research was obtained.

Data Analysis

The Statistical Package for the Social Sciences (SPSS) and Excel were used to analyze the data. It must be noted that in the self-efficacy and student satisfaction study 44% of the instructors taught classes in a Pathway program, a year-long program of general study skills and academic start courses designed to help non-matriculated students become college-ready. Because these are not traditional courses or traditional students, an analysis was conducted both with and without their data.

Moreover, in the discussion board study it was discovered that the first assignment on the discussion board had unique characteristics that were not common to the rest of the discussion boards. Therefore the data was analyzed with and without the first assignment in order to more accurately understand discussion board practices.

Teacher Self efficacy and Student Satisfaction Study

A study was conducted in Fall 2013 to ascertain the relationship between online instructor self-efficacy and student satisfaction in the course. All 486 instructors teaching online at BYU-I in the 2013 Fall Semester were invited to participate in the study by

completing the OISS prior to students completing the end-of-semester surveys. All students enrolled in online courses at BYU-I during the Fall 2013 semester (n = 18,336) were invited to complete the end of semester course evaluation.

From the total online instructor population, 265 instructors (54.5%) completed the survey. Of those responding, 50.6% were female and 49.4% were male. In respects to online teaching experience, 24.5% were teaching their first online course, 8.7% had taught 1-2 semesters, 31.7% had taught 3-5 semesters and 35% had taught over five semesters. In addition, 27% of the instructors had taught online for other universities. Of those, 13.9% had one or two semesters of experience teaching online at other universities, ten (13.9%) had three to five semesters of experience, and the remaining 72.2% had over five semesters (n = 52) of experience teaching online at other universities.

Pathway Instructors

Because the population of Pathway students was markedly different than traditional college students, the analysis was split into three datasets: one including all responses (All Instructors), another with only Pathway students (Pathway), and the last with non-Pathway students (Non-Pathway). The majority of instructors (n = 168) taught non-Pathway courses (63.4%), followed by 117 instructors (44.2%) who taught Pathway courses. Some overlap existed, since 20 instructors taught both Pathway and non-Pathway courses.

Students

Survey responses were collected from 18,336 online students. However, since only 54.5% of instructors responded to the OISS, only 9,179 student responses could be utilized in this analysis. Females accounted for 66.5% of the population (n = 6,102), and 33.5% were male (n = 3,077).

Freshmen represented 16.3% of the student participants (n = 1,492); 17.8% of the students were sophomores (n = 1,637); 15.5% were juniors (n = 1,419); and 17.3% were seniors (n = 1,592). The remaining third of the students, 33.1%, were not matriculated into BYU-Idaho (n = 3,039). These were students enrolled in the Pathway program.

Students who completed the survey were taking courses in a variety of areas, with the largest category of students (42.4%) taking General Education courses (n = 3,890). Students who were taking courses in their major accounted for 30.2% of the students (n = 2,774), while 4.4% of the students were enrolled in online courses for their minor (n = 403), and 5.6% of the students completed the survey as part of an elective online course (n = 510). The remaining students were either categorized their course as "other" (16.2%; n = 1,490) or did not identify a category for their course (1.2%; n = 112).

Instructor Self Efficacy Study Summary

This study explored the relationship between instructor self-efficacy and student satisfaction for online courses from end-of-semester student evaluations. Specifically, instructor self- efficacy in online teaching was examined in terms of the instructor's confidence in online teaching pedagogy, use of technology, and subject matter expertise. A significant correlation was found with the Pathway students (p = .046), identifying that the more confident an instructor was in his or her technological skills, the lower the Pathway student's satisfaction was with the course.

In addition, Pathway students rated the courses significantly (.01 level) higher than the matriculated students, (especially the upperclassmen). Pathways students reported feeling they had learned significantly more from their online course than other courses they had taken (21.1%) and were more satisfied with their online course than other courses they

had taken (21.9%). It must be noted that Pathway is a special BYU-I program targeted toward individuals who are not traditional students and who have an opportunity they would not otherwise have expected. It is possible that because they have been excluded from the traditional college path, they value it more highly than traditional students. Overall, the scores of Pathway students for satisfaction have historically been higher than traditional university students (Routson, 2013). Higher satisfaction ratings might also be attributed to the fact that Online Operations purposefully assigned higher-rated instructors to Pathway courses in the past. Finally, Pathway courses are the first experiences many Pathway individuals have with university courses. Pathway students typically do not have as much experience with university courses, and might have lower expectations and hence higher satisfaction with their instructors and courses.

Statistical analysis also revealed a unique response pattern in terms of student satisfaction with respect to class standing. The less higher education experienced, the higher the course satisfaction rating. The more education a student experienced (senior standing) the less satisfaction with online courses.

This study also found relatively few satisfaction ratings at either extreme (a great deal less satisfied or a great deal more satisfied) with traditional students (non-Pathway students). This confirmed previous findings by the university noting that in comparison to on-campus course offerings, online courses experienced fewer extremely high and extremely low satisfaction ratings (Young, 2014).

Statistical analysis between instructor self-efficacy in online pedagogy and experience teaching online revealed a correlation between the amount of experience an instructor had teaching for BYU-Idaho and his or her confidence in his or her online

pedagogical abilities. The longer the instructor had taught for BYU-I, the higher his or her self-efficacy in online pedagogy.

Even stronger correlations were found between instructors' confidence in using online teaching technologies (email, discussion boards, attaching images, creating hyperlinks, sharing video files, etc.) and instructor experience at BYU-Idaho. The longer instructors had taught for BYU-Idaho, the more self-efficacy they reported in these areas.

However, a significant difference was found regarding student satisfaction and instructors' experience teaching at other universities. Remote instructors who only taught at BYU-I had significantly higher student course ratings ($p = .036$) along with perceived learning ($p = .009$) and satisfaction ($p = .012$), with their online course (compared to other courses) than instructors who had experience teaching at other universities.

Statistical analysis of all of the remote instructors teaching at BYU-I for over five semesters were rated significantly lower in their course evaluations than instructors teaching their first semester at BYU-I ($p = .012$). Moreover, instructors with over three semesters of teaching experience at BYU-I were rated significantly lower than instructors teaching their first semester at BYU-I ($p = .002$). Students perceived they learned significantly less than other courses from instructors with over three semesters of experience at BYU-I and rated the amount they learned (compared to other courses) from instructors teaching their first semester at BYU-I significantly higher ($p < .001$).

No significant correlations were found at BYU-Idaho between student satisfaction and online instructors' self-efficacy with online pedagogy. In addition, no correlations were found between student satisfaction and instructors' subject-matter expertise or overall online self-efficacy. Only very small, reverse correlations were identified between instructors'

efficacy in teaching technology and student satisfaction ratings. This is discrepant to the literature indicating that high teacher self-efficacy correlates with increased student learning and satisfaction (Goddard et al., 2000; Henson, 2001). However, this study did reveal positive correlations between instructor self-efficacy and length of experience teaching online.

Interestingly, this study discovered that the more experience instructors had teaching, the less satisfied students were with their learning experience. Accordingly, the longer BYU-I instructors taught for the university, the higher their self-efficacy, but also the lower their students' satisfaction levels. Student satisfaction and perceived learning appeared highest in those courses where instructors had taught only for BYU-Idaho and were in their first semester teaching. A possible explanation for this dynamic could be that training for new instructors has improved. Another explanation could be burnout among veteran instructors, as well as more enthusiasm and involvement from new instructors. Burnout among more experienced instructors could be from teaching multiple online sections or through additional leadership assignments in a given semester. More research is needed in order to uncover the meaning of these relationships and to discover strategies for improving student satisfaction ratings. Moreover, understanding of the dynamics of seasoned instructors would be beneficial in order to maintain quality instruction and avoid burnout.

Another interesting finding revealed that student satisfaction in online courses diminished as students progressed in their education. This could be due to the fact that the more classes students have experienced, as in the case of seniors, the higher the satisfaction expectation level becomes for future courses. It could also be due to the maturity of the online program at BYU-I as indicated by the online course list

(http://www.byui.edu/online/courses/course-list), indicating that upper division online courses are newer to the program. Seniors and Juniors in Fall 2013 might have been the first to encounter new online courses that may yet need to be adjusted to this new environment. In addition, the nature of senior-level courses and students might need or prefer a different format than what online courses traditionally offer (i.e. hybrid).

Finally, a significant correlation was found with Pathway students (p = .046), identifying that the more confident an instructor was in his or her technological skills, the lower Pathway students' satisfaction was with the course. These findings were significant, for the Pathway student population. This could represent a dislike for the course content or the medium of instruction. It could also represent that the technology used by Pathway instructors may be beyond the comfort level of non-matriculated students. Since Pathway students represent a population of non-traditional students taking college- preparation courses, rather than traditional university courses. The students may also be surprised at the amount of extra work college courses require compared to high school courses. This study did not corroborate Sahin's (2007) study, which indicated that the higher an online instructor's competence with technology, the better the learning environment they will provide to their students.

Discussion Board Best Practices Study

The second study examined the use of discussion board practices as measured by a discussion board rubric and its relationship to student satisfaction, student perceived learning and the Community of Inquiry survey. In order to accomplish this it was first necessary to develop a rubric to assess the extent to which the architecture and administration of discussion boards reflect known best practices of discussion boards.

A rubric of twenty measures of researched based best practices of discussion boards was developed to assess the effectiveness of discussion boards or grouping of discussion boards in online classes. By focusing on the components of the CoI framework and adding technology related concepts from the TPACK framework, the discussion board rubric measures theoretical components of online learning. Based upon theory, the use of these discussion board techniques should correlate with student satisfaction in the course. The best practices identified by research were organized into the CoI model with and added section on discussion board management practices.

Cognitive Presence

Cognitive presence is a process of critical thinking and inquiry whereby participants in a Community of Inquiry construct meaning (Garrison, Andersen & Archer, 1999). This online learning process begins "with a triggering event then moving (again ideally) to exploration, integration and resolution" (Shea et al., 2010, p.11). Six discussion board practices were identified that fall into the category of cognitive presence.

The first cognitive presence factor of effective discussion boards is to select discussion topics that relate directly to the students' main curriculum (Hew, Cheung & Ng, 2009). By focusing on the course curriculum, the students are engaged in the intended learning for the course. Selecting good discussion board topics can trigger the student's ability to make meaning of the material and lead to substantive exploration of the content.

A second factor is the use of controversial topics in the discussion board to stimulate discussion (Hew et al., 2010). This follows the cognitive presence concept of encouraging a sense of puzzlement and applying new ideas to concepts from the curriculum. It can also act

as a triggering event to stimulate students to think about a topic differently than they might have considered before.

A similar cognitive process that can be encouraged in discussion boards is to use note starters or prompts to initiate thinking (Hew et al., 2010; Thompson, 2006). By using note starters, students are encouraged to think and explore critically, rather than simply replying with a rote recitation of some concept taught in the course.

A continuation of this same cognitive theme is to question students in a way that encourages connecting of ideas and exchanging information in terms of lived experience with other students. This can be accomplished by using another discussion board best practice of asking open ended questions where there may not be a correct answer or solution (Hew et al., 2010). This reinforces exploration of the course material and ultimately leads to integration of related ideas and concepts in the course.

Another way to measure the cognitive effectiveness of a discussion board is to count the number of educationally valuable content posts per discussion board (Bliss & Lawrence, 2009). This consists of determining if a post by a student or instructor relates to the curriculum and objectives of the course and more specifically the discussion board topic at hand. This helps assess the cognitive area of whether or not the student progresses in his or her posts to from triggering and exploration to integration and resolution of course content into new meaning and understanding.

Finally, the last cognitive presence factor of effective discussion boards is the use of Socratic questioning to enhance students' critical thinking skills (Berry, 2008; Hew et al., 2010). This practice again follows the concepts of cognitive presence by determining if students are encouraged to challenge assumptions, explore and apply news ideas, connect

related concepts, and resolve competing ideas into a new construct within their own understanding.

Social Presence

Social presence encapsulates the idea of using connectedness to improve meaning making by facilitating free-expression. It is measured by determining the extent to which the participants in a community of inquiry are able to construct meaning through sustained communication (Garrison, Andersen & Archer, 1999). This section of the discussion board rubric contains five factors that consider the strength of social presence in an online discussion board. One way to measure social presence is to count the number of educationally valuable social posts per discussion board (Bliss & Lawrence, 2009). These are posts where students encourage or congratulate one another thereby creating a social presence where students can feel more comfortable in expressing their online persona.

A second measure of effective social presence in a discussion board is to determine if ground rules addressing respectful behavior have been set and enforced in the discussion board. This is a concept recommended as a useful practice for discussion boards (Hew et al., 2010). An important part of social presence is the idea of risk-free expression and open communication which are encouraged by having guidelines for respectful communication. Ground rules further help establish social presence by creating an environment that encourages collaboration.

Assigning students to small groups of 4 - 9 students is another effective discussion board practice (Berry, 2008; Bliss & Lawrence, 2009). This rubric helps determine if the Social Presence category of group cohesion has been encouraged in the discussion board.

Students who connect socially in small groups can together build meaning from their own experience and the experience shared by their peers.

The last two factors in the Social Presence category relate to the role of students in running the discussion board. Use of students rather than instructors as discussion board facilitators has been identified as a practice that encourages discussion board participation (Hew et al., 2010). Another related practice encouraged in the literature is to assign a student the role of summarizer for the discussion board (Hew et al., 2010). These practices encourage students to take ownership for the discussion and allows for increased sense of community for the participants. These two practices foster the Social Presence categories and are indicators of open communication, collaboration, group cohesion and effective expression.

Teaching Presence

Teaching presence, as defined by the Community of Inquiry framework consists of two functions, one is the grouping of activities that are part of course design and the other is the grouping of activities that encapsulate course facilitation. Because course design and grading functions can be separated from the instructor or facilitator of a course, the rubric categorizes design functions under discussion board management and has only facilitation related measures in the teaching presence category.

A simple and effective way to measure Teaching Presence in a discussion board is to count the number of instructor posts to a discussion board. This has been suggested as a useful measure of an effective discussion board (Sherer-Bassani, 2011; Thompson, 2006). When instructors are not engaged in a discussion, students can assume that the discussion is not important to the objectives of the course. By simply posting frequently to the discussion

board, an instructor can achieve the CoI teaching presence indicators of focusing discussion and modeling how to share personal meaning.

Another way to measure effective Teaching Presence in the course is to determine the number of probing questions posed by the instructor (Sherer-Bassani, 2011). These are questions that do not have a yes or no answer, rather require students to explore their thoughts and articulate concepts. Teaching presence requires facilitating discourse and asking probing questions.

A third way to effectively measure Teaching Presence in a course is to measure the timeliness of instructor posts to other responses in the discussion board (Sahin, 2007). When instructors remain engaged in a discussion, it can focus the discussion which is one of the indicators of Teaching Presence in the CoI framework. Timely responses can encourage students to remain engaged in a discussion. It can also facilitate sharing personal meaning as students feel their discussion has an audience rather than just being offered to the void of untimely or no response.

A fourth factor of effective Teaching Presence within a discussion board is to determine if students have been adequately prepared to participate with the technology. This has been identified as an important technique for effective discussion boards (Hew et al., 2010). If students cannot effectively participate with the technology, it inhibits the discussion. Instructors can provide tutorials or other posts which outline how to use the technology in the discussion board. This achieves the CoI aim of direct instruction on how to participate in the course.

Discussion Board Management

The Discussion Board Management section of the rubric contains five measures which relate to how technology can be successfully combined with pedagogy in an online discussion board. This overlap of pedagogy and technology relate conceptually to the TPACK framework (Koehler & Mishra, 2009). Often these measures happen before a course begins as part of the course design which is why they are better suited to this category than Cognitive Presence or Social Presence components of the CoI. A part of the Teaching Presence in the CoI addresses course design, but by separating course design decisions from other practices where instruction is present in the course, some of the vagueness of the source of instructor presence can be resolved.

The first discussion board management related factor in the rubric calls for assignment of a grade or other incentive to discussion board participation. This practice is identified as a discussion board best practice (Hew et al., 2010; Thompson, 2006). While assigning a grade or other incentive to an assessment is not a new pedagogical concept, application by specifying discussion board participation by the student, encourages interaction in the discussion rather than having the discussion be seen as an optional venue for engaging in learning. This aligns with the concept of pedagogical content knowledge which is knowledge about how to implement pedagogy into the course design.

Another discussion board management related factor is outlining a rubric for the discussion board. Assessing students and helping them understand the criteria on which they will be assessed; helps improve the quality of the discussion (Berry, 2008; Hew et al., 2010). This practice not only motivates students to engage, but it helps provide direction to their

posts. This practice represents application of pedagogical content knowledge on how to teach and assess students.

Similar to using a rubric for assessment, clearly stating the purpose for the discussion board activity, improves the discussion (Hew et al., 2010). When a student can understand why the discussion needs to take place, the posts will be better formulated along with responses to other posts in the discussion, thereby making the discussion a better learning experience for all participants.

A fourth best practice related to discussion board management is assigning a deadline for student contribution (Hew et al., 2010; Thompson, 2006). This is a rather poignant way in which technology overlaps with pedagogy and fits in the TPACK category of Technological Pedagogical Knowledge. When a discussion board is technologically set up as an asynchronous discussion, it is valuable to encourage participation in order to keep the discussion alive and meaningful to students.

The fifth and final discussion board management technique that relates to technology is using easy navigation techniques. This also has been specified in literature as a discussion board best practice (Hew et al., 2010; Thompson, 2006). Without easy navigation techniques, students can become lost or frustrated in the discussion, thereby limiting their ability to engage for their benefit and the benefit of others. This practice fits into the category of Technological Content Knowledge by allowing the technology to promote rather than get in the way of presenting content.

The second phase of the study utilized the Discussion Board Best Practices rubric to explore the relationship between the use of discussion board best practices with student course satisfaction and perceived learning.

Six sections of FDCNC 350: Analytical Thinking and Moral Judgment discussion boards were analyzed, which were taught by four instructors. Two instructors had taught online at BYU-I for more than five semesters. Two taught online for less than five semesters. One of the instructors also had experience teaching online at other universities.

There were 181 students **e**nrolled in the six sections; of which 76.2% (n = 138) participated in the CoI Survey and 75.1% (n= 136) participated in the Course Evaluation Survey. The participants' (n = 136) age ranged from 19 to 50, with a mean of 27.4, median of 24, and mode of 24. Females represented 63.2% of the participants (n = 86), while 38.8% (n = 50) were male. Seniors constituted 62.5% of the student participants (n = 85); 35.3% were juniors (n = 48); 1.5% were sophomores (n = 2); and 0.7% were non-matriculated (n = 1).

A significant correlation was found in Cognitive Presence for both student satisfaction ($r = .829$, $p = .042$) and student perceived learning ($r = .943$, $p = .005$). This indicates that the more Cognitive Presence practices were used, the more students perceived they learned in the course and found the course satisfying.

This study also examined the relationship between the use of discussion board practices for Cognitive Presence, Social Presence, Teaching Presence as measured by the Discussion Board Rubric and their corresponding categories in the Community of Inquiry framework. It was interesting to note that the student's perception of Teaching Presence in the online course (as measured by the CoI) significantly correlated with the discussion board rubric in both Social Presence ($r = .828$, $p = .042$) and Teaching Presence ($r = .956$, $p = .003$). However, no correlation was found between the discussion board rubric and the corresponding category within the Community of Inquiry framework in Cognitive Presence and Social Presence.

To better understand the data, the introductory discussion boards which focused primarily on establishing an online community in the course were removed and the data was then re-analyzed. Statistical analysis revealed that significantly more discussion boards than should be expected by chance (.01 level) had low numbers of instructor posts, probing questions, cognitive posts, and timeliness of instructor response. All four of these results were driven primarily by discussion boards where the posts were absent, indicating that after the introductory lesson, the instructors were more absent from the discussion than should be expected by chance.

Discussion Board Summary

The purpose of this study was to develop a rubric to assess the degree to which discussion boards utilize best practices and explore the correlation between the use of discussion board best practices and student satisfaction and perceived learning in online courses. In order to accomplish this, the study was conducted in two phases. The first phase of the study was the development of a rubric measuring the use of discussion board best practices. Practices were identified in the literature and classified into components of the Community of Inquiry framework of: Cognitive Presence, Social Presence and Teaching Presence. Because the validation of Teaching Presence in the CoI framework revealed that teaching presence needed to be separated into "two factors—one related to course design and organization and the other related to instructor behavior during the course" (Arbaugh, et al., 2008, p. 133), a section on Discussion Board Management was also incorporated into the rubric. Internal consistency of the rubric was measured via inter-item reliability and found to be acceptable for Cognitive Presence (Chronbach's alpha = .772), Teaching Presence (Chronbach's alpha = .7) and Management (Chronbach's alpha = .618). A Chronbach alpha was unable to be calculated for Social Presence due to the limited variability of responses, partially due to the course design not implementing Social Presence best practices.

Construct validity for the discussion board rubric was founded on the research of proven best practices along with the TPACK and CoI theoretical framework. In addition, convergent validity was ascertained by correlating the discussion board rubric results with the student's perception of Cognitive Presence (r = .371, p = .468), Teaching Presence (r = .956, p = .003) and Social Presence (r = 828, p = .042), as measured by the CoI. Convergent validity was ascertained between the CoI and the discussion board rubric for Teaching Presences and Social Presence. No correlation could be calculated for the management section of the rubric since the courses reviewed in this study utilized the same course design and therefore little variation between the sections (the standard deviation for three of the five measures were zero).

Applying the Discussion Board Best Practices Rubric to the Analytical Thinking and Moral Judgment course revealed that some best practices were clearly present and others were not. In respects to Cognitive Presence the most applied best practice was the selection of discussion board topics that related directly to the main curriculum (M = 2.86, SD = .56), followed by the use of prompts to initiate thinking and use of Socratic questioning in the discussion boards (M = 2.71, SD = .59 for both). The least applied best practice was in respect to the number of educationally valuable content posts per discussion board (M = 1.40, SD = .71).

In the Social Presence domain, three of the five measures reflect the standardized course design in that none of the course designs assigned students to small groups of 4-9 students, used students in the role of summarizer, or used students rather than the instructor to facilitate the discussion board. However, all of the courses set ground rules for respectful behavior in the discussion board. With the exception of establishing ground rules for respectful behavior, the standard course design did not use best practices that encourage

Social Presence as evidenced by the number of educationally valuable social posts on the discussion board (*M* = 1.12, SD = .45).

The best practice most used in Teaching Presence was adequately preparing students to participate with technology (M = 3, Md = 3, Mo = 3). It must be noted that the instructors did not post much to the discussion boards ($p < .001$, w = .86), nor did they ask many probing questions ($p < .001$, w = .93). In addition, 54% of the discussion boards did not have an instructor's response to the student posts (.01 significance level). However, of the instructors who did respond, they did so within two days ($p < .001$, w = .27).

In respects to discussion board management best practices, assigning deadlines for student contribution and using easy navigation techniques were the most frequently used discussion board management techniques and were rated as high (*M* = 3.00, SD = 0) for both measures. However, outlining a rubric for discussion board assessment was the management technique least used in the course (*M* = 1.71, *SD* = .96).

Analysis of the course evaluations revealed that the students (56%) significantly ($p < .001$, w = .08) rated the course positively compared to other courses they had taken. In addition 56.6% indicated that they believed they had learned more in this course than other courses they had taken ($p < .001$, w = .129). It was interesting to note that there was no relationship between the amount of time it took for instructors to respond to student posts and student satisfaction with the course, $X^2(3) = 3.054$, p = .383.

The second phase of the study utilized the Discussion Board Rubric to explore the correlation between the use of discussion board best practices and student course satisfaction and perceived learning. A significant correlation was found in Cognitive Presence with both student satisfaction (r = .862, p = .042) and student perceived learning (r = .943, p = .005). The more Cognitive Presence discussion board best practices used the more students perceived they learned in the course and found the course satisfying. Students were more

satisfied ($r = .862$, $p = .042$) when the Cognitive Presence practices of selecting of discussion topics that related directly to the students' main curriculum, using controversial topics in the discussion board to stimulate discussion, using prompts to initiate thinking, asking open ended questions where there may not be a correct answer or solution, and using Socratic questioning to enhance student's critical thinking skills were used.

During the data collection period it was noted that the introductory discussion board usage was different from the rest of the semester, since the first posts focused primarily on establishing an online community in the course. To better understand the data, the first discussion board data were removed and the data was then re-analyzed. Statistical analysis revealed that significantly more discussion boards than should be expected by chance had low numbers of instructor posts (.01 level), probing questions (.01 level), cognitive posts (.01 level), and timeliness of instructor response (.01 level). All four of these results were driven primarily by discussion boards where the posts were absent, indicating that after the introductory lesson, the instructors were more absent from the discussion than should be expected by chance.

In respects to difference between the instructors in the use of discussion board best practice areas of Cognitive Presence, Social Presence and Teaching Presence, statistical analysis revealed the instructor who had less than five semesters teaching online and was teaching only one course online ($M = 1.615$, $SD = .17$) was significantly higher in Social Presence ($M = 1.46$, $SD = .12$) than the two instructors who were teaching multiple online sections; one of which was a relatively new instructor (fewer than five semesters teaching online) and the other was a seasoned teacher with over five semesters online teaching experience ($M = 1.43$, $SD = .11$).

It was interesting to note that between the two instructors who taught more than one section the instructor with less experience (less than 5 semesters of online teaching) had significantly more posts (.01 level) while the seasoned online instructor (over 5 semesters of online instruction) had significantly less posts (.05 level). In addition this instructor with relatively little experience (less than 5 semesters) and teaching multiple online sections had significantly more probing questions (.05 level medium range) while the rest of the instructors had few probing questions.

Discussion

The purpose of the study was to examine the use of discussion board best practices and their relationship to student satisfaction and student perceived learning. A significant correlation was found in the Cognitive Presence section of the discussion board rubric for both student satisfaction ($r = .862$, $p = .042$) and student perceived learning ($r = .943$, $p = .005$) identifying that the more cognitive presence practices used, the more students perceived they learned in the course and found the course satisfying. This supports the continued use of Cognitive Presence practices in online courses.

The discussion board Cognitive Presence best practices of using controversial topics (Hew et al., 2009) and asking open ended questions (Hew et al., 2009) were used intermittently in the discussion boards ($M = 2.00$, $SD = .93$ and $M = 2.43$, $SD = .62$ respectively). Similarly it was difficult to determine what effect the number of educationally valuable posts (Bliss & Lawrence, 2009) had on student satisfaction and perceived learning due to their relative low use in the discussion boards ($M = 1.40$, $SD = .71$).

In respects to Social Presence, it appears that students did not use the discussion board to communicate socially as evidenced by the relatively low use of discussion board practices in the Social Presence category ($M = 1.42$, $SD = .09$). This suggests that course

design and facilitation for the courses examined in the study, did not encourage social presence by use of recommended best practices in this category. Despite this finding, students did perceive their learning to be a great deal more than in other college courses they have taken and student course satisfaction was also significantly higher (.01 level) as compared to other college courses they had taken. These findings suggest that connectivism and social networks (Downes, 2007; Siemens, 2004) may not be as important as otherwise asserted. The practices of assigning students to small groups (Berry, 2008; Bliss & Lawrence, 2009), assigning students to the role of summarizer (Hew et al., 2009), and using students rather than instructors as discussion board facilitators (Hew et al., 2009) were all not used in the discussion boards (M = 1.00 and SD = 0 for all measures) analyzed in this study. The number of educationally valuable social posts (Bliss & Lawrence, 2009) to the discussion board were also infrequently present in the discussion boards (M = 1.12, SD = .45).

It must be noted that the degree to which the use of Teaching Presence affects student satisfaction and student perceived learning proved to be inconclusive (not significant) due to the apparent mixed use of these techniques in the discussion boards. For example, the use of probing questions (Sherer-Bassani, 2011) and number of instructor posts were low (M = 1.04, SD = .24 and M = 1.07, SD = .34 respectively), but timeliness of instructor response (Sahin, 2007) and adequately preparing students to participate in technology (Hew et al., 2009) were rated as medium and high (M = 2.38, SD = 1.31 and M = 3, SD = 0 respectively). With these mixed results, the effect of the practices for Instructor Presence on student satisfaction and student perceived learning is difficult to determine.

As it pertains to the relationship between the use of discussion board practices for Cognitive Presence, Social Presence, Teaching Presence (as measured by the discussion board rubric) and their corresponding categories in the Community of Inquiry framework, a

significant correlation was found between the discussion board rubric Social Presence ($p = .042$) and Teaching Presence ($p = .003$) best practices and teaching presence in the course (as measured by the CoI).

In regards to the Teaching Presence category of the CoI framework, the discussion board rubric separated Teaching Presence into two categories, Teaching Presence and Discussion Board Management practices. The reasoning for this separation is to recognize the difference between facilitation of discussion boards and course setup. Best practices of number of instructor posts (Sherer-Bassani, 2011; Thompson, 2006), number of probing questions (Sherer-Bassani, 2011), timeliness of instructor responses (Sahin, 2007), and adequately preparing students to participate in technology (Hew et al., 2009) are all related to facilitation that is unique for each course and discussion board and reflect teaching more than course design. In contrast, best practices for assigning a grade or other incentive to discussion board participation (Hew et al., 2009; Thompson, 2006), outlining a rubric for discussion board assessment (Berry, 2008; Hew et al., 2009), clearly stating the purpose of the discussion board activity (Hew et al., 2009), assigning deadlines for student contribution (Hew et al., 2009; Thompson, 2006), and using easy navigation techniques. (Hew et al., 2009; Thompson, 2006) are all course design decisions and may or may not vary amongst discussion boards or even courses. Therefore, these later practices should be studied and measured separately from course facilitation practices.

Conclusion

Online education continues to be an area of increased growth in higher education (Wasilik & Bolliger, 2009). Given this trend, what can be done to improve the quality of online education? How can instructors and students effectively build community in an online setting? What instructional techniques prove most helpful when working in a distance

education setting? How are educational practices being used and how do students feel about what they experience in online settings? For BYU-Idaho, results from two studies on self-efficacy and discussion board best practices present some intriguing answers and even more intriguing questions.

The first answer is to recognize that something appears to be going well in online learning at BYU-Idaho. Students in the self-efficacy study rate their course satisfaction as positive compared to other college courses they have taken (M = 0.97, sd = 1.13). Any score above zero represents that students are more satisfied with their course as compared to other college courses they have taken. This is corroborated by satisfaction scores from the discussion board study which revealed that students in the capstone course were also more satisfied with that course than other college courses they had taken (M = .45, sd = 1.29). This second result becomes even more pronounced when considering that over 97% of the students in the discussion board study were juniors and seniors and results from the self-efficacy study revealed that junior and senior students were more likely to rate their online courses negatively ($p < .001$, Cramer's V = .186) as compared to other students. This means that something good appears to be happening in online courses in general and the capstone foundation course in particular. These findings could be more informative by comparing these results to student satisfaction scores for face-to-face instruction. Better understanding about what is going well deserves further investigation so that it can be maintained in courses where positive practices are in place and become implemented in courses that are not using best practices.

Despite positive signs from online learning results, there are areas that merit investigation for improvement. Analysis of the use of Social Presence related practices in discussion boards shows that few of the practices are used (M = 1.42, sd = .81). When

eliminating the category of setting guidelines for respectful behavior from the Social Presence category, the analysis becomes even more pronounced (M = 1.03, sd = .23). Keeping in mind that the lowest use of a practice was scored as 1, it is apparent that few best practices are in place in the Social Presence category. BYU-Idaho may want to consider assigning students the role of discussion board facilitator and summarizer and to assign small discussion groups of four to nine students within discussion boards. It is interesting to note that both of these practices are similar to activities that are part of the Thursday night gatherings in Pathway courses which have a significantly higher student satisfaction (.01 level) than one might expect by chance. All of these practices also fit within BYU-Idaho's stated Learning Model principles of Teach One Another (BYU-Idaho, 2014) and have the potential to add to student engagement in the course while having little impact on instructor workload. Experimenting with these practices could help make discussion boards more effective instructional tools.

Another consideration for improvement would be to train instructors on all discussion board best practices. Specific focus could be placed on expectations for instructor participation in discussion boards. Results from the discussion board study indicate that outside of the introductory lesson, approximately 59% of discussion boards did not have any instructor response to any of the student posts in the discussion. Using open ended questions and Socratic questioning that challenge students to think beyond perfunctory responses could also significantly affect Teaching Presence in the discussion boards.

Another interesting finding from the self-efficacy study suggests that there is an inverse relationship between instructor self-efficacy in technology and student satisfaction. This was particularly pronounced amongst Pathway students, suggesting that perhaps when

instructors feel confident with technology, they expect or assume their students will be confident as well, when that may not be the case amongst the students.

The self-efficacy study also revealed that as students' progress in their education, they become less satisfied with their online courses. Senior and junior level students were significantly more likely (.01 level) to rate their online courses negatively as compared to other courses they have taken. However, the discussion board study, which was with juniors and seniors, contradicts this information since significantly more students rated this online capstone class as better than other courses they have taken and indicated they believed they had learned more in this online capstone class than other classes they had taken. More research is needed to understand this dynamic.

Perhaps the most intriguing findings that merits further investigation involves the relationship between instructor experience, self-efficacy, and positive course indicators. The self-efficacy study surprisingly shows that courses taught by more experienced instructors and more confident instructors (as indicated by self-efficacy scores) were rated lower than courses taught by less experienced instructors. The discussion board study also suggests that a less experienced instructor (fewer than five semesters) had significantly higher Social Presence compared to his/her peers. Furthermore, another instructor who was also less experienced had significantly more posts compared to his/her peers. The self-efficacy study also indicated that students were less satisfied with courses facilitated by instructors with experience at other universities. These findings were in part corroborated by the discussion board study which revealed that the instructor with more experience and with experience teaching online at other universities was less engaged in the discussion board (fewer posts) than one would expect by chance (.05 level). These findings seem to combine to indicate that the ideal instructor in terms of positive course ratings is one who has relatively little

teaching experience and teaches only at BYU-Idaho. At the other end of the spectrum is an instructor who has some experience teaching at other universities and more extensive experience at BYU-Idaho. These findings become particularly poignant when considering that it is the more experienced instructors who are assigned as teaching group leaders and mentors to other instructors.

There is one mitigating factor to the findings on instructor experience. The discussion board study identified a less experienced instructor had significantly higher Social Presence compared to her/his peers; however, she/he was also the only instructor facilitating just one section. This was compared to two instructors who had more experience teaching and one who had less experience, but who were all facilitating more than one online section, suggesting that it may not be experience, but rather workload that is a more significant factor in determining positive outcomes.

These results indicate that more investigation is needed to determine what it is about instructor experience that leads to less engagement and lower satisfaction amongst students. Is it that instructors are more confident and therefore feel less need to engage with students in order to fulfill their obligations? Is it that instructors are asked or accept too much of a workload when they become more experienced and therefore have less to give to each student? Do instructors experience burnout with time and engage less in the course? Are there poor practices being shared in the instructor community that contribute to lower satisfaction as experience increases? Could newer instructors be receiving improved orientation and training which could benefit more experienced instructors? Are more experienced instructors being assigned to facilitate newer or upper class courses where students give more negative ratings, thereby skewing the instructor ratings for courses with

experienced instructors? These factors need to be isolated and further researched in order to understand what it is about instructor experience that seems to relate to less than desirable outcomes.

Implications for Practice

The findings of this study indicate online teaching self-efficacy may not be a significant consideration when hiring online instructors. In fact, high self-efficacy, especially in terms of technology, may actually be a negative factor in facilitating online courses. Online learning programs may benefit from looking more at other factors, such as personality, training, and mentoring as indicators of instructor success.

Another finding that merits consideration is lack of student satisfaction with online courses as students' years in school increase. If higher level courses are newer and therefore of lower quality, then more time needs to be invested in course development, or newer courses should receive more improvement focus than they current receive. If students increasingly experience lower satisfaction because they have more courses for comparison, perhaps more experienced students should be engaged to find ways to improve online courses. A good candidate for investigating this finding is to look at the practices found in the FDCNC capstone course, which shows upperclassmen generally satisfied with the course.

The finding that a decrease in student satisfaction also appears to correlate with an increase in instructor experience seems to be the result with the most promise for practice implications. This finding needs to be confirmed and more deeply understood through additional analysis over multiple semesters. If it is confirmed, it could lead to significant changes in practice. For example, teacher experience may need to be eliminated or even

considered as a contra indicator when selecting remote leadership for adjunct instructors. Perhaps more recent training and mentoring offered to less experienced instructors needs to be encouraged or required for more experienced instructors.

Finally, more focus could be given to course design and instructor training for discussion boards. Course design decisions could incorporate more of the best practices, particularly in the Social Presence category. Students can be assigned and encouraged to facilitate discussions, instructors can ask more open ended and probing questions designed to engage students through thoughtful responses. By implementing these practices within discussion board activities the expectation is that student engagement in discussion board will increase thereby leading to higher quality education.

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Chapter 5: Conclusion

Overview

Higher education in the 21st century has a unique set of challenges. The growing use of online learning and mobile technology require that teaching pedagogy adapt to these changes. The pace of change demands rigorous examination of instruction practices, course design, along with the use of technology and program design to enhance the quality of education.

This Professional Practice Doctorate three article dissertation utilized a group format where a group of doctoral students came together with a common interest, collaborated on one article and then conducted two other studies in a related field. This research team focused on issues surrounding technology and online learning in higher education in order to best advise the stakeholder on instructor level, course level and program level practices that can be used to enhance the overall quality of online education in order to produce highly trained graduates ready for the 21st century workforce.

To begin with, the team explored the effect of online instructor's self-efficacy on student satisfaction and student perceived learning in relation to other college courses taken. Then the training and professional development of online instructors were investigated (Carter, 2014). The servant leadership philosophy was explored to identify if servant teachers were effective in an online learning environment (Huber, 2014). The use of the mobile technology in the classroom was explored, specifically the use of Remind 101 (Hochstrasser, 2014). Finally, since discussion boards are such a prominent aspect of online education, in this dissertation a rubric was developed to identify how discussion board best practices were being used in a BYU-I capstone course and identify if the use of discussion

board best practices correlated with student satisfaction in the course and the student's perspective of how much they had learned in the class compared to other courses they had taken. Moreover, this dissertation investigated how much the rubric correlated with the student's perception of Teaching Presence, Cognitive Presence, and Social Presence in the course as measured by the Community of Inquiry survey.

Research Summary

Theoretical Framework

The common theoretical framework of all the studies revolved around andragogy, constructivism, and connectivism. Andragogy is an adult learning theory which assumes that the adult learner has experience prior to entering higher education that predisposes the adult learner to be internally motivated in order to meet a specific need (complete their education). Since adult learning theory indicates that adult learners are internally motivated and self-directed, the constructivist philosophy is an ideal pedagogy to use with adult learners. The constructivist classroom helps students to build meaning and understanding through learner-centered collaborative environments (Jonassen, Davidson, Collins, Campbell, & Haag, 1995).

Connectivism is a newer theory designed to explain how learning occurs in this technological age. The theory recognizes that every person has a network of knowledge which feeds into different organizations which then feed back into the network to facilitate learning (Siemens, 2005). Part of the network of knowledge includes usage of technology and mobile devices throughout the learning environment. Figure 5.1 was created by one of the research team members (J. Hachstrasser) to visually illustrate the basic concept of connectivism.

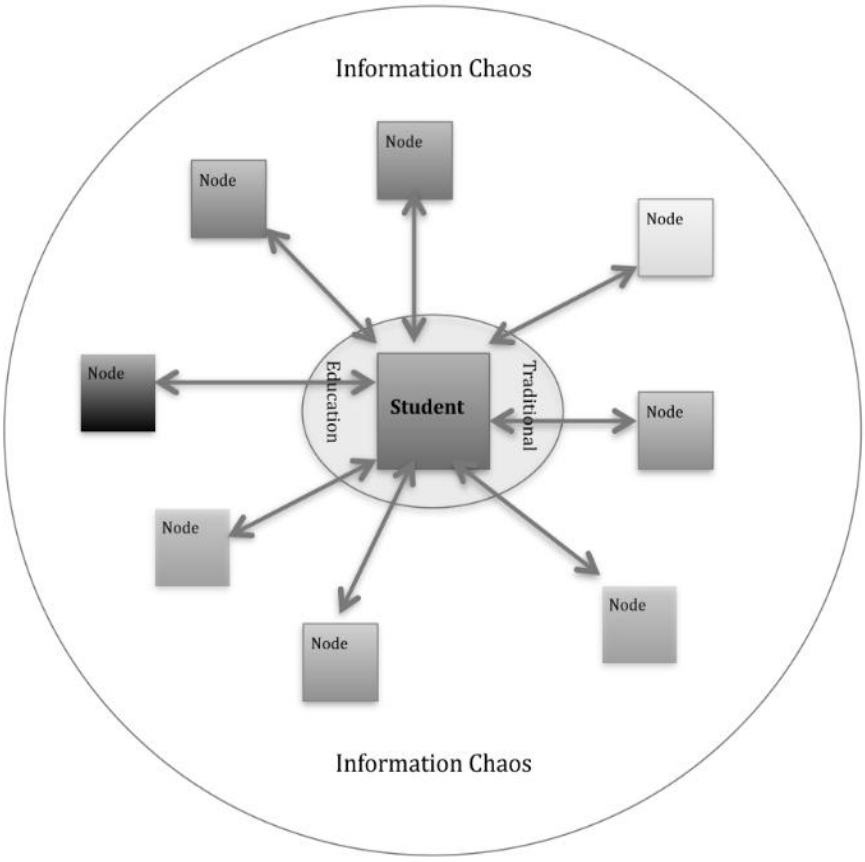

Figure 7.1. *Connectivism Model. Symbolically explains the main elements of the theory. A student reaches out in the chaos of information to various nodes of knowledge to try and gather desired information. These connections are mediated by the Internet and technology (Hochstrasser, 2014).*

In addition three of the studies were also based on the Technological Pedagogical Content Knowledge (TPACK) framework and Community of Inquiry (CoI) framework. The TPACK framework looks at the interconnectedness of different types of knowledge (content, pedagogy, and technology) and how it facilitates learning (Graham, 2011; Koehler & Mishra, 2009).

While online teaching effectiveness and learning are desired outcomes in online courses, research revealed that determining the learners social engagement in the instruction,

(identified as social presence), was also important to assess (Garrison, Andersen & Archer, 1999). The Community of Inquiry (CoI) survey was then developed in order to measure the effectiveness of online instruction. In respect to the cognitive dimension of teaching and learning TPACK uses the term Content Knowledge, while the CoI uses the term Cognitive Presence. This is because TPACK is assessing the instructor's knowledge of the content, while the CoI is assessing how much cognition (domain specific learning) is present in the online classroom and is thus termed cognitive presence.

Accordingly, TPACK uses the term Pedagogical Knowledge when referring to the amount of knowledge the instructor has on instructional techniques, while the CoI uses the term Teaching Presence in order to assess the amount of presence and influence the teacher has in an online course. The effect of technological practices (as identified through TPACK), content knowledge, teaching practices (pedagogical knowledge) along with social presence (which has been identified as an important aspect in online courses) create the core concepts of the Community of Inquiry framework (Social Presence, Teaching Presence, and Cognitive Presence).

The group study on instructor self-efficacy was also founded on the theoretical concepts presented by Bandura (1977) which suggest that the more confident instructors are in their own abilities, the better they will perform in their duties. In concept, better instructor performance in the course would lead to increased student learning and satisfaction with the course. To measure online instructor self-efficacy, the research team adapted several generalized instruments into an instructor survey focused on instructor self-efficacy areas of pedagogy, subject matter expertise and use of technology.

Figure 5.2 depicts the relationship of self-efficacy with the three domains of the online instructor (Carter, Hochstrasser, Huber, & Yadon, 2014). It should be noted that although Online Instruction Pedagogy is found at the top of the circle, this does not suggest that one aspect of self-efficacy is more important than another.

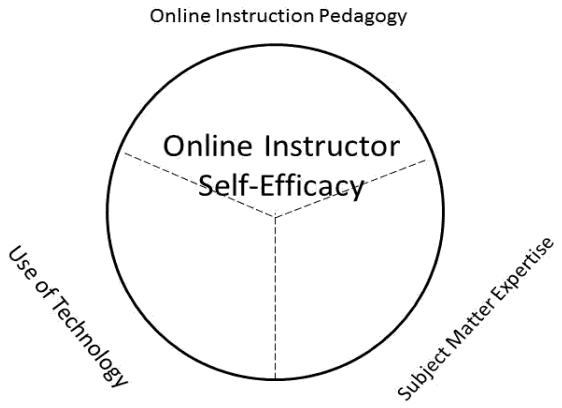

Figure 8.2. *Constructs of Online Instructor Self-Efficacy (Carter, Hochstrasser, Huber, & Yadon, 2013).*

Discussion

The technology in education research team explored the correlation between online teacher self-efficacy with student satisfaction in the course, along with the effects of mandatory online Communities of Practice for professional development of online instructors. The servant teacher model was explored to identify its effectiveness as an online teaching pedagogy. A discussion board rubric of best practices was developed to ascertain the correlation between the use of discussion board best practices and student satisfaction in the course. Finally the use of Remind 101 was assessed to identify its usefulness in the classroom.

The intent of the group study was to identify the correlational relationship between self-efficacy and positive course outcomes. This understanding could lead to professional development that could enhance instructor influence on quality in the online classroom. The results could also be used to determine which characteristics to look for in hiring online instructors. The study found unique relationships between instructor experience and student satisfaction. Interestingly, less seasoned instructors had higher student satisfaction ratings. Another important finding was that as instructor self-efficacy increased in technology, student satisfaction decreased. This was particularly evident among newer students suggesting that instructors should not assume that because the instructor is comfortable with technology that it translates into success in the course.

In addition, a significant difference was found in terms of student satisfaction and class standing, with more advanced students being less satisfied with their instructors, their perceived learning, and their online course. Analysis of data from pre-college (Pathway) students revealed significant differences from the traditional students in this study. Moreover, the more confident an instructor was in their technological skills, the lower the student satisfaction was with the online course for the non-matriculated students.

A qualitative research design and naturalistic inquiry was implemented to study the effectiveness of professional development for online instructors using mandatory Communities of Practice (Carter, 2014). This study used multiple data points to triangulate research and create an overall picture of online Communities of Practice (CoPs) at the university. Mandatory online CoPs were found to be effective at building camaraderie and citizenship among remote instructors, as well as at providing applicable professional development through self-regulated learning opportunities. There was high morale for the

online Communities of Practice, leadership, and students, but instructors experienced low morale regarding opportunities to give feedback and contribute to the overall online organization (Carter, 2014). Mandatory CoPs did positively influence instructor connection to the course and community which increased instructor morale. The research further noted that CoPs may not be the ideal environment to generate innovative ideas for organizational learning; rather other methods should be explored to provide feedback for course improvement. In addition, increased opportunities for feedback and better communication with administration and campus could improve the remote instructors' connection to the university, sense of citizenship, and overall morale.

The servant teacher philosophy was found to be an effective pedagogy for teaching online (Huber, 2014). When instructors focus on principles of listening, empathy, healing, awareness, persuasion, conceptualization, foresight, stewardship, commitment to growth of people and building community, better instruction is the outcome. The students feel like they achieve more personal growth when instructors use servant teaching as a practice.

The study on discussion board best practices that was presented in this dissertation organized 20 identified discussion board best practices into the Community of Inquiry framework which focuses on assessment of online education. The best practices were categorized into Cognitive Presence, Social Presence, Teaching Presence and Discussion Board Management practices. The first three categories were also used in the Community of Inquiry framework and the fourth category represents elements that can be related to the TPACK framework and the results of the validity study of the CoI which suggested breaking up teaching presence into two categories. Six sections of an online course were selected for discussion board analysis, scoring each discussion board as low, medium or high use for

each of the 20 best practices. The categories were then quantitatively compared to course rankings for student satisfaction and student perceived learning.

Discussion board practices in the Cognitive Presence category were significantly correlated to student satisfaction ($p = .042$) and student perceived learning ($p = .005$) meaning that students felt more satisfied and felt like they learned more when the cognitive practices of selecting discussion topics that relate directly to the students' main curriculum, using controversial topics in the discussion board to stimulate discussion, using prompts to initiate thinking, asking open ended questions where there may not be a correct answer or solution, and using Socratic questioning to enhance student's critical thinking skills were used.

Another interesting finding related to instructor experience. The instructor with a significantly higher Social Presence ($p = .004$) as compared to his/her peers, was also the instructor who has less experience and was facilitating only one online section that semester. This suggests that newer and/or less burdened instructors might be more likely to establish good Social Presence in a discussion board.

The discussion board practices study also compared the discussion board categories to student scoring collected using the Community of Inquiry survey instrument (Arbaugh, et al., 2008). Interestingly, use of discussion board practices in Teaching Presence and Social Presence categories significantly correlated ($p = .003$ and $p = .042$ respectively) to the Community of Inquiry measure for Teaching Presence. This indicates that when instructors foster a social environment and use good teaching practices, the students perceive a strong teaching presence in the course.

In addition, the use of mobile technology was found to be welcomed amongst students in higher education. In particular, Remind 101 was found to be an effective mobile technology that students found helpful to remind them of assignments and exams. The students felt that the use of Remind 101 helped them to get a better grade in the course.

Implications for Practice

Results from the research conducted by the technology in education research team identify areas that are going well and other areas that could be improved. A variety of professional development and pedagogical practices could be implemented to improve instructor community, course design and implementation of online teaching best practices.

Instructors would likely benefit from:

1) Continued focus on the establishing stronger communities of practice (Carter, 2014).
2) Implementation of professional development to support instructors
    a. Train instructors in discussion board facilitation best practices (Chapter 3 & 4).
    b. Train instructors in servant leadership and servant teacher principles (Huber, 2014).
    c. Encourage use of practices and techniques that promote building of community (Carter, 2014).
    d. Include mobile technology in course design and administration (Hochstrasser, 2014).
3) Course Design Mentoring/Support/Instruction
    a. Incorporate more discussion board best practices into course design (Chapter 3 & 4).

   b. Include mobile technology (Remind 101) in course design and administration (Hochstrasser, 2014).
   c. Have a training class for instructors to support choices they may make in course design (Huber, 2014).

4) Make sure newer students receive instruction on how to use technology.
   a. Instructors should not assume that because they are comfortable using technology, that the students are just as adept in their use of technology (Chapter 2).
5) Provide remote adjuncts a variety of ways to provide feedback.
   a. Have open communication channels from administration to instructors and from instructors to administration (Carter, 2015).
6) Focus more on instructor experience than on instructor self-efficacy (Chapter 2).
7) Measure instructor engagement in the discussion boards:
   a. By counting the number of posts
   b. By calculating the timeliness of instructor responses.

Suggestions for Future Research

Further research could be conducted to see which of the above findings are supported across more courses and a greater percentage of the student population. Metrics that are more quantitative in nature could be separated from the qualitative metrics allowing for easier analysis on the entire student population.

Interventions could be designed where some of the above recommendations are implemented in an isolated way and compared against a control group, so the effect of the given practice on desirable course outcomes is more apparent. In particular, experimentation

with different discussion board best practices would be useful to determine what drives student engagement and how that affects student perception of the course.

After implementing the recommended changes, it would be beneficial to re-assess student satisfaction, student perceived learning and other measures of course and program success (i.e. grades, graduation, acceptance to graduate school, employment) to confirm the effectiveness of the interventions.

Conclusion

Three of the top priorities of the stakeholders include serving more students, doing so at a lower relative cost to the student, and improving students' learning experience (Clark, 2005). The university's online program has helped fulfill these missions which can be seen in the huge increase in online course enrolment offered at BYU-I in the last decade. Raising the quality of online students' experience, correlates with improving the professional development of online instructors. This dissertation provides research based information to help increase the effectiveness of online courses and important information needed in professional development in order to best support online instructors. Implementation of any or all of these suggestions will help increase teaching effectiveness as the university continues to explore ways to improve student satisfaction, especially in the online learning program.

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Appendices

Appendix A

Demographic Instructor Survey Information

Demographic Information

Directions: Please answer the following questions as they relate to your current teaching situation.

I am a:
- ❍ Male (1)
- ❍ Female (2)

Age:
- ❍ less than 25 (1)
- ❍ 25-34 (2)
- ❍ 35-44 (3)
- ❍ 45-54 (4)
- ❍ 55-64 (5)
- ❍ 65+ (6)

How long have you taught online for BYU-Idaho?
- ❍ less than one semester (1)
- ❍ 1-2 semesters (2)
- ❍ 3-5 semesters (3)
- ❍ over 5 semesters (4)

Have you ever taught online for other universities?
- ❍ Yes (9)
- ❍ No (10)

Answer If Have you ever taught online for other universities? Yes Is Selected

Q54 For which other university(ies) have you taught online?

Answer If Have you ever taught online for other universities? Yes Is Selected

How long have you taught online for other universities?
- ❍ less than one semester (1)
- ❍ 1-2 semesters (2)
- ❍ 3-5 semesters (3)
- ❍ over 5 semesters (4)

In what department/subject area do you teach?
- ❍ Art (1)
- ❍ Biology (2)
- ❍ Business (3)
- ❍ Communications (4)
- ❍ English (5)
- ❍ Foundations (6)
- ❍ Home and Family (7)
- ❍ Language (8)
- ❍ Math (9)
- ❍ Pathway (10)
- ❍ Religious Education (11)
- ❍ Science (12)
- ❍ Sociology/Psychology (13)

How were you prepared to teach? Check all that apply.

- ❑ Undergraduate teacher education program (teacher certification) (1)
- ❑ Graduate program of one year beyond bachelor's degree (2)
- ❑ Combined undergraduate and graduate programs (3)
- ❑ Doctorate level program (4)
- ❑ Online teacher training program (5)
- ❑ Other specialized trainings (6)

Would you be willing to participate in a confidential focus group discussing your teaching group experience?

- ❍ Yes (9)
- ❍ No (10)

Appendix B

Online Instructor Self-efficacy Survey

Online Instructor Self Efficacy Survey

adapted from the Online Educator Self-Efficacy Scale (OESES), the Online Technologies Self-Efficacy Sale (OTSES), Lee's Self-efficacy Instrument, and Tschannen-Moran & Hoy's Teacher Efficacy Construct.

This assessment is divided into two sections. Section I includes information about the survey and asks for your willingness to participate. Section II contains items designed to assess the self-efficacy of online teachers' pedagogical skills, technical skills, and subject matter expertise.

SECTION I: Informed Consent

You are invited to participate in a survey. The goal of this research study is to identify self-efficacy of instructors in online learning at BYU-Idaho. This study is being conducted by Heather (Bosworth) Carter, Jeffrey Hochstrasser, Rachel Huber, and Brett Yadon, in association with the University of Idaho. In order to participate in this study you need to be an online learning instructor at BYU-Idaho. Participation in this study is voluntary. If you agree to participate in this study, you would be asked to complete a short survey. The survey includes questions about your demographics, perception of your teaching in terms of use of technology, subject matter expertise, and online instruction pedagogy. Participating in this study may not benefit you directly, but it will help us learn how to improve instructor training and professional development for online education. You may skip any questions you don't want to answer and you may end the survey at any time. The information you will share with us if you participate in this study will be kept completely confidential to the full extent of the law. Your information will be assigned a code number that is unique to this study. When the study is completed and the data have been analyzed, the list linking participant's names to study numbers will be destroyed. Study findings will be presented only in summary form and your name would not be used in any report. If you have any questions about this study, please contact us. If you have questions about your rights as a research participant, please contact University of Idaho IRB. YOU WILL BE GIVEN A COPY OF THIS FORM WHETHER OR NOT YOU AGREE TO PARTICIPATE.

Your responses will be kept confidential. Thank you for completing this survey.

Do you agree to participate in this survey?

- ❍ Yes (9)
- ❍ No (10)

SECTION II: Online Instructor Self-efficacy Survey

Directions: For each of the following topics, select the box that best indicates your level of confidence in performing the described teaching task.

Pedagogical skill: Assess your level of confidence in accomplishing the following pedagogical techniques online.

Q11 Addressing the diverse needs of students
- ❍ Very Confident (1)
- ❍ Somewhat Confident (2)
- ❍ Not Very Confident (3)
- ❍ Not Confident At All (4)

Q61 Responding promptly to student questions and concerns
- ❍ Very Confident (1)
- ❍ Somewhat Confident (2)
- ❍ Not Very Confident (3)
- ❍ Not Confident At All (4)

Q12 Successfully teaching difficult students
- ❍ Very Confident (1)
- ❍ Somewhat Confident (2)
- ❍ Not Very Confident (3)
- ❍ Not Confident At All (4)

Q13 Exerting a positive influence on the personal development of my students
- ❍ Very Confident (1)
- ❍ Somewhat Confident (2)
- ❍ Not Very Confident (3)
- ❍ Not Confident At All (4)

Q63 Exerting a positive influence on the academic development of my students
- ❍ Very Confident (1)
- ❍ Somewhat Confident (2)
- ❍ Not Very Confident (3)
- ❍ Not Confident At All (4)

Q22 Crafting critical questions for students (questions that require analytical thinking)
- ❍ Very Confident (1)
- ❍ Somewhat Confident (2)
- ❍ Not Very Confident (3)
- ❍ Not Confident At All (4)

Q62 Developing critical thinking skills in my students
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q23 Preparing students for the workforce
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q15 Requiring my students to think beyond content toward application and discovery
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q14 Supporting student interaction in asynchronous online discussions (forums or discussion boards)
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q59 Supporting student interaction in synchronous class settings (Adobe Connect or Skype)
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q16 Building a community where students interact with and learn from each other
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q64 What has had the biggest impact in your feelings of confidence in teaching online?

Technological skill: Assess your level of confidence in performing the following technical skills online.

Q28 Copying and pasting content
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q26 Bookmarking a website
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q27 Creating a hyperlink and sharing the hyperlink with students
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q29 Downloading (saving) an image from a web site to your computer
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q30 Uploading or attaching an image to classroom notes or announcements
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q31 Chatting live via a synchronous chat system such as Adobe Connect or Skype
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q32 Reading messages from one or more members of the synchronous chat system (Adobe Connect/Skype)
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q33 Answering a message or starting my own message in a synchronous chat system (Adobe Connect/Skype)
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q34 Using video and microphones in a synchronous chat system (Adobe Connect/Skype)
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q36 Logging on and off the myBYUI email system
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q37 Sending an email message to more than one person at the same time using the mail system in I-Learn
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q38 Attaching a file to an email message
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q45 Updating course notes and announcements
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q39 Creating a new thread in an online discussion board
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q41 Replying to students' discussion board messages and questions
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q42 Uploading a file to a discussion board thread
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q44 Creating a screencast or podcast
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q46 Sharing video and audio files with students
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q65 What task do you feel most confident about executing in terms of using technology to teach online?

Q66 What task do you feel least confident about executing in terms of using technology to teach online?

Knowledge of subject matter: Assess your level of confidence in understanding the subject you teach.

Q51 Answering students' questions about the subject outside the textbook or course materials
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q56 Providing an alternative explanation or example when students are confused
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q57 Teaching students about the subject in simple yet engaging ways
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q49 Understanding the subject well enough to effectively teach both high-performing and struggling students
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q58 Increasing my content knowledge and expertise outside of the classroom
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q47 Being aware of new discoveries in my field of study
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q48 Sharing new discoveries in my field with my students
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q52 Presenting practical, work-related knowledge of the subject to my students
- Very Confident (1)
- Somewhat Confident (2)
- Not Very Confident (3)
- Not Confident At All (4)

Q67 What do you feel has the biggest impact on your ability to teach your subject of expertise online?

Appendix C

Online Student Evaluations

BYU-Idaho end of Semester Course Evaluation by Students

BYU-IDAHO COURSE EVALUATION

Please evaluate the following instructor and course. When you are finished, click on the SUBMIT button at the bottom of the page. Your identity is completely anonymous. Please be as thorough and as accurate as possible. Your feedback is highly valued. It is used by your instructor and the school's administration to improve teaching.

Instructor:	**CHECKETTS MAX L**
Course :	**REL 233** **CHURCH HISTORY**
Section:	**9**

Items about Your Performance in this Class: CHECKETTS MAX L -- REL 233

		not applicable	strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree	very strongly agree
1.	I was prepared for each class.	○	○	○	○	○	○	○	○
2.	I arrived at class on time.	○	○	○	○	○	○	○	○
3.	I was an active participant in online or face-to-face class discussions.	○	○	○	○	○	○	○	○
4.	I sought opportunities to share my learning with others outside of class.	○	○	○	○	○	○	○	○
5	I worked hard to meet the requirements	○	○	○	○	○	○	○	○

	of this class.								
6.	I sought opportunities to reflect on what I had learned in the class.								
7.	I feel that I made important contributions to the learning and growth of fellow classmates.								
8.	The course as a whole has produced new knowledge, skills, and awareness in me.								

Items about the Course: CHECKETTS MAX L -- REL 233

		not applicable	strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree	very strongly agree
1.	Course objectives were clear.								
2.	Course was well-organized.								
3.	Student responsibilities and expectations were clearly defined.								
4.	Instructional resources –								

	textbook(s), course guide(s), online material, etc – were useful and helped me to achieve course objectives.								
5	Assessment activities – exams, quizzes, papers, hands-on demonstrations, presentations, etc. – accurately and fairly measured the knowledge and abilities I acquired from the course.	○	○	○	○	○	○	○	○
6.	Class assignments contributed to my learning and growth.	○	○	○	○	○	○	○	○
7.	The course provided opportunities to learn from and teach other students.	○	○	○	○	○	○	○	○
8.	Group work, if assigned,	○	○	○	○	○	○	○	○

	was beneficial and meaningful.								
9.	Students were actively involved in this class through discussions, group work, and teaching.								

Appendix D

BYU-Idaho IRB Approval - Group Research

BYU
IDAHO

October 21, 2013

Dear Heather,

Your request to use human subjects for the study entitled *Assessment of Online Learning and Technologies in Higher Education* is approved for 12 months from the date of this letter.

Please notify the IRB if you intend to make any significant modifications to the study's design or implementation.

Good luck with your study.

Regards,

Scott J. Bergstrom

Scott J. Bergstrom, Ph.D.
Chair, BYU-Idaho Institutional Review Board

Scott J. Bergstrom *Director, Institutional Research & Assessment, Kimball 290C*
Phone (208) 496-1136 Fax (208) 496-5136 E-mail bergstroms@byui.edu

Appendix E

University of Idaho IRB Approval – Group Research

University of Idaho

September 19, 2013

Office of Research Assurances
Institutional Review Board
875 Perimeter Drive, MS 3010
Moscow ID 83844-3010

Phone: 208-885-6162
Fax: 208-885-5752
irb@uidaho.edu

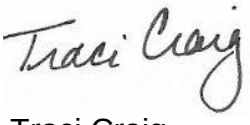
To: Linda Taylor
Cc: Heather Carter, Jeffrey Hochstrasser, Rachel Huber & Brett Yadon

From: Traci Craig, PhD
Chair, University of Idaho Institutional Review Board
University Research Office
Moscow, ID 83844-3010
Title: 'Assessment of Online Learning and Technologies in Higher Education'

Project: 13-201
Approved: 09/19/13
Expires: 09/18/14

On behalf of the Institutional Review Board at the University of Idaho, I am pleased to inform you that the protocol for the above-named research project is approved as offering no significant risk to human subjects.

This approval is valid for one year from the date of this memo. Should there be significant changes in the protocol for this project, it will be necessary for you to resubmit the protocol for review by the Committee.



Traci Craig

Appendix F

Discussion Board Rubric

		Practice	Low	Medium	High
Cognitive Presence	**1.**	Select discussion topics that relate directly to the students' main curriculum. (Hew, Cheung & Ng, 2009)	No assignment of a specific discussion board topic. Students are assigned only to post on a vague or general topic that does not relate to the curriculum.	The discussion board topic is repetitive from other topics in the course. For example, a repetitive assignment to post, "what did you learn this week?" or the topic selected does not relate to the curriculum.	The discussion board is individualized to a current, specific topic in the course curriculum.
	2.	Use of controversial topics in the discussion board to stimulate discussion. (Hew et al., 2009)	No controversial topics are outlined and students are encouraged to agree with each other.	Controversial topics may be used, but students are not encouraged to take opposing viewpoints.	Controversial topics are used and students are encouraged to think about how they might present opposing views.
	3.	Use note starters or prompts to initiate thinking. (Hew et al., 2009; Thompson, 2006)	There are no discussion board prompts.	Some prompts are used, but they are general and/or repetitive.	Specific and distinct prompts to the discussion board are used.
	4.	Ask open ended questions where there may not be a correct answer or solution. (Hew et al., 2009)	A majority of questions are not open ended or there is only one correct response.	Some questions are "yes" or "no" and others are open ended, but can be adequately answered with simple responses.	Questions have no clear answer and cannot be answered with a "yes" or a "no". All questions require substantive responses.
	5.	Number of educationally valuable content posts per discussion board. (Bliss & Lawrence, 2009)	Number of content related posts in the discussion board. The posts have to be specific to course material designed to be covered in the discussion board.		

	6.	Use Socratic questioning to enhance student's critical thinking skills. (Berry, 2008; Hew et al., 2009)	No questions are part of the discussion board, rather the discussion board encourages only statements of agreement or opinion only.	General guidelines encouraging students to "think critically" or "challenge" the comments of others are made, but the guidelines are vague and not specific.	Students are encouraged to clarify statements and assumptions and to present evidence supporting statements.
Social Presence	**7.**	Number of educationally valuable social posts per discussion board. (Bliss & Lawrence, 2009)	Number of social posts where students congratulate or encourage one another.		
	8.	Use of ground rules addressing respectful behavior in the discussion board. (Hew et al., 2009)	No rules for respectful behavior are provided.	Ground rules for respectful behavior are provided, but are not repeated, modeled or enforced.	Ground rules for respectful behavior are clearly outlined, periodically repeated, modeled and enforced.
	9.	Assign students to groups of 4-9 students. (Berry, 2008; Bliss & Lawrence, 2009)	No group assignments in the discussion board.	Students are assigned to groups, but group size is less than 4 or larger than 9.	Students are assigned to groups of 4-9 students.
	10.	Assign students the role of summarizer. (Hew et al., 2009)	There is no role assignment or the instructor assumes the role of summarizer in the discussion.	Students are encouraged to summarize discussion, but not assigned to the role.	Students are assigned to the role of summarizer and are given examples of how to perform the summarizer function.
	11.	Use of a student rather than an instructor as discussion board facilitator. (Hew et al., 2009)	No facilitation.	Instructor facilitated.	Student facilitated.

Teaching Presence	**12.**	Number of instructor posts to a discussion board. (Sherer-Bassani, 2011; Thompson, 2006)	The number of instructor posts to the discussion board.		
	13.	Number of probing questions posed by the instructor per discussion board. (Sherer-Bassani, 2011)	The number of open ended questions posed by the instructor in the discussion board.		
	14.	Timeliness of instructor posts to other responses.	Time between student post and instructor response in a discussion board.		
	15.	Adequately prepare students to participate with the technology. (Hew et al., 2009)	Students receive no technological training or instruction.	Students receive minimal technological training or instruction on how to use the discussion board.	Helps and guides with examples are provided with instruction on how to use the discussion board.
Discussion Board Management	**16.**	Assign a grade or other incentive to discussion board participation. (Hew et al., 2009; Thompson, 2006)	No grade or other incentive is applied to discussion board activities.	Discussion board participation comprises less than a third of the student's final grade	Discussion board participation comprises a third or more of the student's final grade
	17.	Outline a rubric for discussion board assessment. (Berry, 2008; Hew et al., 2009)	No rubric.	General comments or non-specific comments are made about grading.	Specific and descriptive rubrics are outlined with clear wording and examples.
	18.	Clearly state the purpose of the discussion board activity. (Hew et al., 2009)	No statement of purpose or description of the use of discussion boards in course objectives.	Discussion boards are suggested as useful, but described with general purpose statements and not aligned with course objectives.	Each discussion board has a unique purpose that is clearly defined and linked to course objectives.

	19.	Assign deadlines for student contribution. (Hew et al., 2009; Thompson, 2006)	No deadlines assigned for posting.	Deadlines are set for the discussion board topic in general, but with no guidelines to original or subsequent responses.	Deadlines are set for both original contributions and subsequent responses.
	20.	Use easy navigation techniques. (Hew et al., 2009; Thompson, 2006)	Discussion board navigation is cumbersome, confusing or time consuming.	Discussion board navigation is adequate, but not intuitive.	Discussion board navigation is intuitive and allows for simultaneously viewing of assignments, posts and responses.

References

Berry, G. (2008). Asynchronous discussions: Best practices. *Paper presented at the 24th Annual Conference on Distance Teaching & Learning, Madison, Wisconsin.* Retrieved from http://www.uwex.edu/disted/conference/Resource_library/proceedings/08_12701.pdf

Bliss, C. A., Lawrence, B. (2009). Is the whole greater than the sum of its parts? A comparison of small group and whole class discussion board activity in online. *Journal of Asynchronous Learning Networks*, *13*(4), 25-39.

Hew, K. F., Cheung, W. S., Ng, C. S. L. (2009). Student contribution in asynchronous online discussion: a review of the research and empirical exploration. *Instructional Science*, *38*(10), 571-606.

Scherer-Bassani, P. B. (2011). Interpersonal exchanges in discussion forums: A study of learning communities in distance learning settings. *Computers & Education*, *56*(4), 931-938.

Thompson, J. T. (2006). Best practices in asynchronous online course discussions. *Journal of College Teaching & Learning*, *3*(7). Retrieved from http://cluteonline.com/journals/index.php/TLC/article/view/1698/1678

Appendix G

Community of Inquiry Survey

Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, & Swan, K. P. (2008). Developing a community of inquiry instrument: Testing a measure of the Community of Inquiry framework using a multi-institutional sample. *The Internet and higher Education*, 11(3-4), 133-136

Community of Inquiry instrument questions. Ordinal responses are scored using the scale (0=Strongly Disagree) to (4=Strongly Agree).

		D				***A***
Teaching Presence						
Design & Organization						
	The instructor clearly communicated important course topics.					
	The instructor clearly communicated important course goals.					
	The instructor provided clear instructions on how to participate in course learning activities.					
	The instructor clearly communicated important due dates/time frames for learning activities.					
Facilitation						
	The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.					
	The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.					
	The instructor helped to keep course participants engaged and participating in productive dialogue.					
	The instructor helped keep the course participants on task in a way that helped me to learn.					
	The instructor encouraged course participants to explore new concepts in this course.					
	Instructor actions reinforced the development of a sense of community among course participants.					
Direct Instruction						
	The instructor helped to focus discussion on relevant issues in a way that helped me to learn.					
	The instructor provided feedback that helped me understand my strengths and weaknesses.					
	The instructor provided feedback in a timely fashion.					
Social Presence						
Affective expression						
	Getting to know other course participants gave me a sense					

	of belonging in the course.					
	I was able to form distinct impressions of some course participants.					
	Online or web-based communication is an excellent medium for social interaction.					
	Open communication					
	I felt comfortable conversing through the online medium.					
	I felt comfortable participating in the course discussions.					
	I felt comfortable interacting with other course participants.					
	Group cohesion					
	I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.					
	I felt that my point of view was acknowledged by other course participants.					
	Online discussions help me to develop a sense of collaboration.					
	Cognitive Presence					
	Triggering event					
	Problems posed increased my interest in course issues.					
	Course activities piqued my curiosity.					
	I felt motivated to explore content related questions.					
	Exploration					
	I utilized a variety of information sources to explore problems posed in this course.					
	Brainstorming and finding relevant information helped me resolve content related questions.					
	Online discussions were valuable in helping me appreciate different perspectives.					
	Integration					
	Combining new information helped me answer questions raised in course activities.					
	Learning activities helped me construct explanations/solutions.					
	Reflection on course content and discussions helped me understand fundamental concepts in this class.					
	Resolution					
	I can describe ways to test and apply the knowledge created in this course.					
	I have developed solutions to course problems that can be applied in practice.					
	I can apply the knowledge created in this course ton my work or other non-class related activities					

Appendix H

University of Idaho IRB Approval Individual Research

University of Idaho
Office of Research Assurances (ORA)
Institutional Review Board (IRB)
875 Perimeter Drive, MS 3010
Moscow ID 83844-3010

Phone: 208-885-6162
Fax: 208-885-5752
irb@uidaho.edu

September 11, 2013

To: Linda Taylor
Cc: Susan Kologi

From: IRB, University of Idaho Institutional Review Board

Subject: Exempt Certification for IRB project number 13-223

Determination: September 11, 2013
Certified as Exempt under category 1 & 2 at 45 CFR 46.101(b)(1 & 2)
IRB project number 13-223: Moral Reasoning

This study may be conducted according to the protocol described in the Application without further review by the IRB. As specific instruments are developed, each should be forwarded to the ORA, in order to allow the IRB to maintain current records. Every effort should be made to ensure that the project is conducted in a manner consistent with the three fundamental principles identified in the Belmont Report: respect for persons; beneficence; and justice.

It is important to note that certification of exemption is NOT approval by the IRB. Do not include the statement that the UI IRB has reviewed and approved the study for human subject participation. Remove all statements of IRB Approval and IRB contact information from study materials that will be disseminated to participants. Instead please indicate, "The University of Idaho Institutional Review Board has Certified this project as Exempt."

Certification of exemption is not to be construed as authorization to recruit participants or conduct research in schools or other institutions, including on Native Reserved lands or within Native Institutions, which have their own policies that require approvals before Human Subjects Research Projects can begin. This authorization must be obtained from the appropriate Tribal Government (or equivalent) and/or Institutional Administration. This may include independent review by a tribal or institutional IRB or equivalent. It is the investigator's responsibility to obtain all such necessary approvals and provide copies of these approvals to ORA, in order to allow the IRB to maintain current records.

This certification is valid only for the study protocol as it was submitted to the ORA. Studies certified as Exempt are not subject to continuing review (this Certification does not expire). If any changes are made to the study protocol, you must submit the changes to the ORA for determination that the study remains Exempt before implementing the changes. The IRB Modification Request Form is available online at: http://www.uidaho.edu/ora/committees/irb/irbforms

Appendix I

BYU-Idaho IRB Approval – Individual Research

Email from Scott Bergstrom, BYU-Idaho Institutional Research Officer on October 4, 2013

Thanks. If the online guys are OK with this, then you are OK to proceed.

Sent from my iPad
> <13-223 Exempt Certification Letter-1.pdf>
> <IRB_Yadon v01.docx>