DESIGNING A SUPPORTIVE BLENDED LEARNING EXPERIENCE:

THE RELATIONSHIP BETWEEN STUDENT PERFORMANCE and SOCIAL, TEACHER, and COGNITIVE PRESENCE

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Project Abstract

This study sought to deconstruct the educational experience in a blended classroom (with both online and face-to-face instruction) in order to test for specific associations between elements of that experience and achievement (final course grade). The Community of Inquiry (CoI) (Garrison, 2011) framework considers a student's educational experience as a combination of social, cognitive, and teacher interactions. Working with a large data set (n = 1,926) collected over three years (2011-2014) in 13 undergraduate, blended classrooms at a prominent Canadian university, this study examined how student perceptions of these interactions (with peers, course content, and instructors) related to grades.

Using Structural Equation Modelling (SEM) (Tabachnick & Fidell, 2007) and ANOVA techniques (Warne, 2014) this study was able to consider the presence-achievement relationship in the context of other important variables such as: student adoption attitudes, the quality of the online course design, and varying blend formats (the differing amount of course time spent online versus face-to-face in each course design). Findings indicate a significant ($p < 0.001$), positive relationship between presence and achievement (path coefficient 0.16), with results on the presence interrelationship [teacher → social (0.23, $p < 0.001$), and social → cognitive (0.45, $p < 0.001$)] highlighting the role of teacher presence in promoting achievement. Student adoption attitudes were also highlighted as a factor in the presence-achievement relationship (0.41, $p < 0.001$), as well as blend format ($F(4, 1921) = 29.98$, $p < 0.001$), where the more integrated, clear, communicative, and consistent a course was about expectations and assessments, the more presence students felt and in turn, the higher they performed.

Results from this study illustrate the potential to design for presence as a catalyst to achievement in blended learning. Key takeaways include the role of blended tutorials in the learning experience, the importance of professional development opportunities that help teachers better understand their interactions as presence, and support programs for students that help to cultivate a more positive adoption attitude towards ICT in their educational experience.

Dedication

For my family, my first teachers and most powerful education.

Thank you for helping me to learn the importance of hard work, the power of believing in yourself, and the beautiful humility in asking for help. Everything I accomplish in life comes from the living of these lessons, and knowing the unwavering love and support that accompanies them.

For Ban, the best roommate ever – whose support and kindness made the process bearable!

#Cheerleader

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CHAPTER 1: Introduction

Technology enhanced learning is an important 21st century reality (Griffin, 2012; Jenkins & Ford, 2013) that is increasingly becoming a centrepiece in higher education (Trilling & Fadel, 2012; Pelligrino, 2012). Today witnesses the highest number of academic courses offered in a blended format [with both online and face-to-face (F2F) instruction] (Waldman & Smith, 2013), but current course designs are falling short (Owston, York & Finkel, 2013). Research suggests varied student attitudes to course design and delivery (Al-Harbi, 2011; Snart, 2010) and mixed achievement levels within blended spaces (So & Bonk, 2010; Owston, York, & Murtha, 2013; Vaughan & Garrison, 2013), indicating that we do not yet fully understand how to support all learners in these spaces (Garrison & Kanuka, 2004; Owston, Lupshenyuk, Wideman, & Murphy, 2008; Owston, & York, 2012). With clear connections already made between achievement and a positive learning experience (Islam, 2013; Lee & Lee, 2008; Owston, et. al, 2013), this study seeks to deconstruct the blended educational experience into specific components, which can then be tested for associations with achievement, in order to design blended experiences that more consistently support positive student attitudes and outcomes.

The Community of Inquiry (CoI) (Garrison, 2011) model considers the educational experience as a collaborative-constructivist process that involves learners being "present" in social interactions with peers, in cognitive interactions with content, and in formative interactions with their instructors (Arbaugh, Cleveland-Innes, Diaz, Garrison, Richardson, & Swan, 2008). By deconstructing experience along the lines of presence, cognitive, social, and teacher interactions become the foundation of a positive learning space. The examination of the "experience-achievement" relationship, as the "presence-achievement" relationship is a unique contribution to the literature around blended learning at the higher education level. However, having designed a statistical analysis that was also able to consider the role of exogenous variables [student adoption attitudes, the quality of online course designs, and the effect of varying blend formats], the discussion around the blended experience has become much richer.

My interests as a researcher lie in the design of engaging, supportive blended experiences, because I believe that the integration of information communications technology (ICT) has become an important piece of the learning puzzle. I see an effective blended experience (with both F2F and online components) as one where design elements (curriculum, pedagogy, assessment, and technology) work together to actively engage students and teachers in the learning process, ultimately improving learner outcomes. If a positive student experience is an important contributing factor to achievement, how can we distil the important elements of engagement in to better inform blended instructional design?

This broader question has fuelled my dissertation focus on the unpacking of experience along the lines of cognitive, social, and teacher presence (Garrison & Vaughan, 2008). Can the theoretical notion of presence, with its emphasis on interaction and inquiry in digital spaces, be a catalyst for achievement in blended courses? And if so, how can we design to better promote it? The availability of extensive longitudinal data on the student experience in blended courses at a prominent Canadian university led me to select higher education as the initial testing ground for the possible connections between aspects of presence (cognitive, social, and teacher) and achievement (grade).

1.2 Research Objectives

This dissertation is focused on the study of presence in blended courses within higher education and how it relates to achievement in those spaces. The specific objectives are to examine:

1. How do student perceptions of social, teaching, and cognitive presence in blended courses relate to student achievement?
2. How does the online design of a blended course relate to student perceptions of presence and student achievement?
3. How do student adoption attitudes relate to perceptions of presence and achievement in blended courses? and
4. How does the format of the blend (i.e., the relative amount of time spent online versus face-to-face) relate to student adoption attitudes, presence, and achievement?

1.3 Significance and Rationale of the Study

With an increasing demand for educational environments that account for the digital age of work and life that surround them, education professionals need to better understand what they can do to design engaging, technology enhanced learning experiences. A review of the literature will point to specific gaps in the support currently offered to students in blended programs. There is a common progression at the levels of institutional management (Beetham & Sharpe, 2013; Carey & Trick, 2013), and pedagogy (Graham, Woodfield, & Harrison, 2013; Masterman, 2013) towards the increased use of online and blended formats, but a lack of knowledge around how to make these changes in a manner that supports consistently positive student outcomes (Griffin, 2012; Owston, York, & Murtha, 2013; Vaughan, 2010). Decades of research examining the impact of technology suggest that indeed, it does have the potential to enhance student learning (Bernard, Abrami, Borokhovski, Wade, Tamim, Surkes, & Bethel, 2009), and blended courses, in particular, have been shown to appeal to a great number of students in higher education. However, research also shows that some students truly struggle (Bullen, & Janes, 2007; Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011).

As contributing factors to the student experience, teachers also display varying attitudes towards blended courses (Angeli & Valanides, 2005; Snart, 2010), and institutions, in their attempt to keep up with 21st century economic trends (Bellanca, 2010; Pelligrino, 2012; Trilling & Fadel, 2012) remain unsure of how best to afford or address the needs of their continuously diversifying student populations (Garrison, & Vaughan, 2013; Graham, Woodfield, & Harrison, 2013; Twigg, 2003). These distinct economic shifts include both technologically mediated knowledge exchange, and the skill of self-regulation, which blended learning has the potential to target. With teachers, students, and university administrators alike facing the reality of an increased popularity of technology enhanced collaboration, the question then becomes how to best support students and address gaps in the current blended model. This study sought to further unpack the educational experience in order to better support learners and in turn, positively affect student outcomes in blended classrooms.

The Community of Inquiry (CoI) model (Garrison, Anderson, & Archer, 2000) takes the idea of being invested in one's educational experience and breaks it down into three distinct components – cognitive, social, and teaching presence. Examples of cognitive presence include the design of activities that stimulate curiosity and are easily navigated. Examples of social presence can be seen in relation to online discussion forums and how comfortable a student feels to contribute, or challenge another's ideas. How available a student feels their teacher is, or how helpful they were in guiding students towards new information, leads to a measure of teacher presence. This research connected a wealth of student data (n= 1,926) to quantifiable measures of presence in order to better understand the relationship between presence and achievement (objective 1). The influence of exogenous variables such as the quality of a course's online design (objective 2) and student adoptions attitudes (objective 3) were also considered. Lastly, varying levels of technological integration (blend format) was studied in relation to variances in presence, adoption attitude, and achievement (objective 4).

1.4 Chapter Summary

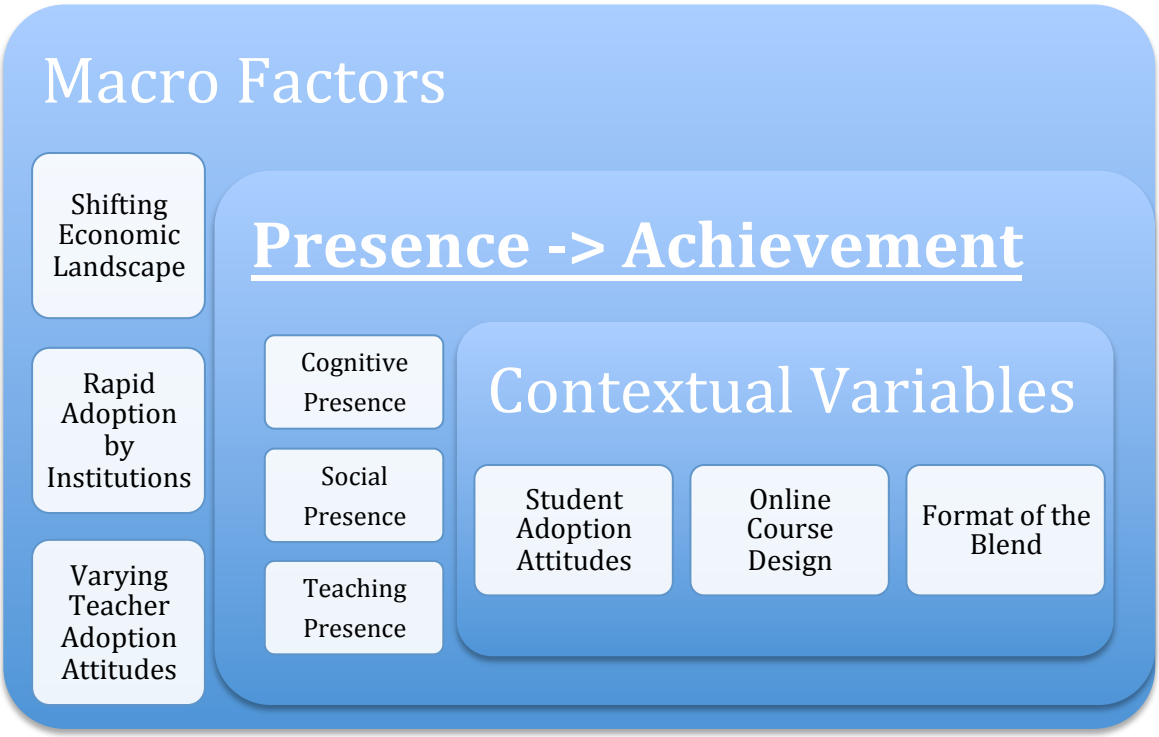


Figure 1. Examining the Presence-Achievement Relationship: Designing for Consistent Student Outcomes in Blended Spaces

CHAPTER 2: Literature Review

This study is concerned with the student experience within a blended course. With the presence-achievement relationship at its core, contextual variables under examination include the role of student adoption attitudes, the quality of the online course designs (Moodle), and student perceptions in relation to blend format. I begin with a review of the pertinent literature surrounding achievement in blended spaces, defining "achievement" for the context of this research, and in relation to previous studies on performance in blended spaces. I will follow with an analysis of the contextual variables including: student adoption attitudes, quality of online course design, and format of the blend.

Given the macro-trends towards blended learning outlined above, the first contextual variable under consideration will be why students may choose (or not) to adopt technology-enhanced learning. The themes of increased technological prevalence, diverse teacher adoption attitudes, and a lack of student readiness for these environments point to a need to examine the role of student adoption attitudes on presence, as a potential contributing factor to learning outcomes within a blended space. Literature will then be considered regarding student perceptions of online course designs and how the quality of those designs has been shown to affect the student learning experience, presenting a gap in regards to how the quality of a learning management system may specifically relate to student perceptions of presence. While limited, literature around the format of the blend will be considered in connection to the presence-achievement relationship, highlighting a gap that this study is aimed at addressing – the format of the blend as potentially a contributing factor to achievement. The presence-achievement relationship has yet to be studied in this comprehensive of a design, and the interpretation of findings from this research inform a discussion on the relationship between presence and achievement within the context of higher education in an urban, Canadian context.

2.1 Student Achievement in Blended Courses

> In addition to motivations for increasing hybrid course offerings that include institutional pressures to manage campus resources and individual faculty interest in teaching with technology…[W]hat really matters, of course, is how such grand ideas are operationalized for administrators, faculty, and the students who live the everyday [hybrid] reality. In other words, what do course-specific learning objectives and outcomes look like? Do the specific goals that students are to achieve and the basic competencies they are to display upon completion of a particular course reflect larger institutional objectives? (Snart, 2010, p.15)

The term "student" will be employed in this text to broadly encompass the learner population in undergraduate higher education classrooms within the Canadian context. It is critical to understand that the term student or "learner" includes an extremely diverse set of cultural backgrounds and individual experiences. Owston, York, and Murtha (2013) conducted research at a large, urban Canadian comprehensive university investing in scaling up its blended course offerings and measured student perceptions of their blended experience along four indicators: course satisfaction, convenience, engagement, and learning outcomes (which were strongly correlated to the students' final course grades). How learners feel they are doing in a course and how connected they feel impacts how well they will ultimately do. According to the authors, being a "high-achiever" plays a significant role in blended achievement. High achieving students were more satisfied overall and would take another blended course. Low achievers on the other hand found the courses less engaging, less convenient, and a harder place to assimilate new content. Why is it that research shows some students are not able to cope as well within a blended environment (Bernard, Borokhovski, Schmid, Tamim, & Abrami, 2014)?

Assessment and achievement are two distinct concepts. In the literature, the achievement of learning outcomes (as opposed to student satisfaction) in technology enhanced courses has been quantified as a course grade and/or cumulative grade point average (Abdous & Yen, 2010; Artino, 2009; Owston, York, & Murtha, 2013; Vaughan, Cleveland-Innes, Garrison, 2013; Xiao & Lucking,

2008). Assessment, however, is considered the means by which quantitative achievement is determined (Vaughan, Cleveland-Innes, & Garrison, 2013). Why is it that some students achieve through blended assessment practices and others do not? Some studies have found that fully online or blended learning has the potential to yield consistently positive results (Dziuban, Hartman, Juge, Moskal, & Sorg, 2006; U.S. Department of Education, 2010), while many more consider definitive factors in achievement to be specifically the use of the course management system in assessment (Moeller, Spitzer, & Spreckelsen, 2010; Reiss & Steffens, 2010) or the level of interactivity present in tasks online (Kember, McNaught, Chong, Lam, & Cheng, 2010; Lopez-Perez, Perez-Lopez, and Rodriguez-Ariza, 2011; McCarthy, 2010).

One of the most striking findings from the Owston et. al (2012) report was the strong relationship between perception/attitude and grades. High-achievers were more satisfied with the blended experience, and they felt that the technology was "convenient" and "engaging" as opposed to low-achieving students who described the course as "overwhelming" or "frustrating". This association between attitude and experience highlights the need to further examine adoption attitude as a contextual factor in the presence-achievement relationship. This connection between attitude, course perceptions and achievement levels was a unique contribution to the literature by Owston and his team (2012), with distinct take aways around high achievers in a blended course feeling more satisfied, engaged, and connected to their learning experience. While this study situates itself in the literature around the blended student experience as it relates to achievement (Bliuc, Ellis, Goodyear, & Piggott, 2011; Chou & Chou, 2011; Mitchell & Honore, 2007; Moore & Gilmartin, 2010; Poon, 2012; Smyth, Houghton, Cooney, & Casey, 2012), it specifically builds off of the work by Owston et. al (2012) insofar as explicitly connecting attitudes to achievement, however through the construct of presence – which again, had yet to be explored in the literature as one model.

As the foundation of achievement, assessment has also presented challenges within a blended environment. One of the most prevalent challenges in blended courses is the absence of pertinent

diagnostic assessments (audience information, reflective needs assessments, and a clear understanding of expectations) prior to the commencement of a course (Anderson, Lankshear, Courtney, & Timms, 2008; Bain & Rice, 2006; Bellanca, 2010). Within a course, the four most common words students think of when asked to describe their perceptions of assessment are: fear, stress, anxiety, and judgement (Vaughan, 2010). These perceptions have a significant impact on how students approach learning (Biggs, 1998; Ramsden, 2003; Thislethwaite, 2006). The main gaps in effective blended assessment thus far are: a lack of assessments that are clearly linked to learning objectives and outcomes (Boston, Diaz, Gibson, Richardson, & Swan, 2009; Jefferies & Hyde, 2010; Sher, 2009; Sitzman, Ely, Brown, & Bauer, 2010), a lack of diversity in the methods of assessment available for students online (Entwistle, 2000; Eom, 2006; Snart, 2010; Vaughan, Cleveland-Innes & Garrision 2013), and a lack of student voice in feedback (Barab, Schatz, & Scheckler, 2004; Fenwick, 2013; Foundation Coalition, 2002; Gibbs & Simpson, 2004; Gibbs, 2006; Sheehy & Bucknall, 2008).

Hartman (2005) suggests that the organizational foundation of a blended course, regardless of the philosophy adopted (be it standardization or individualization), should be built on the foundation of effective systems of design (Graham & Dzuiban, 2007). Two recent literature reviews dealing with online assessment design inform this discussion, one by Gikandi, Morrow, and Davis (2011) and the other by Gilbert, Whitelock and Gale (2011). The first study points to the use of the following forms of formative assessment online: reflective self-assessment (as it ties it to the necessary self-regulation of online environments), peer-peer assessment tools (to promote social presence) and e-portfolios (which again involves a reflective element in the presentation of one's learning and an interactive element in formative peer/instructor feedback), none of which were employed by the courses under examination. Gikandi, Morrow, and Davis (2011) remind us, however, that these assessments need to be applied synergistically, as the ultimate function of online assessment is a “multidimensional perspective” of individual learners. Gilbert, Whitelock, and Gale (2011) agree that there needs to be an appropriate and systemic use of technology enhanced assessment strategies, ensuring a teacher’s chosen method(s) are

appropriate for the learning objective and that students are then adequately informed/prepared for those structures as they relate to course learning objectives. These new forms of assessment all require an understanding of the ICT structures that support them, the networked learning theories that are behind them, and the fact that blended assessment is moving away from testing the dissemination of knowledge and towards self-regulation as success criteria. A lack of teacher awareness or aptitude in the forms and functions of blended assessment can in turn create barriers to an effective user experience and potentially student achievement (course grades).

Given the contested nature of blended assessment, it is reasonable to assume that the combination of synchronous and asynchronous tasks present within each of this study's syllabi, does in fact serve as an adequate set of observable variables through which the latent variable of achievement is being measured. Looking at findings around the presence-achievement relationship in connection to online course designs will contribute to the literature around the impact of online systems on achievement (Moeller, Spitzer, & Spreckelsen, 2010; Reiss & Steffens, 2010). Findings on specific blend formats (see Appendix B: Outline of Blend Formats), where each blend represents a different combination of tasks and percentages of assessment placed online, will inform a discussion around certain methods of blending where research has demonstrated a propensity towards supporting lower achieving students (i.e. lecture capture) (Leadbeater, 2013; Traphagan et al. 2009; Williams & Fardon 2007). A survey completed by Owston, Lupshenyuk, and Wideman (2011) of 869 undergraduate students in Ontario universities found that the amount of time students spent accessing recorded lectures was significantly related to students final grades. Those students with a more solid understanding of the course's key concepts accessed the files less frequently than those who required more support (i.e. students who accessed the lectures four – six times per week achieved significantly lower grades that the students who accessed them two – three times per week). Contributions to potential instruction and assessment forms that support student outcomes will be made through a discussion of potential mean variance between different blended formats and achievement.

2.2 Student Adoption Attitudes

2.2.1 TECHNOLOGICAL PREVALENCE

> The adoption of blended learning (BL), the combination of traditional face-to-face and technology-mediated instruction, is increasing in higher education around the world. In fact, scholars have predicted that BL will become the "new traditional model" (Norberg, Dziuban, & Moskal, 2011; Ross & Gage, 2006) or the "new normal" in higher education course delivery. (Graham, Woodfield, & Harrison, 2013, p. 3)

As Lehmann (2009) writes: "when the printing press was invented, the outcome was not Europe plus some books, but a whole new Europe" (p. 3). A new revolutionary shift began with the introduction of ICT into our globalized world (Brauer, 2010). A recent EDUCAUSE report states that 99% of higher education institutions in North America are currently using a LMS (Dahlstrom, Walker, & Dziuban, 2014) to offer courses online or in a blended format. Blended learning in higher education has been one of the answers to the call for systemic change in relation to the socio-technical integration of ICT (Parker, Lenhart, & Moore, 2011; Trilling & Fadel, 2012). Students in higher education are situated within a global context (Amin, 2007; Neumeier, 2005) connected to an increasingly participatory culture (Jenkins, Ford, & Green, 2013) and expectations to interact with information technology as part of their personal and professional lives (Gee, 2013; Negroponte, 1995; Trilling & Fadel, 2012). In their annual survey, Allen and Seaman (2014) reported that 7.1 million college students took at least one online course during the fall semester of 2013, a 1.5 million increase from 2002. The latest Horizon Report (2015) from the New Media Consortium (NMC) highlights the fact that students are choosing technology more and more in higher education. A staggering statistic shows that now one in ten students enrolled in American higher education institutions were taking all of their courses exclusively online. An additional 13.3% of students were participating in blended courses. Building off of this observed trend of students gravitating towards technology enhanced learning options, the report predicts that blended learning will continue to rise in the coming years due to its

ability to draw on best practices from both online and face-to-face pedagogy (Johnson, Adams, Becker, Estrada, & Freeman, 2015).

Indeed, there have been numerous studies articulating young people's affinity for digital activities in relation to this growing technological prevalence. In a 2007 Pew study on teen Internet use, an overwhelming 89% of respondents reported using the Internet daily, with a positive attitude as to how it affected their lives (i.e. the internet made their lives "easier" or "more convenient"). A more recent Pew study (2015) on how teens use technology to connect to others found that 55% of teens are now using connective technology on a daily basis (instant messaging, social media, messaging apps, email, video chat, or video games). Owston (2009) references several surveys reporting that youth in America spend approximately nine hours a week on Web 2.0 activities. However, if you add the time those same youth would spend watching television, playing video games, texting, downloading entertainment, and listening to digital media, the number of hours grows to almost the same amount of time spent at a full-time job (Rideout, Roberts, & Foehr, 2005).

In their paper examining factors that influence student adoption of e-learning in Saudi Arabian universities, Al-Harbi (2011) conducted a mixed method analysis of adoption patterns amidst the undergraduate student population through a series of asynchronous online focus groups followed by semi-structured interviews. The study looked to assess normative beliefs and attitudes that surrounded students, and how those factors affected their choice to either adopt or not adopt e-learning practices. Findings highlighted an increased level of "flexibility" (Al-Harbi, 2011, p.93) and decreased demands on student time through "less commuting" (p.96), contributed to shaping the student's attitude towards adopting technology. In line with the previous discussion around broader macro influences, students who showed positive attitudes towards adoption pointed to social pressures such as "keeping up with trends" (p.93), and teacher beliefs about technology that were "extremely positive" (p.96). On the topic of access, many students were also quoted as saying the cost, the slow speed of the internet within their home, and the lack of access to devices on campus (libraries, within faculty buildings), were direct

contributing factors to their non-adoption of e-learning. This literature around diverse levels of student access and positive responses to the technologies that make their lives "easier" and "more convenient" are potential factors in a student's decision to adopt (or not) ICT, and will inform a discussion in this study around better targeting equitable educational experiences and outcomes.

2.2.2 LACK OF STUDENT READINESS

> Considering that most students in 1900 courses are first-year students who are unfamiliar with a university and may be challenged by blended learning, initial support for those students is vital to their academic success, as well as to the reputation of the Faculty. (Owston, York & Finkel, 2013, p.36)

Despite the rapid adoption and increased popularity of e-, mobile, and blended learning at the university level, surprisingly little research has been done thus far on the preparedness or readiness of students for the realities of these learning environments. Without a more explicit understanding of how readiness supports adoption for students prior to beginning a course, there is a danger of creating "an emphasis on enrolment over pedagogical soundness" (Snart, 2010, p. 33). This sentiment is echoed by Owston, York, & Finkel (2013) in their second evaluation report on the blended courses at a Canadian comprehensive university in the Faculty of Fine Arts, where they caution institutions from enrolling students in blended courses prior to gathering enough information about their level of preparedness, both technically (ICT) and academically (self-regulation). McVay (2000) developed one of the first measurement tools, a "readiness for online learning" questionnaire that uses scores on attitude and behaviours as predictors of student readiness. The questionnaire was used again (Smith, Murphy, & Mahoney, 2003; Smith, 2005) in the United States and in Australia and highlighted the two main contributing factors to student preparedness previously identified: comfort with e-learning and self-management when learning. These two factors were also shown to be differentiating elements to high versus low achieving student profiles, where high achievers expressed increased levels of comfort and ease in their navigation of blended courses (Owston, et. al, 2013). In their 2010 study, Blankenship and

Atkinson found that gender did not play as significant a role as previously thought in e-learning achievement, but e-learning comfort and strategies for self-regulation remained critical success factors across genders. In their more recent study at an Australian university, Parkes, Stein, and Reading (2014) asked faculty and students alike to rate levels of student preparedness across a set of 58 e-learning competencies (both technical and academic). The main take-aways from this research include:

1) students are often adept with the technologies they are exposed to in daily life (web-based, social networking) but not technologies that are new to them – such as a LMS;
2) time management is the most prevalent barrier to student self-management;
3) critical thinking skills associated with assessment (self-reflection, peer-to-peer feedback) are still very hard for students to navigate;
4) critically working, interacting, and collaborating with others in the co-creation of knowledge (the basis of social constructivist thought), was an aspect students were not prepared for; and
5) ongoing support programs are required to ensure that all students are adequately prepared for blended learning environments, both technically and academically (p.35).

Vaughan and colleagues (2013) believe that introductory surveys delivered prior to a blended course may "provide us with a shared understanding of our backgrounds, computer experience, goals, and expectations" (p. 127). It may be that low achieving students need more structure in their learning experience and face-to-face classes suit their needs better. Low achieving students might also need the support in developing the independent study skills required for self-regulated learning. Engaging in more diagnostic measurement prior to course commencement can make better connections between students and learning objectives – positively impacting retention (Beetham, & Sharpe, 2013; Jefferies & Hyde, 2010), and positively effect teacher attitudes (Carbonell, Dailey-Hebert, & Gijselaers, 2013; Guri-Rosenblit, 2009; Lopez-Perez, Lopez-Perez, & Rodriquez-Ariza, 2011). This connection between readiness and adoption will be discussed in relation to findings on the affect of adoption attitudes on the presence-achievement relationship.

2.2.3 THE ROLE OF TEACHER ADOPTION ATTITUDES

> A global progression into the utilization of LMS-based instruction has its challenges. Despite rapid advancement in technology and a worldwide growth in Internet usage, the perception of usefulness and ease, and the acceptance of technology are not universal among all teachers. (Vance & Crawford, 2013, pg.72)

For now, evidence remains that indeed some students do display improved achievement through blended programs, but there are still large numbers of students who have difficulty with the courses and the differing adoption attitudes from faculty (Bereiter & Scardamalia, 2006; Greenhow, Robelia & Huges, 2009; Owston, York, & Finkel, 2013; Vance, & Crawford, 2013). The picture the literature paints about faculty adoption attitudes is challenging, where instructors are able to work with new technologically enhanced course designs majoritively through acts of self-determination (Dziuban, Hartman, Juge, Moskal & Sorg, 2006; Kaleta, Skibba, & Joosten, 2007), or where teachers do adopt technology but only insofar as it diminishes the time and effort required in relation to their traditional course load (Meyer & Xu, 2007; Jenson & Dahya, 2014), or where instructors find the lack of institutional support to unnecessarily add to the time and effort needed to teach a course and choose not to adopt blended teaching practices (Kaleta et al., 2007; Lee & Im, 2006; Lefoe & Hedberg, 2006). As Beetham and Sharpe argue (2013), pedagogy in a digital age is a complex system of design in practice that requires access to support and training to positively impact the student experience.

A skills gap beginning at the level of the teacher continues to the level of the learner. If teachers feel inadequately prepared to teach in a blended environment, the integration of ICT into a course will be inadequate and students are often left with "typing exercises and drills rather than the kinds of skills and thinking that the information society demands" (Servon, 2008, p. 7). According to a Bayesian analysis conducted by Meyer and Xu (2007) assessing institutional and individual factors impacting technology use by faculty in higher education, macro changes to the learning environment do not influence teachers as much as the practical elements of time and energy. The study included 16,914

faculty members who had participated in the 2004 National Study of Postsecondary Faculty in the United States. A total of 41 variables were included in the survey in an attempt to accurately capture "individual-level influences (both demographic and professional) and institution-level influences (e.g., level of resources, Carnegie classification, public or private control) on technology use" (p. 184). Meyer and Xu (2007) state that the study's primary finding is that "the adoption and use of technology by faculty appears to be influenced most consistently by the faculty person's instructional load and responsibilities" (p. 193). Here, issues such as student contact hours/week, total student credit hours, percent time on undergraduate instruction, and whether or not teaching was their principal activity (as opposed to research or administration), were shown to strongly impact the adoption attitudes of faculty.

Similar to faculty, an examination of technology acceptance theories in relation to students demonstrates that requirements (time and effort) and perception (usefulness) greatly influence attitudes when it comes to technology. Perceived Ease of Use (PEoU) is defined by Roby (1979) as, "the degree to which a person believes that using a particular system would be free of effort" (p. 320). If a system does not prove to be favourable in this regard, the Technology Acceptance Model (TAM) (Ajzen & Fishbein, 1980; Davis 1989) states that there is a direct causal link between PEoU and user attitudes, defined by Malhotra and Galletta (1999) as the user's desirability of his or her using the system.
A comprehensive list of studies have employed and validated TAM empirically (Mathieson, 1999; Parsad, 1999; Hwang, 2003; Yi, Henderson, & Divett, 2003) since it was written about by Ajzen and Fishbein in 1980. The TAM model is built upon the construct of PEoU, and states that a user's attitude is based on their perceived usefulness of the technology, and that relationship serves as a predictor for behavioral intentions and ultimately the actual use of the technology based on those intentions. According to Davis (1989), even if students believe that a given piece of ICT is useful, they may, at the same time, find the technology too difficult to use. The determining factor is whether the effort required to use the application outweighs any potential performance benefits.

2.2.3 ADOPTION AND ACHIEVEMENT

Islam's (2013) examination of usage outcomes connects the role of adoption to student achievement. The longitudinal study collected data on 249 Finnish university students enrolled in blended courses at a multi-disciplinary institution that used Moodle as their LMS. Through a partial least squares (PLS) analysis findings showed that student beliefs around PEoU influenced student perceptions of "learning assistance" (that the technology was helpful), and perceived "community building assistance" (that the technology helped to create social bonds), which in turn was shown empirically to impact students perceived academic performance. While previous research has shown correlations between initial adoption attitudes and continued use behaviour (Cho, Cheng, & Lai, 2009; Lin, 2011), few have made explicit connections between adoption, use, and learning outcomes. While there have been studies that support Islam's (2013) viewpoint on the connections between attitudes and outcomes, these models have also been plagued with limitations around changing dependent and independent variables. Lee and Lee (2008) for example, show that higher "student satisfaction" as predicted by perceived usefulness, service and information quality, led to higher student grades. Wan, Wang, and Haggerty (2008) found that "learning effectiveness" defined as a student's perception of achievement, was positively influenced by a student's "ICT experience," while Mcgill and Klobas (2009) chose to describe the user experience online as "task-technology fit," and stated that student grades in the blended courses under examination were determined through an association between that experience and "e-learning use" a variable that included student attitudes and instructor norms.

As the phrasing of the observed variables underpinning the latent "student adoption attitudes" construct speak directly to an increased level of frustration, time, and effort in connection to the course technology; the literature around TAM will serve as a building block to my contributions to the literature around attitudes and outcomes. The role of societal normative pressures, faculty attitudes, access issues, will be addressed insofar as how they may have impacted PEoU, thus contributing to an association between adoption attitude, presence and ultimately, achievement.

2.3 Student Perceptions: Online Course Design

> A student should be clear as to what is expected through various stages of the blended course and provided with guidelines and additional information that would be helpful to improve their learning abilities (e.g., links to guidelines or workshops on time management, self-regulation, Moodle skills, and other related study habits). (Owston, York, & Finkle, 2013, p. 36)

As previously stated, there is a difference in the level of preparedness students have with technologies they are accustomed to using versus those to which they have never been exposed. A well-documented contributive factor to a positive blended student experience is the impact of the learning management system (LMS) or course management system (CMS) (Fung & Yuen, 2012; Gallagher, & Berking, 2013; Kvavik, & Caruso, 2005; Owston, York & Finkel, 2013; Vance & Crawford, 2013). Students who report a positive experience with these online learning management structures are more likely than students with a neutral or negative perception to agree that the use of ICT in courses has a significant positive impact on their engagement, cognitive interest, and cognitive performance (Kvavik, & Caruso, 2005). In their study comparing sections of the same course with the same instructors and the same course materials, but with varying LMSs, Rubin, Fernandes, Avgerinou, and Moore (2009) examined whether the LMS affected faculty and student communication behaviours and perceptions of social, teaching and cognitive presence. Overwhelmingly, the most contributive factor in all three tiers of presence was the quality, consistency, and accessibility of avenues of communication online. This study builds upon this work and expands upon the presence-LMS relationship through considering the impact of that relationship directly on student outcomes.

The reality is that students are entering courses in post-secondary contexts without the essential information or access to the necessary technical and academic skills to succeed and this lack of preparedness leads to lower adoption attitudes (Cleveland-Innes & Garrison, 2009; Graham, 2006; Griffin, 2012). Currently, without diagnostic surveys or a dialogue around expectations, students are often left uninformed in regards to support services made available during a course. The quality of

online (LMS) structures has been identified as a contributing factor in student satisfaction, but a gap exists between information and expectations present online, and a student's ability to navigate and access that information (Prensky, 2012). Diverse student populations require an equally diverse understanding of technical and academic abilities. For example, self-directed learning where students are given more autonomy over the pace of their learning (Knowles, 1975) is a critical aspect of online course design (Garrison & Vaughan, 2008). Self-regulation includes a student's proactive management of their learning, which refers to maintaining motivation and developing cognition (Pintrich, 2000; Zimmerman, 2000) through their online course experience.

Some students find the opportunity to self-regulate their own learning liberating (Lin & Wang, 2012; Poon, 2012; Smyth, Houghton, Cooney, & Casey, 2012), while others find it intimidating and difficult to navigate (Bliuc, Ellis, Goodyear, & Piggott, 2011; Owston, York, & Murtha, 2013; Smyth, Houghton, Cooney, & Casey, 2012). Some students may be adept at utilizing online learning platforms while others struggle to acquire technical literacy alongside course content-knowledge (Cheung, 2004; Christenson, 2012; Cleveland-Innes & Emes, 2005; Preston, 2004). Without clarity of concept, the reality of self-regulation is different than what a student may perceive it to be. The literature points to a need for explicit articulation of online course expectation for student regulation, how to do it, when, and how often they are monitoring their learning within an online course structure. The cognitive aspects to self-regulation are coupled with others related to social presence. In their 2013 study on active interaction with others in online settings, Cho and Kim point out that this type of collaborative expectation in online environments requires student self-regulation (Cho, Shen, & Laffey, 2010; Garner & Bol, 2011). Designing for these interactions within an online course involves both technical aptitude as well as an understanding of the communication skills present within your student cohort. It is not a surprise then that Cho and Kim (2013) found a positive correlation between high-achieving students and the ability to self-regulate their social presence in online courses using an LMS; again pointing out a gap in support for low-achievers within the online components of a blended course. Complementary

to achievement levels, Yang, Tsai, Kim, Cho, and Laffey (2006) found that high levels of academic motivation played a role in a student's ability to project an individual social presence, and perceive an instructor's social presence.

Using the term "mastery goal orientation," Pintrich (1999) also consistently reported that student social presence (both through interactions with peers and with the instructor) was positively correlated to the value a student placed on the learning task and how determined they were to complete it. Smith and his colleagues (2011) also studied this notion of student motivation playing a large role in self-regulation within collaborative online environments. They assessed students' perceptions of group work in online settings versus face-to-face. The results showed that students participating in online sections were more negative about group work, less satisfied with it, and also found it more difficult to resolve the logistical conflicts of having to work within a team while navigating an LMS with which they were uncomfortable. Explanations offered by the study include the normative structure of online formats, where individual self-monitoring of work was expected yet not clearly articulated, and communication with peers was of a strictly asynchronous nature. This lack of synchronous (real-time) communication opportunities on a LMS platform, and a lack of immediacy in completing a task (Wood, 2010), was also offered as an explanation to findings around low course satisfaction. On the other hand, Karpova, Correia, and Baran (2008) encourage us in their study on virtual collaboration, not to lose hope in promoting communities of inquiry online, but to instead focus on a diversification of the technology used for web-based communication. Personal technologies like e-mail, Facebook, or texting were preferred for brainstorming and problem-solving tasks, whereas the LMS was used predominately for posting shared resources and broad information gathering.

These varying experiences with online course designs have been shown to directly contribute to learning outcomes. Positive correlations have been found between the quality of interaction within an online course design and students final grades (Chou & Chou, 2011; Reiss & Steffens, 2010), as well as with high frequency use of the interactive aspects of the technology and students final grades

(Lopez-Perez, et. al, 2011; Kember et.al, 2010), indicating that both quality and quantity can play a role in the LMS-achievement relationship. In 2013 Al-Ani conducted a study of blended courses at Sultan Qaboos University in Oman, which explicitly examined the association between Moodle as the LMS and student achievement. Results from the study's random sample of 283 students showed that a positive experience with Moodle in a blended course can directly correlate to improved learner motivation and the perception of a collaborate learning community. Using 3.00 as the theoretical mean and criterion on which to based impact, the level of effectiveness Moodle was shown to have on motivation showed a mean of 3.216, the impact of Moodle on collaboration and community resulted in a mean of 3.199, and lastly, in connection to achievement the mean was calculated at 3.164. Relationships between these factors were also considered, where high learner motivation was significantly correlated ($\alpha = 0.01$) to learner achievement ($r = 0.778$) and learner achievement was significantly correlated to the creation of a learner community ($r = 0.656$). Perkins and Pfaffman's (2006) qualitative study also demonstrated that Moodle improved student performance through the organization of clear and consistent communication systems between learners, their peers, their instructors, and broader institutional resources.

This project builds upon the above literature around the quality of the online course design (Moodle) in connection to achievement, and the association between a student's online experience and their overall experience within a blended course. The model created for this study uniquely contributes to the literature around online course designs, through its examination of the LMS-educational experience relationship as the LMS-presence association, along with the consideration of the contextual role an LMS may play within a presence-achievement relationship.

2.4 Student Preferences: Format of the Blend

> Despite the numerous studies which indicated that blended learning offers increased flexibility of learning, broader accessibility to educational resources, and pedagogical and technological richness, very little research has been conducted on exploring under what instructional design conditions and with what kinds of students blended learning is most effective. (York, Owston, Murtha, & Finkel, 2014, p.2)

With increasing movement at the institutional level towards blended courses, it is important to consider the student experience within specific combinations of face-to-face and online instruction. However, there remains to be a very small pool of literature examining the impact of blend varieties on the student experience, or student outcomes. As previously discussed, student adoption attitudes around technology differ for many reasons. Recent studies have shown that students are more satisfied within blended courses in comparison to traditional face-to-face lecture formats (Osgerby, 2013; Martinez-Caro & Campuzano-Bolarin, 2011), and that they also favour a more flexible, self-paced learning environment (Dziuban, Hartman, Juge, Moskal, & Sorg, 2006; Owston, Garrison, & Cook, 2006). However, these perceptions are also closely tied to achievement levels. High achievers are more likely to find blended courses more satisfying and freeing in relation to learning flexibility (Owston, York, & Murtha, 2013), while low achievers were left with feelings of being lost, and without any support or coping mechanisms to deal with their frustrations. Face-to-face interaction has been shown to support the comprehension of material (Collopy & Arnold, 2009), especially for first year students often navigating large-enrolment courses. Echoing previous findings, first year students also experience a lack of familiarity/preparation for blended learning, self-regulation, and technology-mediated course designs (LMS) (Goodyear, & Piggott, 2011).

Studies have been conducted attempting to examine the discomfort a large portion of students feel within blended courses. Collopy and Arnold (2009) administered a 19-item Likert-scale survey to 80 students spread over three separate formats of technological integration at the pre-service teacher

education level. They found that students might be specifically concerned about the reduction of face-to-face interaction, and the transfer of learning activities outside the space of a traditional brick and mortar classroom. The lack of student preparedness previously mentioned, coupled with an increased expectation to self-regulate their own learning can make students feel overwhelmed by their online workload (Poon, 2012), and as a result, disengage from their learning (Collopy & Arnold, 2009, York, Owston, Murtha, & Finkel, 2014).

While no study has yet directly examined the connection between format of the blend and achievement at the level of course grade, current research reflects contested findings around format and types of blends in relation to the student experience. In their 2011 study, Farley, Jain, and Thompson surveyed finance students on a metropolitan campus in Melbourne, Australia (n = 412). The survey assessed student perceptions of lectures, tutorials, and web-based learning within a blended model. What makes this research team's findings unique, is not that they found a preference for face-to-face instruction, but that as they followed the students from year one (undergraduate level) to years two and three of their finance programs, they found that the more mature the students were, the more they were willing to work online. This speaks directly to the discussion in the literature around a lack of student preparedness leading to a negative adoption attitude at the undergraduate level.

Regardless of age, Farley, Jain, and Thomson (2011) found that students perceived the online course components as purely supplementary spaces for the storage and retrieval of resources as opposed to environments where learning occurs. This important finding reflects the failure of current blends in promoting peer-to-peer and student-teacher interactions online – social and teacher presence – aspects of the learning process that students in this study attributed overwhelmingly to face-to-face instruction alone. Other research however, such as the 2012 study completed by Korr, Derwin, Greene, and Sokoloff, showed less time spent within a classroom was more preferable. This study, however, was conducted at an American university that serves exclusively an adult learner population, and involved in-depth institutional cooperation in the redesign of the university's delivery system from

face-to-face instruction to a blended model. As Korr et. al (2012) describe this university in question embodied the necessary collaboration previously discussed in the section regarding institutional adoption, curriculum was changed in conjunction with faculty, comprehensive trainings were offered to both students and teachers alike, and at the institutional level, communication was fostered through the development of community forums.

Even within these competing narratives, however, there is some consensus around tutorials, where peer-to-peer interaction within these spaces has been shown to improve with face-to-face settings (Moore & Gilmartin, 2010; Smyth et. al, 2012). In their 2014 paper, York, Owston, Murtha, and Finkel voice that the most important factor in blended format satisfaction, was not the type of blend specifically (in-class lectures and online tutorials, online lectures and face-to-face tutorials…), but instead the consistency of the format chosen. If a course is structured on a fixed schedule (i.e. all lectures are in one format and all tutorials are in another), then students are able to adjust to that learning pathway and ultimately use their learning time more effectively, as opposed to less fixed schedules of hybridity. York et. al, also state class size as a limitation of their findings, where less fixed schedules were coupled with class sizes over 250 students. The dissatisfaction recorded in student responses could have been partly due to the large-enrolment nature of the course.

2.5 Chapter Summary

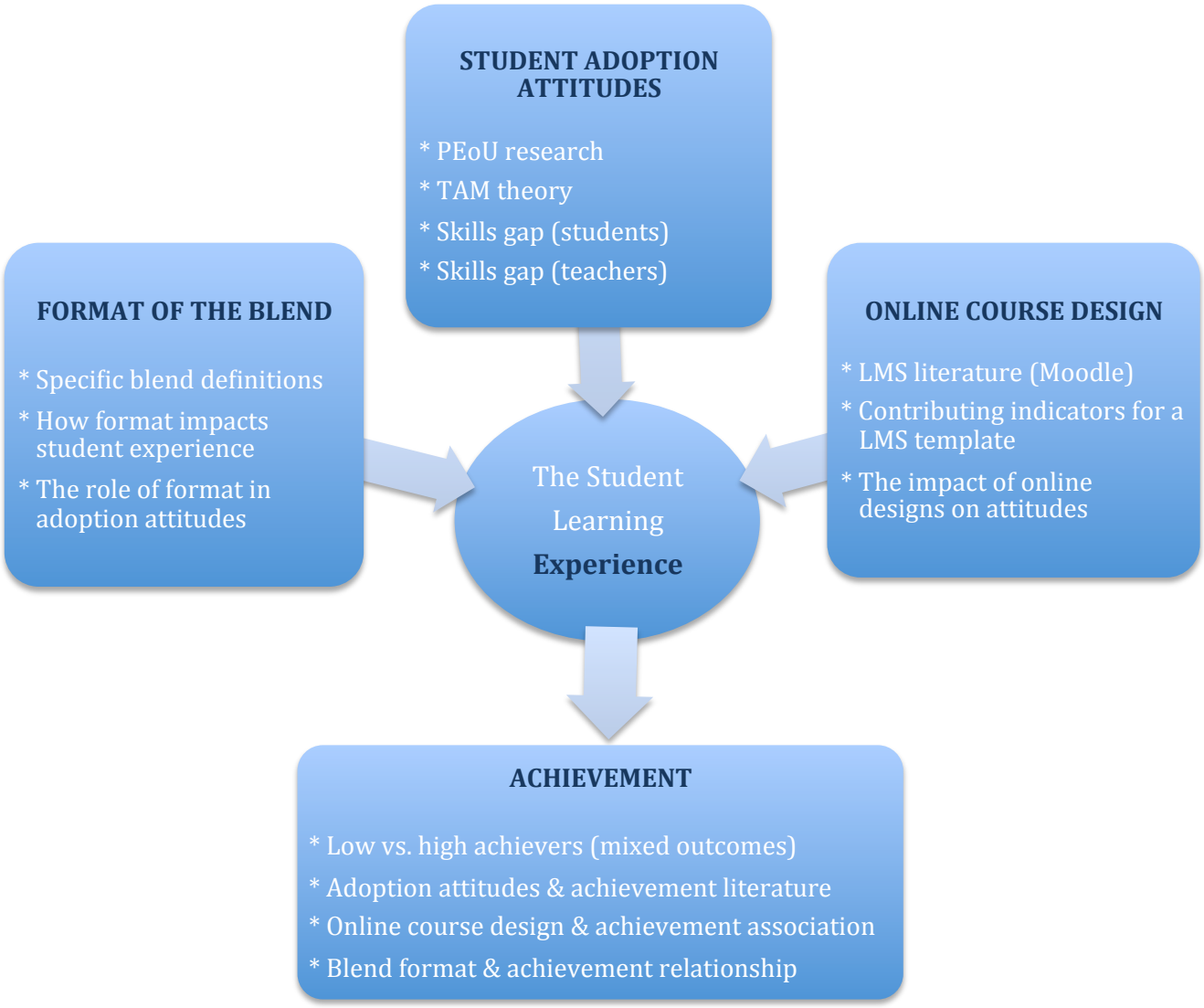


Figure 2. Research Contributions to the Literature on the Student Experience in a Blended Course

CHAPTER 3: Theoretical Framework

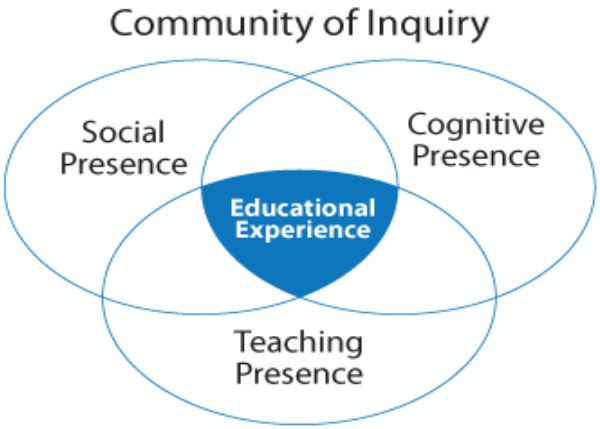


Figure 3. The Community of Inquiry Framework, Garrison & Vaughan, 2008, p.48

3.1 INTRODUCTION

Research on the Community of Inquiry (CoI) model helps to frame my discussion around assessing presence in the blended classroom as a measure of the student learning experience, while an examination of previous studies on the interconnectivity between individual forms of presence informs the theoretical assumptions of both my measurement model and structural analysis. "Inquiry" is a term that has been used quite liberally in the world of education and educational reform in recent years. It is often used in relation to other words such as "critical thinking" or "creativity." Lipman (1991) agrees, "the community of inquiry is perhaps the most promising methodology for the encouragement of that fusion of critical and creative cognitive processing known as higher-ordered thinking" (p. 204). For Trilling and Fadel (2012), the skills associated with the shift towards a knowledge-based economy can be clearly positioned within three distinct categories: critical thinking and problem solving, communication and collaboration, and creativity and innovation.

For Garrison, Anderson, and Archer (2000), this process of inquiry became a constructivist network with three interdependent elements – social, cognitive, and teaching presence, each with their own distinct role in creating a deep and meaningful learning experience. As outlined in key terms,

social presence is "the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop inter-personal relationships by way of projecting their individual personalities" (Garrison & Vaughan, 2008, p. 20). Teaching presence, on the other hand, is the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes (Anderson, Rourke, Garrison, & Archer, 2001). Cognitive presence is the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison, Anderson, & Archer, 2000). Arbaugh (2006) reminds us that the CoI framework has been widely cited in the literature pertaining to higher education. Garrision and Vaughan (2008) believe "one reason for this is that it is a comprehensive yet parsimonious and an intuitively understandable framework. Another reason is that it builds upon two ideas that are essential to higher education – community and inquiry" (p. 9). These two essential ideas encourage us to look at knowledge construction in higher education as "both a collaborative and an individually constructivist learning experience" (Vaughan, Cleveland-Innes, & Garrison, 2013, p. 11). These are spaces of interaction where "students listen to one another with respect, build on one another's ideas, [and] challenge one another to supply reasons for otherwise unsupported opinions" (Lipman, 2003, p. 20). The following table articulates the categories and indicators outlined for each form of presence.

Elements	Categories	Indicators (examples only)
Social Presence	Open Communication Group Cohesion Affective/Personal	Enabling risk-free expression Encouraging collaboration Expressing emotional camaraderie
Cognitive Presence	Triggering Event Exploration Integration Resolution	Having a sense of puzzlement Exchanging information Connecting ideas Applying new ideas
Teacher Presence	Design & Organization Facilitation of Discourse Direct Instruction	Setting curriculum and methods Sharing personal meaning Focusing discussion

Figure 4. Garrison & Vaughan, 2008, p. 19

These categories are cyclical in nature, for example, teaching presence begins with a design phase, moving towards facilitation and direct instruction, where the design phase is inevitably revisited after reflections from direct instruction have taken place (Garrison & Archer, 2000). When looking at social presence, the establishment of personal relationships alongside academic goals is a necessary precursor to interpersonal relationships, but again, identity is fluid and revisited as a concept after forays into open communication and group collaborations (Rourke, Anderson, Garrison, & Archer, 1999), making it a systemic process. The introduction of technology within the new learning paradigm of networked constructivism makes CoI unique in its usefulness for studies concerning blended courses. As Garrison, Cleveland-Innes, and Vaughan (2013) remind us, the real challenge now is to consider the strengths and weaknesses of blended teaching and learning thus far in order to inform systemic, purposeful change in higher education. While there have been no studies to date that have examined the presence-achievement relationship specifically in blended higher education, what follows is a discussion around each form of presence and how they have been shown to impact the student experience as both individual constructs as well as one interdependent vector. This research situates itself in the struggle to design supportive communities of inquiry that promote presence and in turn, consistent and positive student outcomes in blended courses.

3.1.1 MEASURING TEACHER PRESENCE

> Successful blended learning is dependent upon the creation of a collaborative community of inquiry and an understanding of the principles of teaching presence that guides, engages, and successfully achieves a worthwhile educational experience. (Vaughan, Cleveland-Innes & Garrison, 2013, p. 4)

The CoI model defines teaching presence as the act of designing, facilitating, and orienting cognitive and social processes to create an effective educational experience (Garrison & Anderson, 2003). While this constitutes a complex process in which the participants have significant and complementary responsibilities, the role of the teacher is understood to be critical in the curation of

a learning space. The model was developed with three overarching categories under the element of teacher presence, design and organization, facilitating discourse, and direct teaching. Each category speaks to a different aspect of teachers' responsibilities at various times within the curated learning experience. Design indicators are concerned with early decisions around course macro structures, organization referring to formative decision making within the teaching-learning construct as needed; facilitating discourse allows for students to co-construct meaning (knowledge), while direct teaching speaks to a teacher's ability to interact with learning objects and lead cognitive processing tasks effectively (Kupczynski, Ice, Wiesenmayer, & McCluskey, 2010).

Research shows that the role of the teacher in both online and face-to-face settings plays a significant role in student satisfaction and student skill acquisition (Cleveland-Innes & Campbell, 2012; Dziuban, Houghton, Cooney, Casey, Moskal, Bradford, Brophy-Ellison, & Groff, 2010; Garrison & Vaughan, 2008; Museus, 2012; Snart, 2010; Vaughan, Cleveland-Innes, & Garrison, 2013). The simple use of technology is one set of skills that have been measured to inform this deduction, but as Moore (1993) first touched upon, there are also levels of interaction that need to be considered in today's more digitized context. Technology enhanced collaboration is a new lens through which to examine peer-peer, student-teacher, and student-content interaction. During a course, students rely on distinct and familiar ways to access information (i.e. course syllabi, questions asked to the teacher or TA), all of which take on digital aspects in blended coursework (Baym, 2010; Garrison & Cleveland-Innes, 2005). Thus far, these channels for online information transfer to students and the methods for online student assessment have proved insufficient (Barkley, 2010; Shernoff, 2013). How teachers are assessing peer-peer, student-teacher, and student-content interaction, informs a student's perception of teacher presence (Ouimet & Smallwood, 2005; Shernoff, 2013; Shea, & Bidjerano, 2009) and in turn, learning outcomes (Akyol & Garrison, 2011c; Cleveland-Innes & Emes, 2005; Spanjers, Könings, Leppink, Verstegen, Jong, Czabanowska, & Merriënboer, 2015). A consensus amongst current research suggests that teaching presence is both an indicator of the quality of instruction within online learning

environments as well as a predictive factor in a student's satisfaction, sense of community, and perception of learning (Garrison, 2007; Shea & Bidjerano, 2009; Sheridan & Kelly, 2010). As will be discussed in the later section examining interrelationships between forms of presence, Shea and Bidjerano (2009) found in their large-scale ($n \supseteq 2000$) study of undergraduates working within online courses, that teaching presence is the most important aspect of online learning as it helps develop both cognitive and social presence. In their 2014 study, Pollard, Minor, and Swanson expanded the discussion of indicators in relation to teacher presence by seeking to include a dimension they label "instructor social presence" where the manner in which a teacher interacts socially within a learning community online might also need to be considered within our list of measurable inputs (think of this as a Venn diagram where teacher presence and social presence are measured in an online learning community, and there is an overlap between the two where teachers who interact more "socially" (i.e. through discussion boards and social media channels), end up yielding more positive student perceptions in relation to experience within the course. Through a survey (adapted from Arbaugh, Cleveland-Innes, Diaz, Garrison, Ice, Richardson, & Swan, 2008) administered to 137 students within the School of Business of a single online university, Pollard, Minor, and Swanson found that indeed a construct of "instructional social presence" did exist and that it was shown to significantly impact a student's sense of community within their learning environment.

While further research is necessary on this potentially new aspect to teacher presence and the observable indicators that would accompany it, the literature agrees that ICT skills and facilitated interaction are foundational aspects of building teacher presence online. Sheridan and Kelly (2010) examined which of the aforementioned indicators of teaching presence (dimensions to interaction using ICT) were most important to students. Out of a data set that consisted of 65 students enrolled in undergraduate and graduate online courses, researchers found that communicating clear course expectations and timeliness of instructor feedback were the most valued indicators of teacher presence. Surprising, while the students placed high value on communication and instructor's responsiveness

they did not place as much value on synchronous or face-to-face communication. Bowers and Kumar's 2015 research builds off of this question of "does face-to-face matter?" within the context of teacher presence. Participants included a convenience sample of 63 students registered in two different sections of the same undergraduate Criminal Justice course. The face-to-face section had 29 students and the online section, 34; course content and the instructor remained constant over both sections. Surveys (adapted from the CoI instrument created by Arbaugh et al. (2008) were administered to the students across sections in order to identify their perceptions of social and teaching presence. The reliability analyses indicated a strong internal consistency for the survey (Cronbach's α =.947) and for the teacher presence scale (Cronbach's α =.934) specifically. Findings suggest that indeed, we are moving towards an age where asynchronous learning environments are becoming increasingly capable of promoting teacher presence. There were 15 survey items for which there was a statistically significant higher student perception within the online course, including instructor communicating course expectations, due dates, helping students stay on task, stay engaged in the course, and providing feedback.

3.1.2 MEASURING SOCIAL PRESENCE

> The genealogy of the construct social presence can be traced back to Mehrabian's (1969) concept of immediacy, which he defined as "those communication behaviors that enhance closeness to and nonverbal interaction with another" (p. 203). His research suggested that nonverbal cues such as facial expressions, body movements, and eye contact increase the sensory stimulation of interlocutors. This in turn would lead to more intense, more affective, more immediate interactions. (Rourke, Anderson, Garrison, & Archer, 2000, p.50)

Social presence as defined by the CoI model is the capability of participants to project themselves socially and emotionally and, as real people, to promote direct communication between individuals and to make personal representation explicit (Akyol, Garrison, & Ozden, 2009; Garrison & Anderson, 2003). Rourke et al. (2000) identified three unique categories to social presence: affective responses, interactive responses, and cohesive responses. The indicators for social presence (12 in total)

were then decided upon through a process of content analysis within online discussions, and findings from previous research (Garrison, Anderson, & Archer, 2000). In the CoI model, social presence is determined by affective communication, open communication, and group cohesion. Examples of each category, as offered by Garrison and Anderson (2003) include affective communication as offered through visual, tonal, or media enhanced syntactical structures; open communication as a mutually validating process of participation, recognition, and appreciation for the responses of others; and lastly, cohesion looks to understand/examine trust and acceptance over time within a community of inquiry.

Social presence is not only hard to define, but it is also hard to measure. As Lowenthal (2010) points out, there is no set agreement on how to measure social presence. There is no escaping the fact that attitude plays a subjective role in the construction and implementation of any measurement model aiming to gather data on semantically influenced variables (Hughes, Ventura, & Dando, 2007; Lin, 2004; Stein & Wanstreet, 2003). Some have tried to use bi-polar scales (Gunawardena, 1995; Short, 1976) measuring factors of social presence (i.e. socialable-unsocialble, personal-impersonal) on a 7-point Likert scale between two options. In 1997, Gunawardena and Zittle created an instrument called The Social Presence Scale, where the previous bi-polar nature of questions shifted towards more ranking and ordering techniques (i.e. on a scale of 1-5, what degree to which do you agree/disagree with the following statement). The Social Presence Scale was tested for internal consistency (alpha = .88) and appears to investigate the construct of social presence more directly than the previous scale (Gunawardena, 1995). While these early attempts at measurement studied users' attitudes, the CoI model seeks to also better assess/understand users' observable behaviours, as Rourke, Anderson, Garrison, and Archer (2001) looked to measure social presence through an analysis of online discussion content, as opposed to Gunawardena, who measured social presence through a self-report questionnaire. Tu (2002) argued that the questionnaire used by Gunawardena and Zittle (1997) failed to take into consideration different variables cited in the research (e.g., recipients, topics, privacy, task, social relationships, communication styles). As a result, Tu (2002) developed The Social Presence and

Privacy Questionnaire (SPPQ). Despite the strengths of this survey as tested for consistency and reliability, Tu and McIsaac (2002) later determined that "there were more variables that contribute to social presence" (p. 140) than previously thought. Specifically, they found that the social context played a larger role than previously thought. Garrison et al. (2000) indicated that social presence marks a qualitative difference between a collaborative research community and the process of merely downloading information, the emphasis on contextual significance was also echoed by later research (Woods & Baker, 2004; Wang & Chen, 2013).

Rodriguez (2015) employed the Social Presence Scale (Gunawardena & Zittle, 1997) to assess the relationship between social presence, student satisfaction, and academic achievements in online learning environments; achievement measured by the students final semester grade. One hundred and four students volunteered to participate in the study from twenty-five fully online courses. Through a process of multivariate analysis (set of regressions) results indicated a positive correlation between social presence and student satisfaction ($r = .718$ (df = 102), $p < .001$), and a positive correlation between social presence and academic achievement ($r = .259$ (df = 102), $p = .008$). This is consistent with previous studies, that concluded students who had a higher overall perception of social presence scored higher when asked about perceived learning and perceived satisfaction (Arbaugh, 2008; Richardson & Swan, 2003; Swan & Shih, 2005). However, there are findings that revealed that there is no correlation between social presence and student-perceived learning (Akyol & Garrison, 2008; Joo, Lim, & Kim, 2001; Shin, 2003).

The critical role of social presence within the CoI framework promotes an authentic and meaningful learning process within the literature. Lee and Lee (2006) suggest that social presence is where group dynamics within a discussion group prove to be more important than the online structures supporting that group. Their study (2006) found that student groups made up of diverse personalities may be more effective in developing metacognitive interaction than groups comprised of solely extroverted or solely introverted learners. In a more recent study, Garrison and Akyol (2013) expanded

upon this notion of "social metacognition," stating that groups monitor one another's emotions and actions through questions and commands online. They point to these acts of sharing and collaboration as elements not only in metacognition, but also in the sustainable development of cognitive development through a theoretical systems approach to the stages of inquiry – triggering, exploring, integrating, and resolution. In a 2014 study Lee confirmed, "high cognitive presence density did not guarantee the promotion of higher order thinking skills but that social presence was positively related to the quality of cognitive presence" (p.41). This is a drastic shift from the common misconception that if the right information is present, the student will be able to effectively assimilate knowledge. What Lee's study shows is that for high quality cognitive presence, the way in which students communicate and co-construct knowledge is more important than simply what is said or shared. Bowers and Kumar (2015) measured the ability to cultivate social presence within purely online course communities, where no face-to-face contact was present. They found that social presence was in fact perceived significantly stronger in the purely online environment. Each of the three CoI categories for the social element (affective expression, open communication and group cohesion) was found to be significantly higher in the online course.

According to Bowers and Kumar (2015) "Instructor's use of weekly announcements, e-mails, discussion posting summaries, weekly chats and use of online discussion in small groups was probably helpful in establishing these two dimensions of social presence in the online environment" (p.32). Survey data was complimented by student grades. Within each course learning objectives and outcomes remained consistent across format (fully online, face-to-face), but when it came to student performance "…in the traditional class the class average was an 87% where as in the online class the average was a 92%" (Bowers & Kumar, 2015, p.37). Despite the evolution of measurement tools around social presence and robust theories to explain the construct, research still points to a need to better understand and design for that understanding. Biocca, Harms, and Burgoon, (2003) call for definitions and measures to account for diversity within a mediated environment (collaborative

systems, virtual environments, video conferencing systems, embodied agency) and the unpredictable nature of technological innovation in the areas of communication and collaboration. Specifically, the researchers propose the following, consistent with other recent critiques (Lowenthal, 2012; Lowenthal & Dunlop, 2014):

1. Technology + psychology requirement*:* A theory of social presence with broader explanatory power would need to simultaneously address the technological question of what features of a medium elicit social responses and the psychological question about the properties of human cognition that "read minds" in both people and things.
2. Focus on mediated social presence: Although informed by general issues in social cognition and communication, a theory of social presence must be fundamentally a theory of how technology mediates social interaction.
3. Explanatory scope and range conditions: A range of mediated social interactions to overcome the tendency for social presence theories and measures to focus too narrowly on a subset of social presence behaviors (Biocca, Harms, & Burgoon, 2003, p.40).

As Lowenthal (2010) explains "Despite the differences in definitions and methodology, researchers of social presence have come to similar conclusions about the nature of social presence in online learning environments" (p.131). Studies have shown social presence to be a significant factor in instructional effectiveness, positively affecting learning, student satisfaction, achievement, and motivation (Gunawardena & Zittle, 1997; Pollard, Minor, & Swanson, 2014; Rourke et al., 1999), making it a pivotal design element to consider to promote high quality learning environments.

3.1.3 MEASURING COGNITIVE PRESENCE

> If we are to better understand epistemological issues with regard to collaborative constructivist approaches to learning and communities of inquiry, then we must begin to answer the questions: 'What has been learned? And how did understanding evolve? (Hannafin & Kim, 2003, p.348)

Cognitive presence is defined by the CoI model as the extent to which students are capable of constructing meaning through reflection, and communication within a community of learners (Garrison & Anderson, 2003). This translates into the extent to which learning objectives are understood, applied, and extended. The model categories for the cognitive element include activation (a triggering event), exploration, integration, and resolution (Garrison & Anderson, 2003; Garrison et al., 2000). Cognitive presence as defined by these stages, is consistent with a constructivist approach to learning (Arbaugh et al., 2008). Multiple studies have found a positive correlation between the measurements of cognitive presence through the CoI survey instrument and academic achievement, (Akyol & Garrison, 2011; Garrison & Akyol, 2013; Maddrell, Morrison, & Watson, 2011; Shea & Bidjerano, 2012; Shea, Hayes, Smith, Vickers, Bidjerano, Pickett, & Jian, 2012). The latest research seeks to consider an achievement of metacognition in terms of self–regulation and co–regulation.

When carried out effectively, the integration of cognitive, teacher, and social presence has already proven to impact metacognitive skills, the cognitive abilities involved in high–level instruction — making inferences, observing connections, verifying, and organizing (Akyol & Garrison, 2011). Wanstreet and Stein (2011), however, found that scores of cognitive presence were concentrated in the lower levels of learning and did not reflect high levels of integration or resolution with either online or traditional face-to-face classes. This last study, however, used the Rovai (2002) Classroom Community Scale as opposed to the CoI survey. The essential element in metacognitions is in fact not solely the level of cognitive presence within the course, but again, the level of social presence has been shown to drastically impact metacognition (Lee, 2014; Moore & Marra, 2005; Oriogun, Ravenscroft, & Cook, 2005). As metacognition remains a very important aspect of human intelligence and higher learning, further research on its socially-situated nature within a CoI model is an area in the literature my study aims to contribute to through its analysis of specific channels of interaction, and how students perceive their level of cognitive presence in relation to social and teacher presence.

In their 2011 study, Akyol and Garrison ask the question “Is cognitive presence challenging to

cultivate within online learning spaces?" through a mixed methods analysis (surveys and interviews) of 15 students navigating an online course and 12 students in a blended course. The context of this study was a graduate course on the topic of blended learning. Findings from an analysis of online discussions and interview transcripts suggest that students in both courses were able to integrate information from various sources, develop justified hypotheses, and build on each other's ideas or create solutions. Cognitive presence (as measured by the CoI survey) was also shown to have a positive correlation to student outcomes (perceived learning, actual grades, and perceived satisfaction). In their 2015 study, however, Gutiérrez-Santiuste, Elba, Rodríguez-Sabiote, Clemente, Gallego-Arrufat, and María-Jesús, ask the deeper question of "What online learning structures produce the best cognitive results"? Using incidental sampling and multiple linear regression analysis, the researchers surveyed 65 university level students (between the ages of 19 and 38), to assess student perceptions of synchronous and asynchronous virtual text-based communication channels (chats, forums, and emails). Findings suggest that peer-to-peer, social avenues for interaction (chats and forums) are indeed more highly correlated with student perceptions of learning within an online educational experience, than avenues of interaction used majoritively for instructor-student interaction (emails). While previous research has already highlighted the connection between social and teaching presences as related to cognitive presence (Garrison et al., 2010; Archibald, 2010), technology that promotes an increased level of peer-peer interaction and attempts to move students from mere interaction to true intimacy and interpersonal closeness (Tu & McIsaac, 2002; Woods & Baker, 2004) seem advisable in technology enhanced learning environments. An additional 2015 study by Kovanovic, Gasevic, Joksimovic, Hatala, and Adesope, went on to include user behaviours in the body of research around the measurement of cognitive presence, asking "How do different user's technology profiles, affect their cognitive experience"?

Although heavily dependent on technology, a review of the CoI literature reveals rather limited research pertaining to the relationship between learners' use of educational technology and the three

elements of the CoI model. This study builds on Rubin, Fernandes, and Avgerinou's (2013) work on user profiles (2013), the only case that precedes it, but moves away from self-reported technology use profiling, to a leveraging of meta data available through the learning management system used in the Kovanovic's et al., 2015 study. The study was comprised of a comprehensive statistical analysis of 81 student profiles within a masters level distance course on engineering at a public Canadian university. Participants were split into six defined clusters based on their use of technology: 1) task-focused users, 2) content-focused no-users, 3) no-users, 4) highly intensive users, 5) content-focused intensive users, and 6) socially-focused intensive users. These profiles were based on the student's level of interaction with the learning management platform (Moodle), the same structure under examination in my study. Given that several profiles are associated with higher levels of cognitive presence, the results suggest multiple technology use profiles are possible for cognitive success. The results highlight, however, the need for explicit instructional support and pedagogical training to target course design for different technology-use profiles.

Cognitive presence is becoming increasingly difficult to measure given the diversity of technology being used (Azevedo, 2005; Clarebout, Elen, Collazo, Lust, & Jiang, 2013; Yen & Lee, 2011), the diverse user experiences with that technology, and the impact of self-regulated learning on cognitive assessments (Lust, Elen, & Clarebout, 2013; Zhou & Winne, 2012). While the CoI survey, based on the theoretical framework, operates as a functional and valid instrument with which to measure cognitive presence, it does not however, take into account the fact that students' motivation, base level metacognitive abilities, and ICT skill sets will ultimately play a role in their ability to achieve within a community of inquiry. Given those limitations, the cognitive presence construct for the purpose of this study accounts for each category outlined in the CoI model: meaning-making, reflection, and communication within a learning community. Questions specifically ask students to gauge their ability to understand, apply, and expand course content through a range of indicators including how comfortable they were to ask/answer questions, how engaged they felt with course

content, their ability to understand and interact with key concepts, as well as how integrated they felt the online and face-to-face components of the course were in practice.

3.1.4 THE PRESENCE INTERRELATIONSHIP

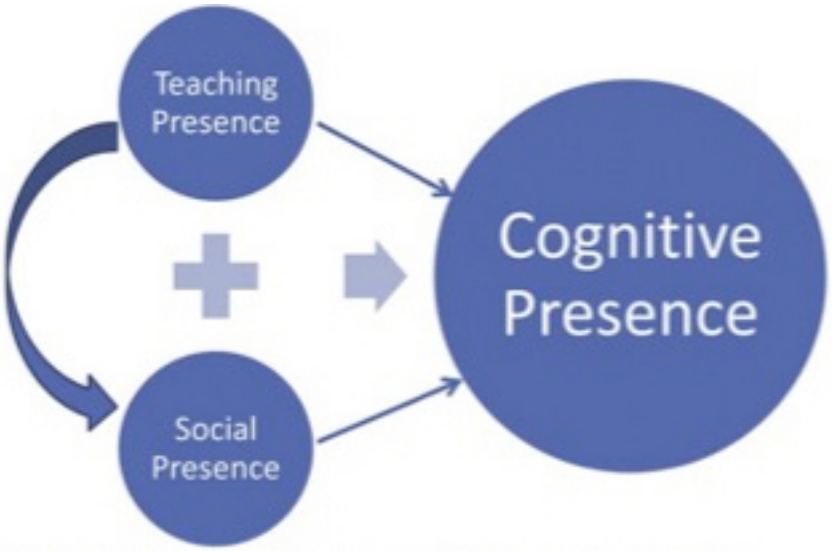
> Establishing and sustaining cognitive presence and deep approaches to learning in online and blended learning environments are dependent upon a dynamic balance of all the presences to support a collaborative community of inquiry. (Akyol & Garrison, 2011, p.250)

The interrelationship of presence (social, teacher, and cognitive) has already been touched upon, however, correlations were explicitly tested for in a 2014 study conducted by Kozan and Richardson. Findings suggest that indeed there are strong, positive, bivariate relationships, meaning that one form of presence has an impact on how the remaining two will interact with each other because when the first one is controlled for, the effect disappears. These pairwise relationships are not all the same: cognitive presence, when paired with social presence, seems to be virtually unaffected by teacher presence. Cognitive presence, when paired with teacher presence, seems to also be largely unaffected by social presence. The researchers suggest this points to social presence in two ways: first, in efforts to promote cognitive presence, teachers will automatically increase student social presence because social presence is not only concerned with interactions but it also provides a space through which to promote cognitive development. This echoes Garrison and Arbaugh's (2007) findings that social presence is integral to cognitive presence within a learning community. With that in mind, teaching presence that enhances cognitive presence would innately improve social presence as well. Even if the learners were only concerned with their interactions in relation to achievement with the cognitive task at hand, they would benefit from the ideas of others and the feedback associated with collaboration. Again, this connects to Garrison and Akyol's (2013) contention that social presence not only relates to interactions, but to the very nature of critical thinking and higher-order thinking skills.

The CoI model implies theoretically, that teaching presence is influential in the formation and maintenance of social and cognitive presence (Garrison et al., 2010). Successive studies have shown

teacher presence is not only a trigger for cognitive presence (Garrison & Anderson, 2003; Garrison & Cleveland-Innes, 2005), but also a catalyst towards building an environment where learners can both recognize and realize social presence (Rourke, Anderson, Garrison, & Archer, 2001; Swan & Shih, 2005). Shea (2010) and his colleagues have contributed to this literature by identifying, through content and social network analysis, patterns that exist between the level of teacher presence within a course, the level of social presence experienced, and the ultimate emerging level of cognitive presence.

In their 2011 study, Joo, Lim, and Kim attempted to add to this discussion around a potential structural relationship between teacher presence and social presence as they relate to cognitive presence. A total of 1200 students were surveyed at a large, well-established online university that had been classified as one of the best online universities in Korea, according to a quality assessment conducted by the Korean Ministry of Education, Science, and Technology in 2007 (Joo, Lim, & Kim, 2011). Students were enrolled in an introductory computer skills course and asked to examine the effect of teaching, social, and cognitive presence, and perceived usefulness and ease of use of an online learning platform on learner satisfaction and persistence. The study employed structural equation modelling to investigate the relationships among the three presence variables by testing the mediating effect of social presence.



Figures 5. The Relationship between Cognitive, Social, and Teacher Presence, Shea & Bidjerano, 2010

Findings from Joo, Lim, and Kim's 2011 study showed a significant relationship between social presence and cognitive presence, supporting previous research on social presence as an isolated presence (Garrison, Anderson, & Archer, 2001; Garrison, Cleveland-Innes, & Fung, 2010). Findings also suggest, however, that social presence does have a mediating effect between teaching presence and cognitive presence, consistent with the results from additional studies in the area (Akyol & Garrison, 2011; Garrison et al., 2010; Shea & Bidjerano, 2010). This information informs how we look at the teacher's role within the design and facilitation of blended courses, where attempts need to be made to promote social presence though active learner participation and conversation. These efforts, based on these findings, would positively impact student meaning-making.

When considering the impact of social presence as a mediating factor between teaching presence and cognitive presence, it becomes clear then that online structures, as well, should explicitly incorporate learner-centered discussions and team-based learning strategies in order to promote a learners sense of social presence. Rubin, Fernandes, and Avgerinou (2013) conducted an important study where the effect of a LMS was measured in relation to scores of presence within a large urban North American university. They found that there are many ways in which a LMS impacts presence (i.e. organizing and integrating content). If students are not actively participating within a blended course, instructors have tools at their disposal through which to continue to orchestrate interaction such as notification applications or email links. LMS platforms differ greatly from one to the other; Rubin's team found that the crucial piece of the puzzle was not the technology itself but what instructors chose to do with it. Their findings suggest that whether or not actions were taken to create a LMS that actively promoted learning principles, it was the perceptions of these principles that affected teaching and learning. Only if faculty and students perceived that the communication tools available to them were easy to use, did their actual use potentially increase social presence. In that regard, the role of the teacher is again highlighted in the cultivation of social and in turn cognitive presence. As Rubin and her colleagues note, satisfaction with the LMS predicted course satisfaction.

This research is set to examine the aforementioned interrelationships of presence, and the mediating effect of the online structures (Moodle) on the presence-achievement relationship. While complex, the preceding studies suggest that in order to develop higher-order thinking and meaningful, authentic learning, an online instructional orchestration needs to take place, where if the instructor leads effectively, the students have been shown to follow an argument also supported in the literature around adoption attitudes. However, if the opposite takes place and a teacher is unable to effectively take on this role, social and cognitive presence have been shown to suffer. These findings are important and suggest that the role of the instructor in cultivating cognitive presence is significant in how they structure both course content and participant interactions. In the following chapter, the structural model outlined for this project specifically builds on this review of the literature, assessing again the role of social presence as a potential mediating factor in the perception of cognitive presence, but also the effect of that mediated cognitive value on student outcomes.

3.2 Chapter Summary

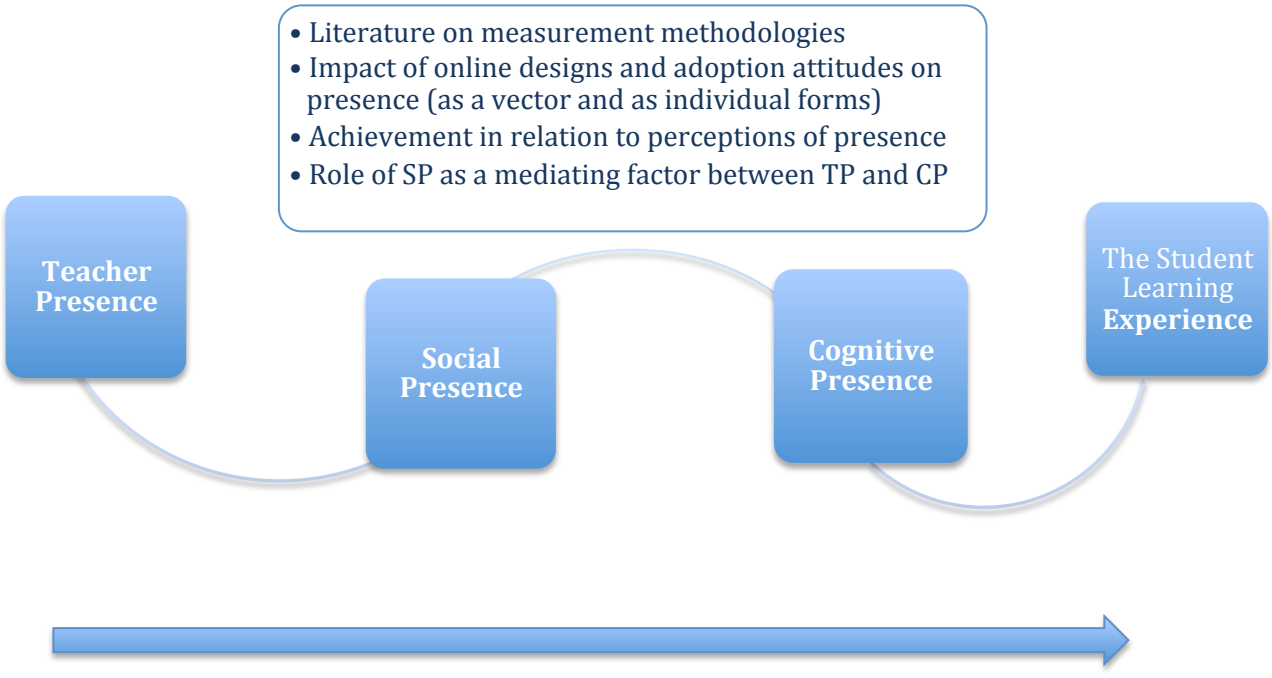


Figure 6. Research Contributions to the Literature on Presence in a Blended Course

3.3 Conclusions & Specific Research Questions

A review of the literature has shown that the learning we do as individuals, and the learning we do within groups, is increasingly being influenced by technology (Johnson, Levin, Smith, & Stone, 2010). Various formats of blended classrooms are becoming increasingly the norm in higher education (Barkley, 2010; Kuh, Kinzie, Scuh, Whitt, & Associates, 2005), and as a complex and multi-faceted issue, any attempt to avoid the pitfalls of an unstructured Internet or the "cult of the amateur" (Keen, 2007), needs to involve an in-depth understanding of the blended learning experience. As Pond reminds us (2002), "neither the purpose, the methods, nor the population for whom education is intended today, bear any resemblance to those on which formal education is historically based" (p. 1). This evolving educational ontology is leading to the creation of new epistemological paradigms around teaching and learning that higher education must account for.

Research indicating mixed student achievement levels within blended courses (So & Bonk, 2010; Owston, York, & Murtha, 2013; Vaughan & Garrison, 2013) suggests that we do not yet fully understand how to support all learners in these spaces (Garrison & Kanuka, 2004; Owston, Lupshenyuk, Wideman, & Murphy, 2008; Owston, & York, 2012). With clear connections already made between achievement and a positive learning experience (Islam, 2013; Lee & Lee, 2008; Owston, York, & Murtha, 2013), this study seeks to deconstruct the educational experience into components that can be tested for direct associations with achievement, in order to design blended experiences that more consistently support positive student attitudes and outcomes. As a result, this project employed the CoI framework to allow for an alternative and perhaps deeper interpretation of the learning experience though the lens of teacher, social, and cognitive interactions that promote new networks of technology enhanced constructivism (Garrison, Anderson, & Archer, 2001; Garrison, & Vaughan, 2008; Rourke, Anderson, Garrison, & Archer, 1999), and contribute to positive outcomes. This analysis will allow for a better understanding of the relationship between presence and achievement, and assist teachers and students alike in the design and navigation of blended learning communities.

With research pointing towards contextual influences affecting the student learning experience (adoption attitude, and perception of online structures), further analysis needs to be carried out regarding how best to target a positive user experience given the association of those factors within the presence-achievement relationship. Still under researched areas concerning the role of blend format on perceptions of presence, and in turn, achievement, have also been targeted with this research design. Findings will be considered in relation to achievement (mixed outcomes) in order to inform student support structures for blended courses moving forward, and contribute to the design of blended learning experience that prove more positive, and accessible to a wider student population.

Through the statistical procedures outlined in the next chapter, this study seeks to better understand the role of exogenous variables [student (ICT) adoption attitudes, the quality of online course design, and varying blend formats], on the presence-achievement relationship, contributing, through the core research questions below, to unique findings in both the CoI literature and the body of work addressing the issue of mixed outcomes and attitudes within blended, higher education spaces.

Core research questions include:

1) How do student perceptions of social, teaching, and cognitive presence in blended courses relate to student achievement?
2) How does the online design of a blended course relate to student perceptions of presence and student achievement?
3) How do student adoption attitudes relate to their perceptions of presence and achievement in blended courses?
4) How does the format of the blend relate to student adoption attitudes, presence, and achievement?

CHAPTER 4: Method

The research design that will be discussed in this section is an attempt to examine presence within blended courses in order to answer the aforementioned research questions. The preceding literature review and theoretical discussion helps frame current trends and gaps in support for blended learning to which my research project aims to contribute. This chapter will serve to provide the necessary procedural information from data collection through to analysis, to ensure the transparency needed to positively contribute to future research in the areas of CoI and blended learning. Results will be framed by this chapter's outline of participant demographics, sampling methods, data sources, the construction process for study variables, and the analytic procedures that were employed.

This is an empirical study using quantitative statistical methods, specifically Structural Equation Modelling (SEM) and diverse Analysis of Variance techniques (ANOVA, MANOVA, and ANCOVA). These methods were chosen out of consideration for the core research questions. With a desire to employ the CoI framework, the survey data collected needed to be seen as observable items, which could then be grouped into the latent constructs of cognitive, social, and teacher presence. Structural Equation Modeling (SEM) is used for that exact purpose – to view data as a network of constructed variables (Westland, 2015). ANOVA techniques were chosen to examine the role of blend format, as an analysis of mean variance can display trends in significance across multiple groups (Gelman, 2008), in this study, an ordered factor comprised of five distinct blend formats.

Given the post-hoc nature of this design, I will first articulate the background of the study, its participants, and the data collection process, followed by an explanation of my philosophical assumptions as researcher to better contextualize my report of findings. Discussions around the reliability of data sources will lead into the process of forming and validating the constructed variables, ending with a more in-depth description of the two data analysis procedures already mentioned. This comprehensive procedural outline serves to provide context and transparency for later chapters.

4.1 Participants

4.1.1 STUDY BACKGROUND

In 2011, an internal funding body at the Canadian university in question awarded the faculty of fine arts the means necessary to research various approaches to learning over a three-year period, with the goal of collecting information that would in turn, enhance the student learning experience. The faculty chose to examine their blended course offerings at the compulsory, introductory level. Each of the 13 courses included in the study, were at the undergraduate level (Art History 1900, Film 1900, Music 1900, Dance 1900, and Theatre 1900), and experimenting with forms of blended instruction.

The framework used to guide this original study was developed from the university's mandate on e-learning. The four criteria outlined as key indicators of merit included: 1) the ability to respond to current or future enrolment pressures, 2) support a positive commuter experience, 3) engage students, and 4) improve student learning. The three-year data collection process carried out by York, Owston, Murtha, and Finkel (2011-2014), included the administration of in-class surveys (paper format, using machine-readable answer sheets), a rubric evaluation for each course's learning management system (Moodle site) (data for years 2 and 3); and the final grades for all students who participated in the courses (data for all three years). These instruments of data collection originated from the aforementioned funding mandate, and the desire to assess the four criteria listed above.

In the winter of 2015, the lead researcher on the project approached me with a proposal to conduct a more in-depth analysis on the dataset. Ethical protocols for working with human participants were outlined and approved by the faculty of graduate studies, and the office of research ethics prior to the data collection process in 2011. Respondent anonymity was preserved through the exclusion of all names, locations, or other identifying features when the data was compiled. The dataset was then handed to me void of all identifying features save the course numbers for each cohort. The data was then maintained on a dedicated external hard drive, and secured through a password-protected device. No additional ethics protocols were required for this post-hoc analysis of the original dataset.

4.1.2 PARTICIPANT DEMOGRAPHICS

Participants were sampled from 13 undergraduate courses, comprised of 5 different content areas within the faculty of fine arts at a large Canadian university. A total of 2,094 students responded to surveys and all observations in the dataset were kept, save for the following two conditions that were used to filter out incomplete and unreliable records: missing course grades, or an unclear association between student and course. The remaining sample size is 1,926, with distributions by year and subject visible in the table and charts below. The breakdown by year reflects the fact that only three courses were surveyed in year one, as opposed to five in each of the remaining years. However, as the two courses excluded in year one had high attendance in years two and three, resulting distributions by subject remain comparable, save for Dance 1900, with significantly smaller class sizes across years.

Table 1. Distribution of Participants by Year and Subject

	Film	**Visual Arts**	**Dance**	**Theatre**	**Music**	
Year 1	N/A	N/A	63	79	131	**273**
Year 2	251	277	69	81	225	**903**
Year 3	178	205	34	231	102	**750**
	429	**482**	**166**	**391**	**458**	**N = 1,926**

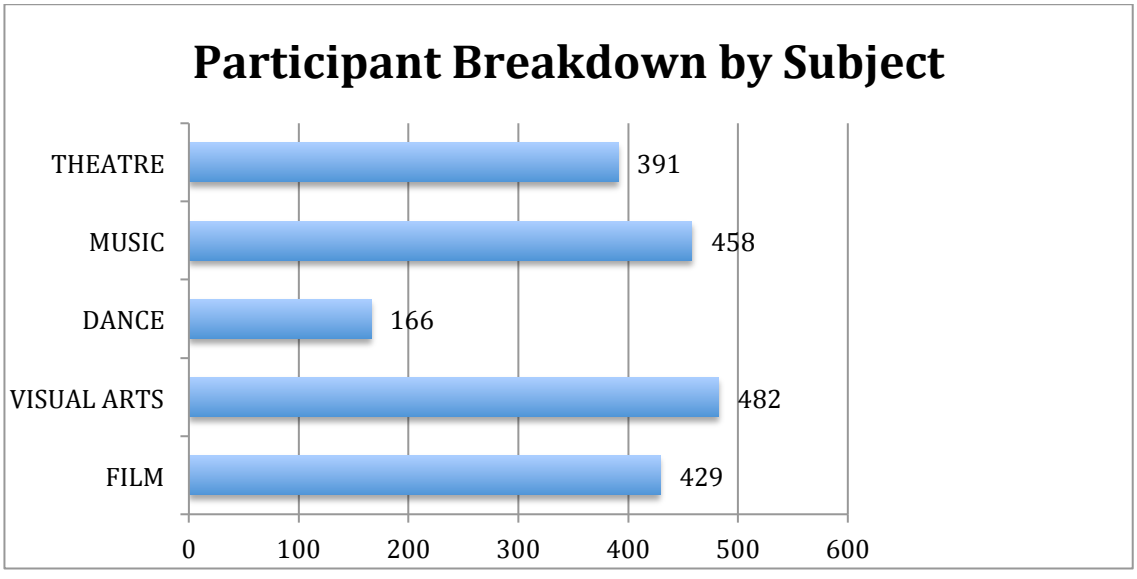


Figure 7. Participant Breakdown by Subject for 3 Years of Data

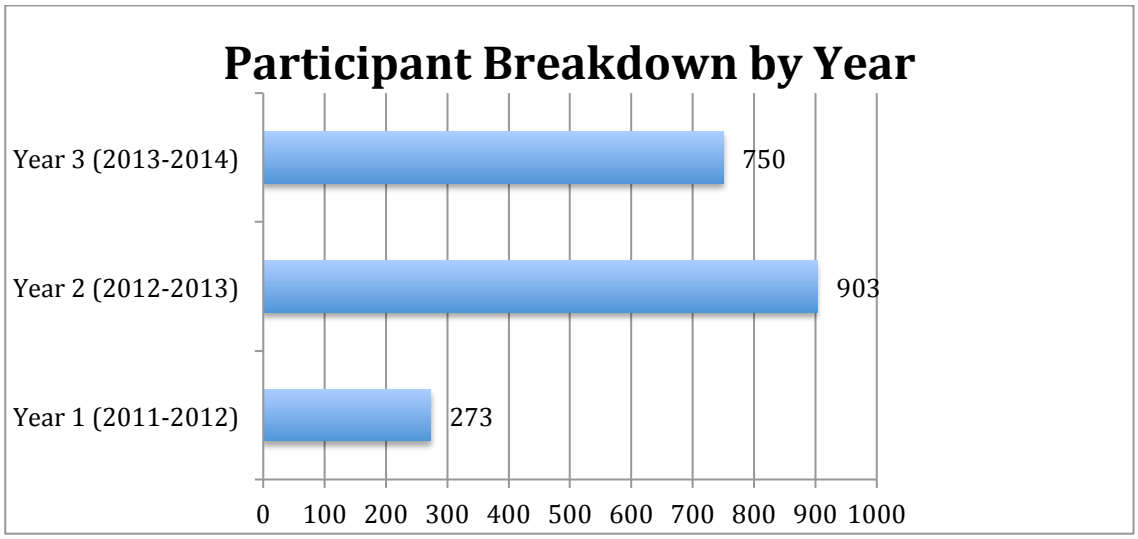


Figure 8. Breakdown of Participants by Year

The sample described above, originated from a Canadian university comprised of a diverse student population. In a survey entitled "Who are our Undergraduates?" carried out in 2000 on the Canadian campus in question, and published by the campus newsletter with the support of the Centre for the Support of Teaching (CST), the diversity of the student population under examination in this study became evident. Statistics from the survey give a glimpse as to the individual realities of many students – 41% of students coming from a non-European origin, 36% growing up in homes where English is not spoken at all, where 30% of those homes have parents with a high school education, while 47% of the remaining fathers and 56% of mothers, had not obtained a high school diploma. It follows then that economic hardships have persisted in many of these families, leading to a staggering 72% of undergraduate students requiring tuition support, 62% of them working over 17 hours a week, and 66% still living at home at the time of the 2000 study.

Students responding to this study's student survey were asked questions about workload and commuter status only. Results showed an average of 18% of students worked between 10-19 hours a week, and 64% of students still commuted to campus as opposed to living in student housing (York, Owston, Finkel, 2014). With high levels of socio-economic variance within the student population,

gauging the diverse levels of student technical expertise (Reeves & Oh, 2007) or physical access to an ICT device (Bauerlein, 2011) (mobile phone, laptop, desktop computer, or tablet) is difficult, but potentially representative of other learner populations within North American, urban institutions (Fung & Yuen, 2012; Trilling & Fadel, 2012; Waldman & Smith, 2013).

4.1.3 SAMPLING PROCEDURE

The sampling for this study was not random, but rather one of convenience (non-probability), where location and ease of accessibility were factors in the courses chosen to observe. Classes in five course topics were studied over a three-year period (n =13 – as only three courses were observed in the first year of the study). Each course is a heterogeneous group of undergraduate students participating in a blended courses at a Canadian university. With a cross-section of year and subject, and a population of almost 2,000 responses, this sample is representative of the undergraduate population in the faculty of fine arts at an urban university within the geographical boundaries of Eastern Canada, or more specifically, the province of Ontario.

Without random sampling, I am unable to generalize findings, as there could be other variables for which I am unable to account (Barnett, 1999; Casella & Berger, 2002). This moves the project away from inference testing, and towards a study of correlations, relationships, and/or associations. The large sample size (13 courses consisting of n = 1,926 student respondents), allows me the use of parametric measures, as the underlying assumptions of the population were not violated (i.e. normality in distribution) (Meyers, 1967; Graham, 2003). These important assumptions will be discussed further in the introduction to variable construction. In survey statistics, it is important to recognize potential sampling and non-sampling error (Barnett, 1999). This study operates with the knowledge of potential sampling error, where random variation in the results could be the result of a random selection of elements in the sample. For example, the students who were present in class the day the survey was administered. Other considerations will be potential measurement error, where respondents might have misunderstood a question or found it difficult to answer; processing error, where there might have been

mistakes in the coding of the data using digital software (SPSS); and a potential for non-response, where the study may have failed to obtain a complete data set given the voluntary nature of the response format (Ross, 1979; Boyd, Lankford, Loeb, & Wyckoff, 2013). These potential study limitations will be considered in more length after findings are distilled. For the purpose of this study, non-response rates and the voluntary response processes do not discount the representative nature of the sample. Although participation in the data collection process was voluntary, no student present in class refused to complete the survey. The tables below outline response rate data for each year of the study as well as aggregate values for all three years categorized by subject. These tables echo the fact that year one yielded fewer respondents than the two subsequent years, and that Dance and Theatre, with the lowest response rates by subject, make up the smallest portion of overall responses.

Table. 2 Response Rates by Year

Year	Total Enrolment	Response Rate	Responses	% of Total
Year 1 (2011-2012)	766	36%	273	14%
Year 2 (2012-2013)	1640	55%	903	47%
Year 3 (2013-2014)	1638	46%	750	39%
	4,044	**47%**	**1,926**	

Table. 3 Response Rates by Subject

Subject	Total Enrolment	Response Rate	Responses	% of Total
Film	779	60%	429	22%
Theatre	695	31%	262	14%
Dance	1010	25%	166	9%
Visual Arts	675	76%	482	25%
Music	885	72%	587	30%

4.2 Philosophical Assumptions of the Researcher

Prior to outlining this project's specific method, one must consider the underlying assumptions held by the researcher. Philosophical assumptions are an important aspect to research design that is often considered largely hidden (Slife & Williams, 1995). Guba (1990) describes these assumptions using "the term worldview as meaning a basic set of beliefs that guide action" (p. 17). Creswell (2014) states, "others have called them paradigms, epistemologies and ontologies, or broadly conceived

research methodologies" (p. 6), but these terms all speak to a way of seeing the world, and by association, the hypotheses put forward and their subsequent testing. This lens is informed by the experiences of an individual, their belief system, their associations, and past actions. The worldview of a researcher impacts their choices, where certain pathways of analysis fit best with how they view the role of research in the world. My worldview as a researcher is pragmatism (Bryman, 2006; Clark, 2008). This worldview is problem oriented and theory generating, "instead of focusing on methods, researchers emphasize the research problem and use all approaches available to understand the problem" (Creswell, 2014, p. 10). Creswell laid out the eight indicators for a "pragmatist" worldview in his 2014 chapter on *The Selection of a Research Design*. He outlines a pragmatists need to have freedom of thought and action in the pursuit of solving a specific problem. There is no loyalty for a pragmatist when it comes to philosophical underpinnings or choice in methods, a pragmatist has an inherent understanding of the systemic variables affecting a research problem (social, political, or historical contexts) and works towards evidence-based truth given that context. At the heart of this worldview is the important role of knowledge transfer in research. If what is studied is not easily communicated to a wide and diverse audience, part of a pragmatist's purpose of research has been lost (Bergman, 2008; Cope, 2009; Tashakkori, 2003). This study seeks to provide open and accessible findings through data visualization and the knowledge transfer process (publications, presentations).

While a pragmatist would usually choose a mixed methods study (Creswell, 2014), this research project will be quantitative in nature – examining scored values and ranked survey responses in relation to quantifiable achievement levels. However, it is through the theoretical framework that the analysis will have the value and impact I hope for as a pragmatist. The ontological shifts around work, technology, and higher education already outlined demonstrate a need for an increased understanding of technology as a catalyst to community. The centring of the CoI framework in this research will allow for a depth of understanding regarding how best to support teachers and students within a 21st century Canadian undergraduate, blended context.

4.3 Data Sources

There are three sources of data for this project: the student responses to the original student survey circulated by Owston and his team (2011-2014), the Moodle rubric scores completed for ten out of the thirteen courses under evaluation (years 2 and 3), and lastly the final grades for all students supplied to me through the registrars office at the university in question. I will first outline the student survey, followed by the Moodle rubric, and lastly, I will discuss the Community of Inquiry questionnaire, which will serve as an operational tool in this interpretation of the original dataset. Copies of each of the instruments discussed here can be found in Appendix C – Research Tools.

4.3.1 THE STUDENT SURVEY

As previously mentioned, the student survey was created in the spring of 2011 by Owston et. al (2013), out of a university mandate to analyze student perceptions of their learning in a blended course. In Y1 the survey was 29 questions in total, with 22 questions appearing in a 6-point Likert scale format. In Y2/3 the survey was 31 questions in total, with 23 questions appearing in a 6-point Likert scale format. This study concerns itself with the Likert scaled items only, as those were the questions regarding the student's experience in their course. The remaining questions gathered data on future preferences the student may have towards blended courses, or were included for the purpose of collecting demographic information (e.g. commuter status, hours of work outside of school). The framework that influenced the development of this instrument consisted of four guiding principles:

1) Increase the university's ability to respond to enrolment pressures;
2) Provide better experiences for commuter students;
3) Better engage students; and
4) Improve student learning (Owston et. al, 2013, p.8).

This discussion of the survey structure is set to examine in further detail this survey to ensure the reliability of its response system, prior to looking more closely at how to take specific questions and apply them to the constructs of presence. The survey is built upon a 6-point Likert-scale structure (A =

strongly disagree, B = disagree, C = neutral, D = agree, E = strongly agree, F = not applicable), employing an alphabetic scale as opposed to numerical, beginning with the positive scale item instead of starting with the lowest scored value and ascending (A = strongly agree, … E = strongly disagree). Likert-scales will be considered in more detail now in order to dismiss any concerns regarding the validity of the measurement system.

A valid instrument must be reliable, but a reliable instrument is not necessarily valid. When employing a 5-point Likert scale, researchers need to be aware that a mid-point response is both a methodological and epistemological concern (Tsang, 2012). The "not applicable" option on the university survey, if chosen has been coded as missing, or otherwise excluded from any analysis and is not technically considered as a scaled item, as it is not a value. For that reason, we will consider the validity of the 5-point Likert-scale systems, and more specifically, the validity of a mid-point. A "neutral" score is not one of indecision ("undecided", "don't know"); neutral denotes a state of confirming one's position. In an attitude scale, neutral states that the respondent has neither a positive nor a negative response, but "undecided" denotes a state of confusion on behalf of the respondent (Sturgis, Roberts, & Smith, 2014). In one way, the presence of a neutral score ("neither agree nor disagree," or "neutral") can allow for a more candid expression of truth on behalf of the respondent, but the main concern is whether the researcher is able to distinguish clear meaning making with such responses (Raaijimakers, Hoof, Hart, Verbogt, & Woolebergh, 2000). For this reason, the mid-point response in both the CoI questionnaire and the survey for this study are labelled as "neutral," to signify a response neutral in its position between positive and negative. Using a scaled survey in this study that was administered face-to-face to the students present in class using machine-readable sheets was a conscious decision by the researchers, as previous studies where web-based surveys were used suggested that response rates might be too low. One last consideration that needs to be made with regards to the student survey is the decision by research staff to add/change questions between 2011 – Year 1 (Y1) and 2012 – Year 2 (Y2/3), where the questions then remained consistent going forward.

During this transition from Y1 to Y2/3, the Likert-scale remained the same, and some of the changes to the survey were small (i.e. reordering the same questions). For example, in Y1 question 2 "Given the opportunity I would take another course in the future that has both online and face-to-face components" became Y2/3 question 3 with the exact same wording. In other instances, it was a change in syntax, but not semantics, where words changed, but the meaning of the question remained intact – Y1 question 6: "The web resources in this course are helpful," Y2/3 question 6: "The resources on the Moodle site were useful". There was however, a case where a change in question order occurred, as well as a syntactical change – Y1 question 8: "this course offered the convenience of not having to come to campus as often," Y2/3 question 9: "[…] this course allowed me to have more flexibility in my personal schedule." Lastly, the most significant change between the two surveys was the inclusion of a question for Y2/3 that was previously not present – Y2/3 question 2: "Taking this course increased my interest in the material". This question will be considered as semantically similar to the Y1 question asking if "This course experience has improved my opportunity to access and use the class content." Please find copies of both of the student surveys (Y1 and Y2/3) in Appendix C of this document.

4.3.2 THE MOODLE RUBRIC

The Moodle course website evaluation rubric is a framework employed as an adaptation of three existing evaluation rubrics frequently used to assess the design and delivery of online courses in higher education. These rubrics include: the Quality Online Course Initiative (QOCI) Rubric, the Quality Matters Rubric, and the Rubric for Online Instruction. As explained by Jonsson and Svingby (2007) "the reliable scoring of assessments can be enhanced by the use of rubrics, especially if they are analytic, topic-specific, and complemented with exemplars and/or rater training" (p.1). The criteria for the Moodle rubric in the Canadian university study was grouped into four topics of evaluation: (a) Moodle organization and layout design; (b) instructional design and delivery; (c) student engagement; and (d) student support and resources. This topic-specific criteria fits with Jonsson, and Svingby's (2007) reliable scoring description and was specifically chosen to represent some of the most important

issues instructors face when designing Moodle for their blended learning courses (Owston, York, & Finkel, 2013). There were also clear exemplar details laid out in the rating scale: "developing**"** (i.e., does not meet the criterion) means that little evidence of this criterion present, but it needs improvement to be presented more clearly or to be better developed; "appropriate**"** (i.e., meets the criterion) means that evidence of this criterion is clear and is appropriate for this blended course, but more could possibly be added; "outstanding**"** (i.e., exceeds the criterion) means that evidence of this criterion is clear, appropriate for this blended course, exceeds the expectations of the "appropriate" criterion, and demonstrates best practices in a manner that models its use (see Appendix C for the full rubric). This rating scale was coupled with distinct topic-specific descriptions for each evaluation indicator. For example, under the general topic of "Moodle organization and layout," the specific evaluation criterion of "ease and clarity of navigation of Moodle course website" was met with three distinct descriptions, "developing:" much of Moodle is under construction, with some key components identified such as the syllabus; "appropriate:" Moodle is organized and navigable, students can understand the key components and structure of the course; and "outstanding:" Moodle is well-organized and easy to navigate, where scrolling is minimized and facilitated with anchors, hyperlinks are based on visual cues such as colour, underlining, and text directives (e.g., start here).

A limitation of this study is that only one rater was able to score each Moodle site in connection to this study. Due to time and logistical constraints, Moodle sites were inaccessible to me as a researcher looking to rate them after the courses were already completed. The original scorer was able to assess each Moodle site while the course was running and while there was still student information and content available. The limitations to not having inter or intra rater reliability will be discussed further in later sections. The rubric, however, was detailed (formalized at each scoring level) to such a degree that I could assume a design-based reduction of scoring discrepancies, which can help to diminish scoring subjectivity (Moskal, & Leydens. 2000) and help to provide more rater reliability. The full Moodle rubric can be found in Appendix E.

4.3.3 THE COI SURVEY

An examination of this survey is necessary as the operationalized tool for the CoI framework. The questions present on this survey were used to theoretically map the constructs of cognitive, social, and teacher presence onto the student survey mentioned above. The theoretical connections made between the two surveys were then empirically tested, but a thorough examination of this tool in it of itself necessary to underpin my theoretical argument: that the items on the student survey do in fact, accurately pertain to and measure presence. According to Arbaugh, Cleveland-Innes, Diaz, Garrison, Ice, Richardson, and Sawn (2008), the 34-item CoI questionnaire was designed to measure:

> Cognitive presence: the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication; social presence: the ability of learners to project their personal characteristics into the community of inquiry, thereby presenting themselves as real people; and teacher presence: the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educational worthwhile learning outcomes (p. 134).

In 2008, Arbaugh and his team set-out to test the validity of the CoI instrument by performing a factor analysis through a principle component approach, which looks for the key elements within data, and administering a scree test, a technique to help decide how many factors to keep in a factor analysis (Tabachnick & Fidell, 2007). The survey was administered at four institutions across the U.S.A and within Canada, in the summer of 2007. The study sample was a random set of students participating in a multi-institutional, asynchronous, primarily text-based, online learning network. A random sample of students was prompted to answer the survey once they had logged onto the online system. Approximately 1,100 students responded (43% response rate). This sample is advantageous due to its breadth of institutional coverage (4 in total) and the consistency offered across institutions – one course management system, one faculty development and training program, the same technological infrastructure provider, and a single student/faculty helpdesk. All of the courses where learners were

sampled also utilized a similar modular structure. A sample of 1,100 is adequate for factor analytics and the high level of continuity between institutions and learning environments within this 2007 study is not only rare, but also allows for generalizability. The Keyser–Meyer–Olkin (KMO) measure of sampling adequacy is 0.96, meaning that a factor that scores near this mark, would be considered distinct and reliable. Arbaugh et al. (2008) showed that the respective KMO values for their survey items were in fact all falling within the range of 0.921 and 0.983, suggesting distinct and reliable factors given the data analysed. As stated by the authors themselves, "it is hoped that the validity of this framework that emerged from this study subsequently can be used to help researchers examine the relationship of the CoI to other variables, such as course outcomes" (Arbaugh et. al, 2008, p.137).

Two subsequent validations have been carried out on the CoI survey, one in Portugal (Moreira, Ferreira, & Almeida, 2013) and the other in Korea (Yu, & Richardson, 2015). The Portuguese sample consisted of 510 higher education students enrolled in blended online courses offered through the Moodle platform during one semester spanning 2010 and 2011. Students were enrolled in a combination of public and private institutions and included students in the faculties of health, education and psychology. Results were positive, with the Cronbach α of teaching presence, social presence, and cognitive presence in the Portuguese CoI instrument recorded as .93, .89, and .91 respectively. Moreira, Ferreira, and Almeida suggest that CoI framework is a valid, reliable, and efficient measure of its dimensions within the Portuguese population. In Korea, Yu and Richardson (2015), utilized a confirmatory factor modeling approach to assess the validity of the CoI constructs. All three forms of presence were shown again, to have high levels of reliability (all Cronbach's $\alpha > .913$). The sample consisted of 995 Korean students who were currently enrolled in the Cyber University, where the majority of students ranged in age from 19 – 23, and all courses are provided through online education. Please find a copy of the CoI survey in Appendix D.

4.4 Variables

Given the data sources and operational instruments outlined above, each variable will now be discussed insofar as how it was constructed using the data sources available. Operational definitions for each variable will be considered, along with descriptive data based on some preliminary univariate analyses. Lastly, any reliability or validity procedures required for each variable will be discussed. Before looking at the how specific variables were constructed however, the assumption of normal distributions within the sample population will be addressed.

There are three primary characteristics for a variable under consideration: the distribution of that variable, the measures of central tendency (mean, median, mode, range) for that variable, and the dispersion (standard deviation) for that variable (Field, 2009). Normality can be tested for in a variety of ways (Anderson-Darling, Ryan-Joiner, or Kolmogorov-Smirnov) (Miller, 1995; Selkirk, 1978). For the purpose of this study, normality was tested two ways, using the Shapiro-Wilk test and then by creating visual Quantile-Quantile (Q-Q) plots. As articulated by Field (2009), the Shapiro-Wilk test looks at *p*-values, if the value is found to be less than the chosen alpha level (in this case 0.05), then there is evidence for an non-normally distributed population. However, "since the test is biased by sample size, the test may be statistically significant from a normal distribution in any large samples. Thus a Q–Q plot is required for verification in addition to the test" (Field, 2009, p.143). A small p-value (less than 0.01) was indeed the case for most of the Shapiro-Wilk results for variables within this study (CGPA, Course Grade, Cognitive Presence, Social Presence, Teacher Presence, Quality of Online Course Design, and Student Adoption Attitudes). As a significance test however, Shapiro-Wilk is incomplete as it does not indicate the degree of deviation from normality directly, it simply produces a significance estimate. Also, it is ambiguous as to the forms of deviation [skew (symmetry of distribution) versus kurtosis (tail weight)] (Field, 2009). Lastly, the test is biased when it is used on larger sample sizes (the larger the sample, the more likely you'll get a statistically significant result).

For that reason graphical methods for assessing distributional assumptions were carried out. The Q-Q plot is an exploratory device, computing the theoretically expected value for each data point based on the distribution in question. If the data indeed follows the assumed distribution, then the points on a Q-Q will approximately fall on a straight line. The Q-Q plots for each variables distribution by year (CGPA, Course Grade, Cognitive Presence, Social Presence, Teacher Presence, Quality of Online Course Design, and (-) Student Adoption Attitudes) reflect a normal distribution for all variables under consideration within a sample size of almost 2,000. Researchers agree, that while both the Shapiro-Wilk test and Q-Q plots are valuable in an assessment of normality, it is the data visualization techniques of a Q-Q plot that offer more information to the researcher (Field, 2009; Miller, 1995; Selkirk, 1978). For that reason and for the purpose of this research, the assumption of normality has been met. A presentation of other univariate indicators (central tendency and dispersion) can be found in the successive variable sections.

4.4.1 ACHIEVEMENT

As previously mentioned, the term achievement will be described for the purposes of this research, as the final course grades received in the course. A student's cumulative grade point average (CGPA) is used as a covariate in the ANCOVA analysis in order to control for a student's overall achievement level given their specific achievement within these blended courses. Both CGPA and course grade are recorded on a scale of 0-9 (9 being an A+, 8 = A, 7 = B+, 6 = B, 5 = C+, 4 = C).

Below are preliminary univariate analyses describing the central tendency and dispersion of achievement for both the variables of course grade and CGPA. These tables highlight that CGPA values remain similarly averaged at the B (6) level across subjects, with standard deviations close to 1, indicating a spread of values close to the average. Course grades area also averaged close to the B (6) level, but in each year of the study Theatre and Dance consisted of the smallest sample sizes, and yielded the greatest deviation from that mean.

Table 4. CGPA by Course and Year

Course	N	M	SD
Music (W-2012)	131	6.46	1.05
Theatre (W-2012)	79	6.12	1.26
Dance (W-2012)	63	6.6	0.9
YEAR 1	**273**	**6.39**	**1.07**
Visual Arts (F-2012)	277	6.12	1.36
Film (F-2012)	251	6.1	1.3
Music (W-2013)	225	5.95	1.28
Theatre (W-2013)	81	6.6	1.05
Dance (W-2013)	69	6.39	1.28
YEAR 2	**903**	**6.23**	**1.25**
Visual Arts (F-2013)	205	6.14	1.36
Film (F-2013)	178	6.19	1.38
Music (W-2014)	231	5.98	1.38
Theatre (W-2014)	102	6.15	1.38
Dance (W-2014)	34	6.49	0.99
YEAR 3	**750**	**6.19**	**1.30**

Table 5. Grades by Course and Year

Course	N	M	SD
Music (W-2012)	131	5.5	1.86
Theatre (W-2012)	79	4.77	2.6
Dance (W-2012)	63	7.1	1.83
YEAR 1	**273**	**5.97**	**2.10**
Visual Arts (F-2012)	277	5.98	2.18
Film (F-2012)	251	6.38	1.82
Music (W-2013)	225	6.3	1.89
Theatre (W-2013)	81	6.87	2.07
Dance (W-2013)	69	6.72	2.63
YEAR 2	**903**	**6.45**	**2.12**
Visual Arts (F-2013)	205	6.95	1.52
Film (F-2013)	178	6.83	1.51
Music (W-2014)	231	6.08	1.65
Theatre (W-2014)	102	6.69	2.37
Dance (W-2014)	34	5.47	2.43
YEAR 3	**750**	**6.40**	**1.91**

Course grades at this Canadian university, at the undergraduate level, adhere to a 9-point scale (e.g., A+ = 9, A= 8, B+ = 7, B = 6, C+ = 5…) (see table below) and this system is universally applied across disciplines and faculties. Grades were given to students either as a number on this 9-point scale

or as their corresponding percentage. The structural equation model will use values along this 9-point scale to describe students' final grades.

Grade	Grade Point	Percentage Range	Description
A+	9	90-100	Exceptional
A	8	80-89	Excellent
B+	7	75-79	Very Good
B	6	70-74	Good
C+	5	65-69	Competent
C	4	60-64	Fairly Competent
D+	3	55-59	Passing
D	2	50-54	Marginally Passing
E	1	(marginally below 50%)	Marginally Failing
F	0	(below 50%)	Failing

Figure 9. The University Grading Scheme

The assessment tools employed in each of the five subjects under examination in this study (Theatre, Dance, Visual Arts, Film, and Music) reflect the composition of a student's final grade. Generally speaking, each course chose to maintain at least one traditional mode of assessment (tests, papers, or essays), weighted between 20%-40% of the final course grade. Each course also attempted to achieve diversity through the inclusion of at least one asynchronous (online comprehension or analysis) task, accounting for 10%-30% of the overall grade. The five unique combinations of synchronous and asynchronous assessment tasks, which will be discussed further when considering the role of blend format on achievement, lead to a student's final achievement grade.

4.4.2 PRESENCE

The variable of presence is a vector comprised of three distinct variables: cognitive, social, and teacher presence. These terms have been defined already for the purposes of this research, but specific indicators that fall under each category will now be explored. A discussion around the construction of each variable based on the instruments introduced will precede a more detailed preliminary descriptive analysis on the central tendency and dispersion of each form of presence.

As the student survey was not designed to explicitly measure presence, 16 questions from the survey were chosen as potential observable variables for the latent constructs of social, cognitive, and teacher presence in this post-hoc research design, based on the theoretical assumptions outlined in the description of each form of presence (see Appendix A for extended definitions of each construct). In the table below, I state the presence category for each of these 16 items, and then explicitly address any variations in semantics between the survey question as it is written in year 1 and the question in the year 2/3 survey, to illustrate that the categorical assumption holds across years. In subsequent sections I will describe a comprehensive empirical examination that served to expand the discussion on those 16 questions, from measuring three distinct factors, to potentially measuring 4.

Table 6. Comparisons & Connections – The CoI & Student Surveys

CoI Category	**Student Survey Year 1**	**Student Survey Year 2/3 Equivalents**
Cognitive	This course experience has improved my opportunity to access and use the class content.	Taking this course increased my interest in the material.
Cognitive	The course Moodle site is well organized and easy to navigate.	I was able to find course information easily at the Moodle site.
Cognitive	The web resources in this course were helpful.	The resources at the Moodle site were useful.
Cognitive	I am overwhelmed with information and resources in this course.	I was overwhelmed with information in this course.
Cognitive	This course required more time and effort.	This course required extra effort
Cognitive	This course improved my understanding of key concepts.	Exact same wording.
Cognitive	I have trouble using the technologies of	The technology in this course interfered

	this course.	with my learning.
Social	I was more engaged in this course.	Exact same wording.
Social	I was more likely to ask questions in this course.	Exact same wording.
Social	The amount of my interaction with other students in this course increased.	Exact same wording.
Social	The quality of my interaction with other students in this course was better.	Exact same wording.
Social	I felt connected to other students in this course.	Exact same wording.
Teacher	The amount of my interaction with the instructor in this course increased.	Exact same wording.
Teacher	The quality of my interaction with the instructor in this course increased.	Exact same wording.
Teacher	The online and face-to-face components of this course enhanced each other.	Exact same wording.
Teacher	When I encounter a problem with the use of the technologies in this course, the York technical support service helped me with my problem in a timely and effective manner.	The technology used for online portions of this course was reliable.

The linguistic (syntactical and semantic) connections between years of the student survey (Y1 and Y2/3) and the theoretical connections to the CoI forms of presence were subsequently empirically tested using factor analysis. A factor analysis is a highly useful tool when looking to take a 34-item questionnaire and validate that indeed, a specific set of items all relate to the same concept or theme (i.e. cognitive presence). Factor analysis operates on the notion that measurable and observable variables can be reduced to a set of latent variables that share a common variance and are unobservable (Bartholomew, Knott, & Moustaki, 2011). Factor analysis is a multivariate statistical approach that yields a mathematical model from which factors are measured or confirmed based on how high or low that item loads on a factor. This statistical technique complements the theoretical connections outlined above, as it makes patterns easily visible for interpretation, and allows for clusters of connected items to be seen empirically. Even though I could run a factor analysis though the measurement model in SEM, running it beforehand allows for finalized sub-scales to be entered at the outset of modelling and allows me the freedom to use factor scores in the SEM as opposed to scored averages.

It is important to run a factor analysis on the student surveys, as the student surveys were not constructed to measure presence. Factors in essence, are hypothetical constructs or theories that help interpret the consistency in a data set. The value of factor analysis here then, is to use the three forms of presence (cognitive, teacher, and social) to provide a meaningful organizational scheme that can be used as an interpretive lens through which to examine the survey results. I started with an exploratory factor analysis (EFA) – to "test" the translation of the data that I have into a more user-friendly organization of items (survey questions) through factor loadings. An EFA will answer the question: "How many factors are present within the items I have chosen to examine?" and I am testing a simple hypothesis that k=3 (three factors are sufficient to explain the correlations amongst items). I will be including a total of 16 items (see above) into this initial analysis.

Various assumptions need to be met in order for the estimations made during factor analysis to be reliable (Tabachnick, & Fidell, 2007), for example EFA assumes a normal distribution when using a Principle Component Analysis extraction method. As mentioned at the outset of this section, the Q-Q plots have shown this assumption to be satisfied. Secondly, a sufficient sample size is required ($n > 200$) and with a clean data set of 1,926 complete student profiles this assumption is also satisfied. It is also important to have the correct a priori model specifications, which have been articulated through the linguistic and theoretical connections made above. Lastly, an assumption of random sampling is expected. However, given the nature of the data collection process for this study (sampling of convenience), this assumption remains unsatisfied and remains a limitation of the study. With a large sample size however, the potential statistical challenges to this lack of independence could be mitigated to a certain degree (Field, 2009). Tables 7 displays the results of the initial EFA considering all 16 input items (components), followed by Table 8 which outlines the component matrix produced when testing for $k = 4$. While both $k = 3$ and $k = 4$ were tested, it was interesting to find that items were present under a fourth construct, as opposed to just three (i.e. three forms of presence), and as aforementioned in Table 9, a rotated factor matrix shows three distinct items loading on that factor.

Table 7. EFA – Initial Extraction

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.62	35.10	35.10	5.62	35.10	35.10
2	1.89	11.79	46.89	1.89	11.79	46.89
3	1.30	8.15	55.03	1.30	8.15	55.03
4	1.13	7.09	62.12	1.13	7.09	62.12
5	.95	5.92	68.04			
6	.78	4.89	72.93			
7	.66	4.05	77.02			
8	.63	3.95	80.96			
9	.53	3.33	84.29			
10	.52	3.25	87.54			
11	.44	2.77	90.31			
12	.39	2.43	92.74			
13	.38	2.40	95.13			
14	.37	2.33	97.46			
15	.23	1.47	98.93			
16	.17	1.07	100.00			

Extraction Method: Principal Component Analysis.

Table 8. Component Matrix – 4 factor loadings

	Component			
	1	2	3	4
Q3.	.58			-.32
Q4.	.69			
Q5.	.51	-.41	.41	
Q6.	.60	-.35	.38	
Q7.	.50		.33	
Q10.	.77			
Q11.	.68			
Q12.	.66	.39		.37
Q13.	.71	.38		
Q14.	.64	.36		.35
Q16.	.70			-.37
Q17.	.68			-.42
Q22.	.65			
Q18.		.60	.56	
Q19.	-.33	.50		
Q21.		.55	.56	

4 components extracted.

Table 9. Rotated Component Matrix "Simple Structure" – 4 factor loadings

Rotated Component Matrix

	Component			
	1	2	3	4
Q3.	.63			
Q4.	.54		.41	
Q5.			.81	
Q6.			.77	
Q7.			.68	
Q10.	.63	.34		
Q11.	.59	.40		
Q12.		.86		
Q13.		.85		
Q14.		.81		
Q16.	.77			
Q17.	.79			
Q22.	.64			
Q18.				.83
Q19.			-.34	.51
Q21.				.81

Rotation Method: Varimax & Kaiser Normalization.

Table 9 above, shows the results post-rotation for a four-factor matrix. The simple structure produced through rotation serves as important reference when deciding how many factors you want to consider in a confirmatory factor analysis (CFA). Rotation is an important aspect of factor analysis, where the axes of the factor can be rotated within the multidimensional variable space to determine the 'best fit' between the variables and the latent factors by searching for the strongest correlations (Tabahnick, & Fiddell, 2007). Rotation methods are either orthogonal or oblique. I employed a Varimax, orthogonal rotation method as the factor correlation matrices showed no value over .3 (the correlation threshold). While there are multiple types of orthogonal methods of rotation, Varimax is the most widely used with SPSS. The resulting matrix above shows a fourth factor clearly emerging from the 16 observable items, and meeting the necessary criteria for factor designation (a minimum of three items loading over 0.4). The decision was made to include this fourth factor in my confirmatory factor analysis, and it will be considered under the next variable heading titled "Student Adoption Attitudes".

A CFA restricts attention to the sub-set of items as they relate to my theoretical questions of interest (do these items and factors relate to three forms of presence?) CFA answers the question: Are these four factors (k = 4) exactly what I think they are? I have made prior theoretical assumptions around the potential sub-scales for presence based on construct definitions and previous empirical research, but a CFA uses hypothesis testing to help mitigate the post-hoc nature of this design, where the student surveys were not explicitly set up to measure the constructs of presence or student adoption attitudes. In order to be considered as a factor in the CFA, a construct required a minimum of three items loading over 0.4 (Tabahnick, & Fiddell, 2007), as indicated by the rotated matrix in Table 9, four factors met this criteria and were subsequently included. The CFA was run using the highest eigenvalues within the rotated component matrix giving the first component 7 items, and all remaining components (2-4) 3 items each. Please refer to Appendix F for a visual diagram of CFA results; what follows is a table outlining the default model regression weights, critical rations and p-values for each item associated with each factor.

Table. 10 CFA Results

	Default Model	
	Maximum Likelihood Estimate	Critical Ratios (C.R)
Q3. – Factor 1	1.00	
Q4. – Factor 1	1.22	21.51***
Q10. – Factor 1	1.36	23.57***
Q11. – Factor 1	1.15	21.91***
Q16. – Factor 1	1.34	22.60***
Q17. – Factor 1	1.33	22.53***
Q22. – Factor 1	.98	20.61***
Q12. – Factor 2	1.00	
Q13. – Factor 2	1.00	44.57***
Q14. – Factor 2	.85	36.89***
Q5. – Factor 3	1.00	
Q6. – Factor 3	1.04	24.97***
Q7. – Factor 3	.92	20.42***
Q18. – Factor 4	1.00	
Q19. – Factor 4	.64	12.66***
Q21. – Factor 4	.94	13.72***

*** $p < 0.01$.

The Maximum Likelihood Estimates in Table 10 indicate that correlations (R^2 values) are strong (close to 1) between each item and their corresponding factor. Critical Ratio values (regression weight divided by the Standard error) are high (higher than 2 is significant), and the three stars (***) in indicates $p < 0.001$ (Kaplan, 2008). The degrees of freedom for this model sit at 98, well within the acceptable range of 152-54, and with a Chi-square value of 1841.319, the cumulative probability is 1, but this value can be accounted for by the large sample size and a more comprehensive model fit analysis must be undertaken (Stevens, 2002). The level of fit for a statistical model describes how well that model fits a set of observations. Measures of goodness of fit usually show the discrepancy between observed and expected values, given the model under consideration (Bartholomew, & Knott, 2011), indicating the ability of that model to reproduce the data. There are multiple fit indices for a CFA, but for the context of this study I will discuss four (CFI, RMSEA, AIC, and the HOELTER INDEX).

Prior to outlining the fit of this study's CFA model, it is important to mention that some researchers do not believe that fit indices add value (e.g., Barrett, 2007) and only the chi-square should be interpreted. Others (e.g., Hayduk, Cummings, Boadu, Pazderka-Robinson, & Boulianne, 2007) argue that cut-offs for a fit index can be misleading and subject to misuse. Most analysts believe in the value of fit indices, but caution against strict reliance on cut-offs. Messick's (1989) emphasis on an "integrated evaluative judgment" (p.13) reminds us that fit is a combination of rationales and evidence. The Comparative Fit Index (CFI), for example, would ideally sit at .9 for good model fit, but due to my large sample size, the 0.858 value produced in the CFA default model is sufficient given that limitation. RMSEA (Root Mean Square Error of Approximation) values should be lower than 0.08, and this model sits at 0.09. However, researchers have suggested 0.10 as the cut-off for poor fitting models (Kenny, Kaniskan, and McCoach, 2014; MacCallum, Browne and Sugawara, 1996). The HOELTER INDEX assumes $n > 200$ and a statistically significant chi-square (Hu, & Bentler, 1998). With those two conditions satisfied the Hoelter value for this model sits at 140, higher than the recommend value of 75.

Table 11. Latent Constructs and Observable Variables – Post CFA

Latent Constructs	Observable Items	Survey Question # (Y1)
Cognitive Presence	1. This course experience has improved my opportunity to access and use the class content.	Q.3
Cognitive Presence	2. The online and face-to-face components of this course enhanced each other.	Q.4
Cognitive Presence	3. I was more engaged in this course.	Q.10
Cognitive Presence	4. I was more likely to ask questions in this course.	Q.11
Cognitive Presence	5. The amount of my interaction with the instructor in this course increased.	Q.16
Cognitive Presence	6. The quality of my interaction with the instructor in this course was better.	Q.17
Cognitive Presence	7. This course improved my understanding of key concepts.	Q.22
Social Presence	8. The amount of my interaction with other students in this course increased.	Q.12
Social Presence	9. The quality of my interaction with other students in this course was better.	Q.13
Social Presence	10. I felt connected to other students in this course.	Q.14
Teacher Presence	11. The course Moodle site was well organized and easy to navigate.	Q.5
Teacher Presence	12. The web resources in this course are helpful.	Q.6
Teacher Presence	13. When I encounter a problem with the use of the technologies in this course, support staff helped me with my problem in a timely and effective manner.	Q.7
Student Adoption Attitude	14. This course required more time and effort.	Q.22
Student Adoption Attitude	15. The technology in this course interfered with my learning.	Q.19
Student Adoption Attitude	16. I was overwhelmed with information in this course.	Q.18

Table 11 above, illustrates the finalized four constructs that were empirically confirmed. Factor labels are in line with the theoretical assumptions made at the outset of the analysis, with the fourth factor labelled Student Adoption Attitude given that the items that loaded on that construct all pertain to a student's experience with the course technology. Please find below, a set of descriptive statistics (tables 12 – 14) for each of the presence variables (cognitive, social, and teacher presence) that will be considered in the analytic process (SEM, ANOVA, MANOVA, and ANCOVA). The scale system for the student survey lists a high score (strongly agree) as 5; this means that presence, constructed using questions from this survey will have a scale of 0-5, where 5 represents a strong agreement. Descriptive statistics outlined below were taken from an average score across all questions relevant to the variable.

In Table 12, cognitive presence is seen to hover close to 3 as a mean across years, with a standard deviation of less than one, indicating that few students answered at the extremes of the scale (i.e. very low or very high scores for cognitive presence). Social presence, when compared to cognitive presence, shows a slightly lower average score per year, with higher levels of variance from that mean.

Table 12. Descriptive Statistics for Cognitive Presence by Course and Year

Course	N	M	SD
Music (W-2012)	131	2.56	0.77
Theatre (W-2012)	79	2.7	0.93
Dance (W-2012)	63	3.25	0.41
YEAR 1	**273**	**2.84**	**0.70**
Visual Arts (F-2012)	277	2.84	0.71
Film (F-2012)	251	2.84	0.76
Music (W-2013)	225	2.72	0.83
Theatre (W-2013)	81	2.29	0.94
Dance (W-2013)	69	2.96	0.75
YEAR 2	**903**	**2.73**	**0.80**
Visual Arts (F-2013)	205	3.25	0.71
Film (F-2013)	178	2.3	0.73
Music (W-2014)	231	3.06	0.78
Theatre (W-2014)	102	3.12	0.83
Dance (W-2014)	34	2.32	0.68
YEAR 3	**750**	**2.81**	**0.75**

Table 13. Descriptive Statistics for Social Presence by Course and Year

Course	N	M	SD
Music (W-2012)	131	2.38	0.96
Theatre (W-2012)	79	2.33	1.14
Dance (W-2012)	63	2.38	0.98
YEAR 1	**273**	**2.36**	**1.03**
Visual Arts (F-2012)	277	2.41	0.96
Film (F-2012)	251	2.86	0.91
Music (W-2013)	225	2.43	0.94
Theatre (W-2013)	81	2.43	1.15
Dance (W-2013)	69	2.33	1.00
YEAR 2	**903**	**2.49**	**0.99**
Visual Arts (F-2013)	205	2.66	0.91
Film (F-2013)	178	2.13	0.96
Music (W-2014)	231	2.79	0.98
Theatre (W-2014)	102	2.64	1.12
Dance (W-2014)	34	2.29	0.91
YEAR 3	**750**	**2.50**	**0.98**

Table 14. Descriptive Statistics for Teacher Presence by Course and Year

Course	N	M	SD
Music (W-2012)	131	2.71	0.66
Theatre (W-2012)	79	2.68	1.09
Dance (W-2012)	63	3.28	0.84
YEAR 1	**273**	**2.89**	**0.86**
Visual Arts (F-2012)	277	3.62	0.80
Film (F-2012)	251	3.67	0.86
Music (W-2013)	225	3.47	1.05
Theatre (W-2013)	81	2.93	1.20
Dance (W-2013)	69	3.66	0.82
YEAR 2	**903**	**3.47**	**0.95**
Visual Arts (F-2013)	205	4.07	0.75
Film (F-2013)	178	3.46	0.93
Music (W-2014)	231	3.82	0.75
Theatre (W-2014)	102	3.92	0.87
Dance (W-2014)	34	3.39	0.89
YEAR 3	**750**	**3.73**	**0.84**

As illustrated in Table 14, teacher presence shows a continuous increase in mean from year 1 through to year 3, with standard deviations less than one indicating that individual student perceptions remained relatively close to the average in each year of this study. In subsequent sections of this chapter, these variables will be discussed further, and connected to the design of both the SEM and the Analyses of Variance models utilized in the testing process.

4.4.3 STUDENT ADOPTION ATTITUDES

When looking at the fourth factor that emerged from that EFA analysis, the initial assumption was that theoretically it was aligned with student adoption attitudes, however, the inter-factor regression weights that were reported through the CFA (see Appendix F for the full read out) between this fourth factor and each of the remaining three (cognitive, social, and teacher presence) were all negative (-.12, -.08, and -.20 respectively). A negative correlation means that if the value of this factor were to increase, the values of the remaining factors would decrease. The latent variable (factor 4) will be labeled as “Student Adoption Attitudes”, with the understanding that this negatively correlated relationship be taken into consideration when interpreting the resulting SEM values. This relationship

is theoretically consistent with both the question content, phrased in a negative syntax ("I was overwhelmed…", "The technology interfered…", "This course required more time and effort") as well as with previous literature. While there is no previous study looking explicitly at the connections between a negative student adoption attitude and presence, research has been carried out looking at student satisfaction in connection to presence and regression weights were similar (0.16, 0.17, and 0.17 respectively) (Shea & Bidjeramo, 2008; Joo, Lim, & Kim, 2011). Like the presence variables, the rating system for student adoption attitudes operates on a 5-point scale, where 5 indicates the highest level of difficult with course technology. In Table 15, both the mean values (between 2.78 and 2.91) and the standard deviations (approximately 0.8) remained consistent across years, indicating that students felt similarly in regards to the negative influence of technology on their learning experience.

Table 15. Descriptive Statistics for Student Adoption Attitudes by Course and Year

Course	N	M	SD
Music (W-2012)	131	2.68	0.82
Theatre (W-2012)	79	3.13	0.70
Dance (W-2012)	63	2.55	0.79
YEAR 1	**273**	**2.79**	**0.77**
Visual Arts (F-2012)	277	2.98	0.78
Film (F-2012)	251	2.68	0.75
Music (W-2013)	225	3.08	0.96
Theatre (W-2013)	81	3.05	0.77
Dance (W-2013)	69	2.77	0.76
YEAR 2	**903**	**2.91**	**0.80**
Visual Arts (F-2013)	205	2.67	0.84
Film (F-2013)	178	2.78	0.77
Music (W-2014)	231	2.98	0.90
Theatre (W-2014)	102	2.63	0.92
Dance (W-2014)	34	2.83	0.67
YEAR 3	**750**	**2.78**	**0.82**

4.4.4 QUALITY OF ONLINE COURSE DESIGNS

The Moodle course website evaluation rubric is a framework employed as an adaptation of three existing evaluation rubrics frequently used to assess the design and delivery of online courses in higher education. These rubrics include: the Quality Online Course Initiative (QOCI) Rubric, the Quality Matters Rubric, and the Rubric for Online Instruction. The rubric employed in the original

study was comprised of 20 individual indicators. These 20 observable indicators for each course in years two and three, comprise the variable titled the "Quality of Online Structures". The rubric data for years 2 and 3 of the study (10/13 of the courses under consideration), scores course sites on four categories: the organization and layout design, instructional design and delivery, student engagement, and student support and resources available. Each of these 4 categories has a total of 5 indicators that were designed to meet the mandate of the university funding body already mentioned in the background of this study. Both this variable as well as Student Adoption Attitudes are considered contextual factors (exogenous), and are considered in the SEM to have a distal causal association with the primary relationship of presence and achievement.

In order for the theoretical rationale of these 20 indicators being said to all measure one construct, and in this case, to all measure the quality of the design of the online component in these blended courses, an empirical test needs to be run in order to confirm. For that reason, an internal consistency test for reliability was carried out on the Moodle rubric using Cronbach's alpha. The resulting value for alpha given all 20 items within the rubric, was 0.802, where scores above 0.7 are adequate enough to assume that the items included in the analysis are indeed all measuring the same construct (Field, 2009). These empirical test results can be seen in Figure 10 on the following page. Due to these empirical results on internal consistency, all 20 observable items on the rubric will be considered elements of the latent construct of the quality of online course design. The scale of measurement was 1-3, where 3 represented a high display of design acumen. Descriptive statistics in Table 16 were taken from an average score across all questions scored on the rubric, and consistent with current research, indicate that the design expertise for online course structures remain moderate, with quite a significant level of variance between courses (Rubin, Fernandes, & Avgerinou, 2013).

Table 16. Quality of Online Course Design by Year

Year	N	M	SD
2 (2012-2013)	903	1.61	0.50
3 (2013-2014)	750	1.56	0.31

MOODLE AS ONE CATEGORY: Quality of Online Structures

Reliability Statistics

Cronbach's Alpha	N of Items
.802	20

M1-5	Organization & Layout
M6-10	Instructional Design & Delivery
M11-15	Student Engagement
M16-20	Student Support & Resources

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	
M1	29.4000	57.822	.316	.796	Ease & clarity of navigation on Moodle site
M2	29.3000	55.344	.637	.781	Consistent navigation from page to page
M3	29.4000	57.156	.371	.793	Visual consistency of the Moodle course site
M4	29.3000	59.344	.243	.799	Functional consistency of the Moodle course site
M5	30.2000	56.178	.277	.802	Use of multimedia
M6	29.9000	58.322	.234	.801	Organization of a blended course
M7	29.5000	56.944	.535	.787	Building learning paths
M8	29.7000	61.789	-.015	.816	Meeting the diverse learning needs of students
M9	30.1000	58.100	.519	.790	Use of Moodle technology
M10	30.1000	56.544	.294	.799	Use of a variety of learning activities
M11	30.2000	59.956	.080	.814	Student-to-student interaction
M12	30.3000	50.678	.922	.760	Student-to-instructor interaction
M13	30.0000	57.111	.176	.813	Student-to-content interaction
M14	30.7000	54.900	.364	.795	Organization/management of discussion forums
M15	31.7000	62.456	0.000	.804	Organization and facilitation of group work
M16	31.1000	58.989	.403	.794	Information about being a successful learner (BC)
M17	30.0000	55.111	.545	.783	Course-related information
M18	30.6000	52.044	.763	.769	Technical support and resources
M19	30.4000	56.267	.566	.785	Academic support and resources
M20	30.4000	54.044	.802	.773	Institutional/program support and resources

Figure 10. Results for Moodle Internal Consistency Test

4.4.5 FORMAT OF THE BLEND

As stated by Garrison and Vaughan (2008), blended learning is a "thoughtful mix of face-to-face and online", but each blended classroom employs a unique combination of these two learning opportunities (Driscoll, 2002; Oliver & Trigwell, 2005; Poon, 2013). There is currently a gap in the literature around the strength or limitations of different blend formats at the higher education level, and the unique combinations that were present in this study can help to address that gap. Each of the five distinct blends outlined below will be considered an element of the ordered factor (IV), where Format 1

represents the least amount of technological integration, and Format 5 the most. In his two AERA papers, Owston (2012, & 2014) has been at the forefront of attempting to label distinct blend combinations, while he has articulated more than the five I will work with here, he too has worked with a spectrum of least (web-enhancement) to most (fully online) technological integration.

Table 17. Format of the Blend: Descriptions of the Ordered Factor Levels

Format	N	Subject	Description
1	262	Theatre	**Web-enhanced:** 0% of graded content was through the work online
2	429	Film	**F2F Lectures + Blended Tutorials:** 45% of graded content was through the blended tutorials, 100% of work submitted online
3	166	Dance	**F2F Lectures + Online Tutorials:** 50% of graded content was through work online
4	587	Music	**Online Lectures + F2F Tutorials:** 75% of graded content was from work done online
5	482	Visual Arts	**Fully Online:** 100% of graded content was from work completed and submitted online

The format of the blend serves as the independent variable (ordered factor) for each of the analysis of variance techniques outlined in the following section, addressing objective 4 of this study.

4.5 Analytic Procedures

SEM and ANOVA techniques were intentionally selected as quantitative methods for this project out of consideration for the core research questions. Choosing to employ the CoI framework meant that the survey data collected needed to be seen as observable items, which could then be grouped into the latent constructs of cognitive, social, and teacher presence. With a total of 6 latent

variables under consideration in the first three research questions (Achievement, Student Adoption Attitudes, Quality of Online Design, Cognitive, Social, and Teacher Presence) Structural Equation Modeling (SEM) was uniquely qualified for that type of procedure – to view data as a network of relationships between variables (Westland, 2015). ANOVA techniques were chosen to examine the role of blend format, answering research question four, through an analysis of mean variance and a display of trends in significance across multiple data groups (Gelman, 2008), in the case of this study, an ordered factor comprised of five distinct blend formats.

4.5.1 STRUCTURAL EQUATION MODELING (SEM)

There are two distinct components to a SEM: a structural model that displays possible causal relationships between endogenous and exogenous variables, and a measurement model that illustrates the connections between latent constructs and their observed indicators (Kaplan, 2008). The exploratory and confirmatory factor analysis that was carried out and articulated in previous sections is an example of the measurement component of an SEM, while the path diagram to follow visualizes the structural model. Structural equation modeling (SEM) as we know and use it today is rooted in generic path modeling (Westland, 2015). With the integration of ICT into statistical practices, disciplines such as sociology, psychology, and other social sciences sectors have increasingly made use of the technique in the representation of complex relationships (Schiller, 2003). As this research's primary focus is with the constructs of presence (cognitive, social and teacher) as defined by a set of measured survey indicators, SEM was a logical choice in helping to map the relationship between presence (as observed by scores of cognitive, social and teacher presence) in connection to the construct of achievement (as observed through course grades). The links between constructs of this study's structural equation model were estimated with using Stata version 14. This program enables the user to specify, estimate, assess, present and refine models to show hypothesized relationships among variables (Blunch, 2013). In addition, the software was chosen for it's flexibility of display, as it allows for either a graphical, non-graphical, or programmatic interface depending on the stage and intentions of analysis.

Researchers believe that SEM is a holistic and accessible statistical practice that reflects a less explicitly causal interpretation to complex problems (Blunch, 2013; Westland, 2015). The CFA previously discussed produced factor scores for each of the following variables: student adoption attitude, cognitive, social, and teacher presence. These factor scores were used in the SEM to represent optimal weights in the construction of the latent constructs (Westland, 2015). The estimation of the original model (using Maximum Likelihood) didn't converge because of too many parameters and so it was decided to use Asymptotic Distribution Free (ADF) estimation method (Joreskog, 2016). An ADF estimation method was also chosen to account for the Shapiro-Wilk test results previously mentioned (close to zero and in need of a Q-Q plot to visualize normality), as normality is a critical assumption of SEM estimation modeling (Blunch, 2013). The final model presented in Figure 11 allowed for all constructs to remain in the analysis, even with a complex set of relationships under analysis.

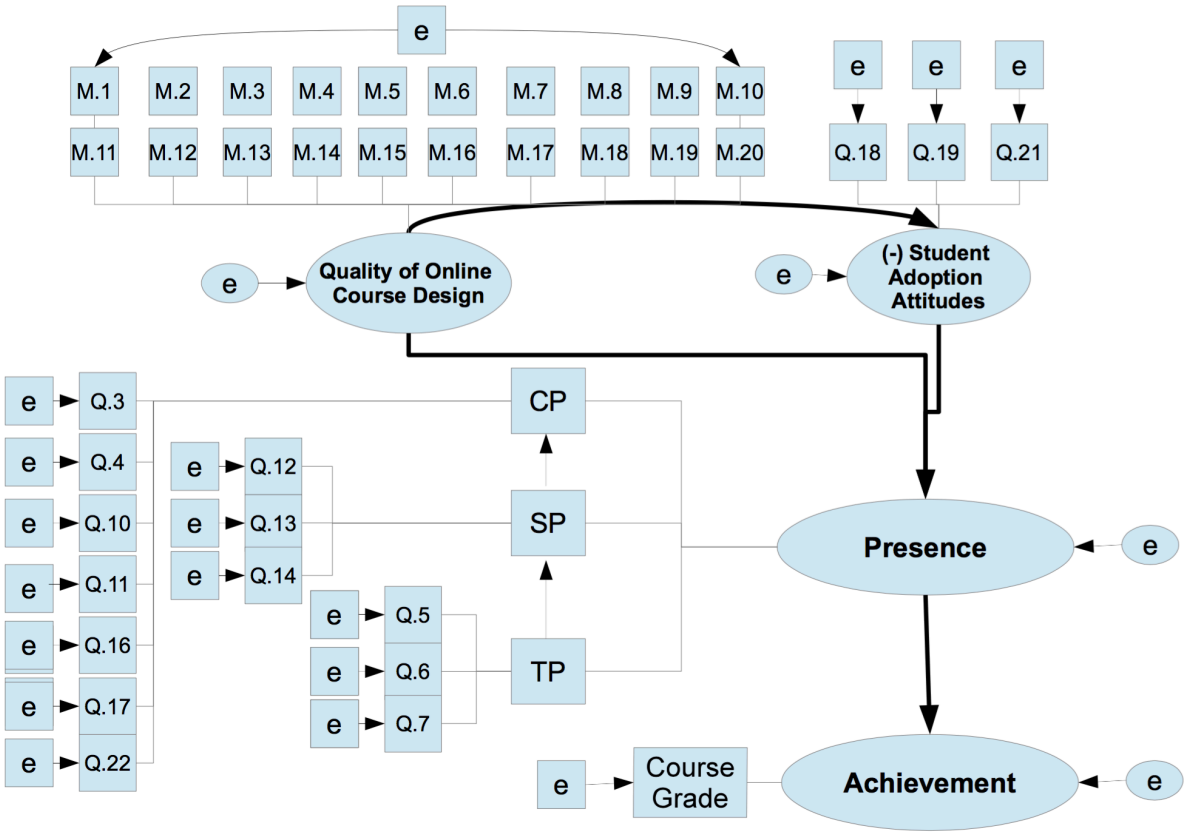


Figure 11. Structural Equation Model

The diagram symbols in the structural model in Figure 11 can be interpreted as follows: arrows articulating the direct relationships under examination, squared items representing the observable variables (i.e. survey items), oval shaped items as the latent constructs that are comprised of these observable items (i.e. Presence), and lastly "e" values that indicate the error associated with either the observable or latent variables. The first three research questions in this study concerned with the presence-achievement relationship, were addressed through this structural model, derived from the literature, and testing the following subset of questions:

1) Does presence have a positive correlation with student performance (grade)?
2) Does social presence have a positive correlation with cognitive presence?
3) Does teaching presence have a positive correlation with social presence?
4) Does teaching presence have an indirect, positive correlation with cognitive presence, mediated by social presence?
5) Does the quality of online course design have an indirect, positive correlation with student performance (grade), mediated by presence?
6) Do student adoption attitudes have an indirect, correlation with student performance, mediated by presence?
7) Does the quality of the online design have a direct, positive correlation with adoption attitudes?

4.5.2 ANALYSIS OF VARIANCE

When you are looking at mean variance between variables there are a number of methods that are possible depending on what you want to test and what the theoretical support is for looking at that association. A simple Analysis of Variance (ANOVA) is used for comparative purposes, where only the difference in outcomes is of most interest (Cox, & Solomon, 2003). This method produces a ratio of variance between groups (or variables) that is theoretically similar to running multiple two sample t-tests (Stigler, 1986). ANOVA's however, are less conservative in their design and computations, which results in less type 1 error (getting a false positive), and is considered a very useful method of analysis.

The beginning of my analysis around mean variance started here with a simple ANOVA. The independent variable (IV) in that first analysis and in all of the tests of variance to follow (MANOVA, ANCOVA) is the variable previously discussed as the "Format of the Blend". This IV consisted of five ordered levels (1-5), where each increasing level indicates an increase in technological integration at the course level. The ratios produced in the initial ANOVAs between the ordered factor and two distinct dependent variables (DVs) (final grades, and adoption attitudes) allowed me to assess the statistical significance of the variance found between each blend format, illustrating the potential role of blend format on achievement levels and student adoption attitudes. A Multivariate Analysis of Variance (MANOVA) was carried out as a method of assessing mean variance where there are multiple dependent variables (cognitive, social, and teacher presence) (Stevens, 2002). MANOVA's answer the following questions: Do changes in the IV have significant effects on the DVs (Warne, 2014)? What are the relationships among the DVs? This multivariate analysis is distinct from ANOVA, as it uses the variance-covariance between variables in testing the statistical significance of the mean differences (Frane, 2015).

Lastly, Analyses of Covariance (ANCOVA) were carried out. ANCOVA's are a combination of ANOVA and regression, producing a general linear model, which offers a significant reduction in complexity (Tabachnick & Fidell, 2007). In general terms, an ANCOVA tests for the influence of an IV on a DV while removing the effect of a covariate factor. ANCOVA first runs a regression of the covariate (CGPA) on the dependent variable (i.e. grade), then residuals (unexplained variance remaining in the regression model) are then run through the ANOVA to find out how much of that variance can be explained by the IV (format of the blend). The addition of covariates was an opportunity to gather more data on that initial format of the blend (IV) and achievement (DV) relationship (i.e. what influence does C have on the A-B relationship) (Miller, & Chapman, 2001). The first ANCOVA controlled for general achievement levels (CGPA), the second controlled for presence (as a vector) and lastly, student adoption attitudes. This ANCOVA analysis allowed me to account for

shifts in attitudes and presence within the format-achievement relationship and by controlling for CGPA, general achievement levels are taken into account and we can see even more clearly, the role of blend format on course grade. Assumptions that need to be met for an ANOVA, MANOVA, both linear models, and an ANCOVA, will be considered at the outset of the results chapter, save for the independence of observations assumption, which will be addressed again in the section on study limitations. The last research question in this study concerned with the impact of blend format, was addressed through my analyses of variance, and tested the following subset of questions:

Using ANOVA as my statistical tool, I tested:

1) Does the blend format have a significant effect on achievement levels?
2) Does the blend format have a significant effect on student adoption attitudes?

Using MANOVA as my statistical tool, I tested:

1) Does the format of the blend have a significant effect on the dependent variables (Cognitive Presence, Social Presence, and Teacher Presence)?
2) What are the relationships among the dependent variable groups?

Using ANCOVA as my statistical tool, I tested:

1) Does the blend format (ordered factor) have a significant effect on achievement (course grade), when controlling for student's general achievement level (CGPA)?
2) Does the blend format (ordered factor) have a significant effect on achievement (course grade), when controlling for student adoption attitudes?
3) Does the blend format (ordered factor) have a significant effect on achievement (course grade), when controlling for presence (as a vector)?

4.6 Method Summary

This figure brings us back to the core research objectives and serves as a broad schematic overview of the methodological approach taken in this study.

	Objective 1: *How do student perceptions of social, teaching, and cognitive presence relate to student achievement?*	**Objective 2:** *How does the online design of a course relate to student perceptions of presence and student achievement?*	**Objective 3:** *How do student adoption attitudes relate to their perception of presence and course achievement?*	**Objective 4:** *How does the format of the blend relate to student adoption attitudes, presence, and achievement?*
Indicators	**Cognitive Presence** (7 items) **Social Presence** (3 items) **Teacher Presence** (3 items) **Final Course Grades** **Cumulative Grade Point Average (CGPA)**	**Online Course Design** (20 items) **Cognitive Presence** (7 items) **Social Presence** (3 items) **Teacher Presence** (3 items) **Final Course Grades**	**(-) Student Adoption Attitudes** (3 items) **Cognitive Presence** (7 items) **Social Presence** (3 items) **Teacher Presence** (3 items) **Final Course Grades** **Cumulative Grade Point Average (CGPA)**	**Format of the Blend** (Ordered Factor 1 – 5) **(-) Student Adoption Attitudes** (3 items) **Cognitive Presence** (7 items) **Social Presence** (3 items) **Teacher Presence** (3 items) **Final Course Grades** **Cumulative Grade Point Average (CGPA)**
Data Source	Student Surveys Course Grades CGPA Values	Moodle Rubric Scores Course Grades	Student Surveys Course Grades CGPA Values	Student Surveys Course Grades CGPA Values
Method of Analysis	EFA/CFA SEM ANCOVA	Reliability Statistics (α) SEM	EFA/CFA SEM ANCOVA	ANOVA MANOVA ANCOVA

Figure 12. Methodology Summary

CHAPTER 5: Results

The analytic procedures described in the previous section, are examples of inferential statistics (Field, 2009) chosen specifically for this study to answer the following core research questions:

1) How do student perceptions of social, teaching, and cognitive presence in blended courses relate to student achievement?

2) How does the online design of a blended course relate to student perceptions of presence and student achievement?

3) How do student adoption attitudes relate to their perceptions of presence and achievement in blended courses?

4) How does the format of the blend relate to student adoption attitudes, presence, and achievement?

Findings are considered insofar as they pertain to these four core questions. This study's 95% confidence interval, means that result with p-values less than 0.05 will be considered significant. It is important to remember however, that significance levels are very much tied to the sample and to the study, and need to be seen in the context of the literature (Bell, Distefano, Morgan, 2010). For that reason, the previous descriptive data on the study population and each variable under consideration will serve as context for the more comprehensive statistical tests (SEM, ANOVA, MANOVA, ANCOVA) outlined in this chapter. The empirical findings from relevant literature will be offered in chapter six to contextualize interpretations.

Findings from this study will be displayed in table format, reporting elements such as the test statistic (F-, R^2), degrees of freedom (df), and p-value associated with each procedure as necessary. I begin with a summary of the assumptions for each of the analytic procedures, demonstrating how they have been met or considered in relation to the process undertaken in this study. The independence of observation assumption remained unsatisfied, and will be formally considered as a study limitation in the concluding chapter. The figure below compliments the procedures outlined in the previous methods chapter, and considers each analytic procedure in terms of its underlying assumptions.

Table 18. Overview of Analytic Assumptions and Considerations

Analytic Procedure	Test Statistic	Key Assumptions	Effect Size	Considerations
SEM	Path Coefficients P – values	1) Normality 2) Homogeneity of Variance (homoscedasticity) 3) Independence of Observation		Asymptotically Distribution Free (ADF) estimation method used to account for a lack of empirical normality (Shapiro-Wilk test) within a larger sample Will be considered in limitations
ANOVA, ANCOVA MANOVA	F – Ratio Explanatory power (R^2) P – Values	Same as above	Eta Squared (η^2)	Q-Q plots have not identified any significant deviations from the normality assumption A version of the F-test (Levene statistic) used that is robust to the violations of homoscedasticity The Tamhane's test for pairwise comparisons is a conservative method based on a t test, used with unequal variance

5.1 Questions #1, #2, #3: The Structural Equation Model

The SEM was used to respond to the first three questions in this study. The model was estimated using Stata 14 software. Through attempting multiple model alternatives in Maximum Likelihood (ML) and Asymptotic Distribution Free (ADF) estimation formats, an ADF estimation method was chosen to address empirical non-normality. ADF makes no assumption of joint normality or even symmetry, whether for observed or latent variables. Whereas QML handles non-normality by adjusting standard errors and not point estimates, ADF produces justifiable point estimates and standard errors with non-normality. ADF is a form of weighted least squares (WLS), which has been implemented with considerable success with categorical (ordinal) variables (Kaplan, 2008).

The high goodness of fit reached with this last model is indicated by the two commonly used indices, the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI), which are both close to one for this model (CFI = 0.948, TLI = 0.870). Model fit was also confirmed with a Root Mean Squared Error of Approximation (RMSEA) of 0.058 at a probability measure of 0.05, and a Standard

Root Mean Residual (SRMR) value of 0.032 (Blunch, 2013; Kaplan, 2008). Figure 13 below shows the standardized estimates of the SEM model, and will be used to discuss findings for the first three research questions.

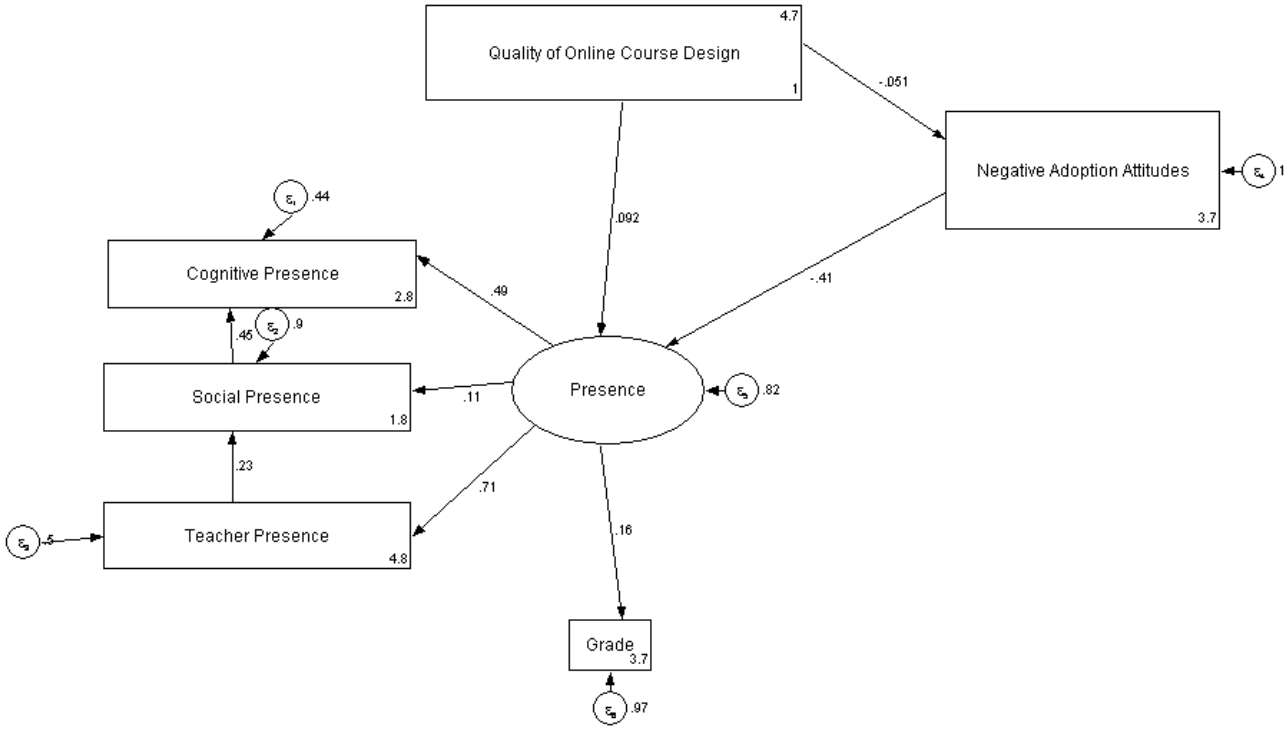


Figure 13. The Estimated Structural Equation Model

This SEM diagram provides us with path coefficients that indicate the level to which items in the model are associated. For example, the primary relationship between presence and achievement can be seen as 0.16. The arrows from the latent construct of presence to each of the three distinct elements of presence (cognitive, social, and teacher) speak to the level of association between those elements and the overall construct. The path coefficient between each context variable (quality of online course design, and adoption attitudes) and presence, illustrate the correlation between those variables and presence. As suggested by SEM researchers, a full syntactical read out from the SEM can be found in Appendix G: Results (Boomsma, 2000; McDonald & Ho, 2002; Nicol & Pexman, 1999), but for ease of understanding, the most statistically relevant information will be summarized in the following table.

Table 19. Statistical Overview of Structural Equation Model

Number of Observations	df	Chi^2	Chi^2 p-value
1,926	6	38.64	0.000

A total of 6 parameters were estimated (presence→grade, teacher presence→social presence, social presence→ cognitive presence, quality of online course design→ student adoption attitudes, student adoption attitudes→presence, and quality of online course design→presence).

5.1.1 THE PRESENCE – ACHIEVEMENT RELATIONSHIP

Research objective number one was to identify the relationship between presence and achievement. This question served to shift the lens of an educational experience, away from traditionally researched areas of student satisfaction and towards a more rich description of presence. Presence as a latent construct was comprised of social (0.11), teacher (0.71), and cognitive presence (0.49). These path coefficients articulate the internal relationship between overall presence as it is comprised of its three components (the higher the coefficient, the stronger the component). These weights were found to maximize the likelihood of the model being true (model fit). Given the high association between teacher presence and the overall presence construct, it can be said that once presence was modelled as being more highly associated with this aspect of presence, other relationships were stronger. This role of teacher presence within the overall presence construct will be considered further in the discussion section of this document.

The presence vector was then estimated in relation to its association with achievement. All items for cognitive, social and teacher presence were included in the estimation. Achievement remained the final course grades for student in all of the 13 courses under examination. In the SEM outlined above, the path coefficient between Presence and Grade was 0.16. Standardized path coefficients, the reporting values for a SEM can be said to follow the following strength pattern: less than .10 ~ small, values around .30 ~ medium, and lastly, values near or greater to .50 can be said to

have ~ a large effect (Blunch, 2013; Schiller, 2003; Westland, 2015). With a corresponding p-value of < 0.001, this result indicates a positive, statistically significant influence of presence on grade.

As previously stated, one of the benefits of the CoI theoretical framework, is the ability to see the forest for the trees – to see the construct of presence as being comprised of three distinct components (cognitive, social, and teacher presence). Seeking to unpack interrelationships between these components, pathways were tested in the SEM between teacher presence and social presence, and again between social presence and cognitive presence. The standardized coefficient for teacher presence in relation to social presence was found to be 0.23 ($p < 0.001$), indicating a positive, moderate and statistically significant correlation. Social presence to cognitive presence was then found to have a coefficient of 0.45 ($p < 0.001$), indicating a strong, positive and statistically significant relationship. Lastly, teacher presence was tested for significance in relation to cognitive presence, where social presence served as a mediating variable, this was calculated through the multiplication of the SP → CP coefficient (0.45) by the TP → SP coefficient (0.23), which produced a coefficient of 0.10 ($p < 0.001$), illustrating a weak, but positive, and significant indirect relationship between teacher presence and cognitive presence as mediated by social presence. These results help to elaborate on the first research question seeking to better understand the influence of presence on achievement in blended, higher education.

5.1.2 ONLINE DESIGN AND THE PRESENCE - ACHIEVEMENT RELATIONSHIP

Research objective number two was to elaborate on the relationship between an online course design (in the case of this study – Moodle as an LMS), and student achievement levels in those courses. The Moodle rubric indicators (20 in total) were included in the latent variable titled "Quality of Online Course Design" and were tested in connection to presence. This first association yielded a coefficient of 0.092 ($p < 0.001$), indicating a weak, but significant effect of online course design on presence. When quality of the online course design was tested in connection to achievement, with presence acting as a mediating variable, the indirect association weakened to 0.015 ($p < 0.001$). However, these values

need to be considered as significant in relation to potential limitations stemming from online course design being a course-level variable (a set of indicator scores for each of the 13 courses under examination), while both the presence and achievement variables were comprised of student level data.

When the quality of the online design was tested in connection to student adoption attitudes the results yielded a coefficient (-0.051, $p = 0.028$), which is a weak association, but statistically significant given this study's alpha threshold of 0.05. Results indicate that the higher the quality of the online course design, the lower the adoption attitude of students. Again, the fact that the quality of online course design is a course-specific feature, while student adoption attitudes is available at an individual level leads to more heterogeneity in one variable, but not the other. This effect will be discussed in more depth with the discussion chapter to follow.

5.1.3 ADOPTION ATTITUDES AND THE PRESENCE – ACHIEVEMENT RELATIONSHIP

Research objective number three was concerned with understanding the association between student adoption attitudes and presence, and the effect that may have on achievement levels. With previous research outlining the importance of considering student perceptions in relation to technology enhanced learning, three survey items related to feelings of being "overwhelmed" or "frustrated" with the technology in these blended courses, were used to create this latent construct. Findings include a coefficient of -0.41 ($p < 0.001$), indicating a strong, and direct effect of student adoption attitudes on presence. This is to say, that the more a student feels about the technology in their course, the lower their scores of presence. The mediated relationship between adoption attitudes and grades, with presence as the intermediary, yielded a smaller, indirect association value of -0.066 ($p < 0.001$), which is still statistically significant. This coefficient indicates that with a relatively low strength, the more a student's adoption attitudes are their lower their final course grades.

5.2 Question #4: ANOVAs, MANOVA, and ANCOVAs

The fourth research objective of this study was to assess the impact of varying blend formats on the variables of achievement, adoption attitude, and presence. The software used for the ANOVA,

MANOVA, and ANCOVA analyses, was IBM SPSS Statistics. As mentioned at the outset of the results section, assumptions needed to be met for the ANOVA results to follow. Prior to the analysis, homogeneity of variances among groups was assessed. According to the Levene test, the null hypothesis that the error variance of the dependent variable is equal across groups is rejected for each analysis ($p < 0.01$), which is why I used a robust Tamhane's post-hoc test, which was considered appropriate when dealing with unequal variance (Gelman, 2005; Warne, 2014). The F statistic used to report results under this analytic procedure is a ratio of variance between groups and within groups. If the two variances were the same or similar, then your F-value should be close to 1. If an F-ratio is above 1, then there is a variance in means (Field, 2009), and the further from 1 the greater the variance.

5.2.1 BLEND FORMAT AND ACHIEVEMENT

Results from this first ANOVA considered the grades (DV) achieved for students given each different blend format (IV), and asked whether there was any difference in the mean grades for each course. The following tables outline the mean grades for each format, followed by the results ($F(4,1921) = 29.980$, $p < 0.001$), indicating a strong and significant varying of means.

Table 20. Mean Grades for Each Blend Format

	Course Blend format				
	F1: Web Enhanced	F2: In-Class Lectures + Blended Tutorials	F3: In-Class Lectures + Online Tutorials	F4: Online Lectures + F2F Tutorials	F5: Fully Online + F2F Tutorial Option
	Mean	Mean	Mean	Mean	Mean
Grade	5.90	6.68	6.40	5.62	6.58

Table 21. ANOVA – Mean Variance: Grade

	Sum of Squares	df	Mean Square	η^2	F	Sig.
Between Groups	395.571	4	98.893	0.27	29.980	.000
Within Groups	6336.645	1921	3.299			
Total	6732.216	1925				

Pairwise comparisons were made for the mean variance between groups (the 5 separate sections of the ordered factor) using Tamhane's test – a conservative pairwise comparisons method based on a t-test. This test is appropriate when the variances are unequal (accounting for a lack of homoscedasticity). The two formats with the highest achievement levels were "In-Class Lectures + Blended Tutorials" and "Fully Online + F2F Tutorial Option". These two formats were not significantly different from each other, but significantly different from the two lowest achieving formats, "Web-Enhanced" and "Online Lectures + F2F Tutorials". The difference between the lowest achieving formats (web-enhanced and online lectures + F2F tutorials) was also not significant at a 5% significance level. The final blend format "In-Class Lectures + Online Tutorials" significantly outperforms only "Online Lectures + F2F Tutorials", and remains not significantly different from all other formats. While a full syntactical read out of the Tamhane's test results can be found in Appendix E, Table 22 plots the two highest achieving formats on the y-axis and shows the relationship between those formats and the remaining three formats (shown on the x-axis). These post-hoc comparisons are reported using first, the mean variance between those two groups (mean 1 – mean 2), followed by the significance level of that difference.

Table 22. Pairwise Comparisons – Blend Format & Grade

	(F3) 3rd Highest Performing: *In-Class Lectures + Online Tutorials*	**(F1) 2nd Lowest Performing:** *Web-Enhanced*	**(F4) Lowest Performing:** *Online Lectures + F2F Tutorials*
(F2) Highest Performing: *In-Class Lectures + Blended Tutorials*	Mean Variance (-0.28539) **Not Significant** (p = 0.810)	Mean Variance (-0.7784) **Significant** (p < 0.000)	Mean Variance (-1.06118) **Significant** (p < 0.000)

(F5) 2nd Highest Performing: *Fully Online + with Optional F2F Tutorials*	Mean Variance (-0.18332) **Not Significant** (p = 0.990)	Mean Variance (-0.67633) **Significant** (p < 0.001)	Mean Variance (0.95911) **Significant** (p < 0.000)

5.2.2 BLEND FORMAT AND ADOPTION ATTITUDES

Results from this second ANOVA considered the level of student adoption attitudes at each level of the ordered factor (in each different blend format), and asked whether there was any difference in the mean attitude for each course. The following tables outline the means for adoption attitudes for each format, followed by the ANOVA results (F (4, 1914) = 8.240, p < 0.001), indicating a moderate and significant varying of means between formats.

Table 23. Means for Adoption Attitude for Each Format

	Course format				
	F1: Web Enhanced	F2: In-Class Lectures + Blended Tutorials	F3: In-Class Lectures + Online Tutorials	F4: Online Lectures + F2F Tutorials	F5: Fully Online + F2F Tutorial Option
	Mean	Mean	Mean	Mean	Mean
Student Adoption Attitude	2.94	2.78	2.74	2.97	2.83

Table 24. ANOVA – Mean Variance: Student Adoption Attitude

	Sum of Squares	df	Mean Square	η^2	F	Sig.
Between Groups	19.571	4	4.893	0.12	8.240	.000
Within Groups	1339.696	1914	.700			
Total	1359.267	1918				

Pairwise comparisons were made for the mean variance between groups (the 5 separate sections of the ordered factor) using Tamhane's test. As expected, F1 and F4, the two lowest achieving formats (Web-Enhanced and Online Lectures + F2F Tutorials) were also associated with the highest means for adoption attitudes. The top three performing courses (F2, F5, and F3) were the lowest scoring in attitudes, where the highest achieving format F2 (In-Class Lectures + Blended Tutorials), corresponded to the most positive adoption attitudes and showed a significant difference between the two lowest achieving formats (F1 and F4). The full pairwise comparisons read-out can be found in Appendix E, but the format with the highest grades and most positive adoption attitudes (F2) will be considered here in comparison to the remaining blend formats.

	(F3) 2nd Most Positive Adoption Attitudes: *In-Class Lectures + Online Tutorials*	**(F5) 3rd Most Positive Adoption Attitudes:** *Fully Online + F2F Tutorial Option*	**(F1) 2nd Lowest Adoption Attitudes:** *Web-Enhanced*	**(F4) Lowest Adoption Attitudes:** *Online Lectures + F2F Tutorials*
(F2) Most Positive Adoption Attitudes: *In-Class Lectures + Blended Tutorials*	Mean Variance (-0.00215) **Not Significant** (p = 1.00)	Mean Variance (-0.11268) **Not Significant** (p = 0.292)	Mean Variance (-0.22086) **Significant** (p = 0.007)	Mean Variance (-0.24193) **Significant** (p < 0.000)

Table 25. Pairwise Comparisons – Blend Format & Student Adoption Attitude

5.2.3 BLEND FORMAT AND PRESENCE

The MANOVA conducted was focused on assessing the role of blend format on the three distinct forms of presence (cognitive, social, and teacher). We computed the values for presence using the average of scores based on all items within that construct. The following page outlines the means comparison table and graphs showing how different formats differ with respect to different types of

presence. According to the tests of between-subjects effects the highest significance (F (4,1893) = 12.348, p-value < 0.001) and explanatory power ($R^2 = 0.025$) are observed for Teacher Presence as the dependent variable. Similar level of significance and explanatory power is observed for Cognitive presence (F (4,1893) = 11.321, p-value < 0.000, $R^2 = 0.023$), while the relationship between blend format and social presence is somewhat weaker (F (4,1893) = 2.372, p-value = 0.050, $R^2 = 0.005$).

Table 26. Means for Presence within Each Format

	Course format				
	F1: Web Enhanced	F2: In-Class Lectures + Blended Tutorials	F3: In-Class Lectures + Online Tutorials	F4: Online Lectures + F2F Tutorials	F5: Fully Online + F2F Tutorial Option
	Mean	Mean	Mean	Mean	Mean
Cognitive Presence	2.76	2.70	2.93	2.85	3.04
Social Presence	2.53	2.61	2.35	2.58	2.54
Teacher Presence	3.38	3.61	3.62	3.58	3.83

Table 27. MANOVA – Mean Variance: Blend Format & Presence

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Cognitive Presence	29.651[a]	4	7.413	11.321	.000
	Social Presence	9.029[b]	4	2.257	2.372	.050
	Teacher Presence	39.214[c]	4	9.804	12.348	.000
Intercept	Cognitive Presence	12567.388	1	12567.388	19192.741	.000
	Social Presence	9821.263	1	9821.263	10321.147	.000
	Teacher Presence	20010.324	1	20010.324	25204.188	.000
Format	Cognitive Presence	29.651	4	7.413	11.321	.000
	Social Presence	9.029	4	2.257	2.372	.050
	Teacher Presence	39.214	4	9.804	12.348	.000
Error	Cognitive Presence	1239.535	1893	.655		
	Social Presence	1801.316	1893	.952		
	Teacher Presence	1502.907	1893	.794		

a. Eta Squared = .023

b. Eta Squared = .005

c. Eta Squared = .025

Multiple comparisons were made for the mean variance between groups (the 5 separate sections of the ordered factor) using Tamhane's test. I will consider each form of presence separately, starting with cognitive. When considering the top three achieving formats (F2, F5, F3) the highest achieving blend format (F2), scored the lowest in cognitive presence, and tested significantly lower than both F5 (-0.3436, $p < 0.000$), and F3 (-0.2237, $p = 0.027$). In-class lectures and blended tutorials (F2) was the highest scoring format for social presence, but not significantly different from the three successively highest scoring formats (F4, F5, F1). F2 was significantly higher however, than the lowest performing format – In-class lectures and online tutorials (F3) (0.2635, $p = 0.033$). Teacher presence has one format – fully online with a tutorial option (F5) – which significantly outperforms all the remaining formats: F3 (0.1992, $p < 0.041$), F2 (0.2155, $p < 0.01$), F4 (0.2568, $P < 0.000$), and F1 (0.4684, $p < 0.000$). The comparisons between the highest scoring blend format for each form of presence and the remaining formats can be visualized in the following tables, full tables are available in Appendix E.

Table 28. Multiple Comparisons – Blend Format & Presence

COGNITIVE PRESENCE	**(F3) 2nd Highest Cognitive Presence:** *In-Class Lectures + Online Tutorials*	**(F4) 3rd Highest Cognitive Presence:** *Online Lectures + F2F Tutorials*	**(F1) 2nd Lowest Adoption Attitudes:** *Web-Enhanced*	**(F2) Lowest Cognitive Presence:** *In-Class Lectures + Blended Tutorials*
(F5) Highest Cognitive Presence: *Fully Online + F2F Tutorial Option*	Mean Variance (-0.1198) **Not Significant** ($p = 0.63$)	Mean Variance (-0.1889) **Significant** ($p < 0.001$)	Mean Variance (-0.2758) **Significant** ($p < 0.001$)	Mean Variance (-0.3436) **Significant** ($p < 0.000$)

SOCIAL PRESENCE	**(F4) 2nd Highest Social Presence:** *Online Lectures + F2F Tutorials*	**(F5) 3rd Highest Social Presence:** *Fully Online + F2F Tutorial Option*	**(F1) 2nd Lowest Social Presence:** *Web-Enhanced*	**(F3) Lowest Social Presence:** *In-Class Lectures + Online Tutorials*
(F2) Highest Social Presence: *In-Class Lectures + Blended Tutorials*	Mean Variance (-0.0295) **Not Significant** (p = 1.00)	Mean Variance (-0.0732) **Not Significant** (p = 0.947)	Mean Variance (-0.0802) **Not Significant** (p = 0.983)	Mean Variance (-0.2635) **Significant** (p = 0.033)

TEACHER PRESENCE	**(F3) 2nd Highest Teacher Presence:** *In-Class Lectures + Online Tutorials*	**(F2) 3rd Highest Teacher Presence:** *In-Class Lectures + Blended Tutorials*	**(F4) 2nd Lowest Teacher Presence:** *Online Lectures + F2F Tutorials*	**(F1) Lowest Teacher Presence:** *Web-Enhanced*
(F5) Highest Teacher Presence: *Fully Online + F2F Tutorial Option*	Mean Variance (-0.1992) **Significant** (p = 0.041)	Mean Variance (-0.2155) **Significant** (p < 0.001)	Mean Variance (-0.2568) **Significant** (p < 0.000)	Mean Variance (-0.4684) **Significant** (p < 0.000)

5.2.4 WHAT IS THE ROLE OF COVARIATES?

Statistically, ANCOVA's unpack the variance in the DV into variance as explained by the covariates, variance due to the IV, and residual variance (Field, 2009). This process is often called "controlling" for a specific variable and generally used to increase the statistical power of an analysis by finding significance between groups if it indeed exists, and reducing inter-group error variance. This is achieved through an F-test format that allows an ANCOVA to divide explained variances between groups by unexplained variances between groups (Green, & Salkind, 2012; Montgomery, 2012). Each of the ANCOVA's conducted, used Course Grade as the dependent variable, and Format as the fixed factor; covariates included: CGPA, Student Adoption Attitude, and the three forms of Presence.

The first ANCOVA used Grade as the dependent variable, Format as the fixed factor and GPA as the covariate. According to the ANCOVA table Format remains a significant determinant of the Grade ($F(4,1921) = 42.090$, $p < 0.001$) even after controlling for GPA, which is itself significantly associated with Grade. This finding states that even when controlling for the influence of CGPA, Format still was shown to be responsible for a significant variance in grade. The second ANCOVA used Student Adoption Attitude as the covariate. Results indicate again, that Format remained a significant determinant of the Grade ($F(4,1918) = 34.801$, $p < 0.001$) even after controlling for Student Adoption Attitude, which is again, significantly associated with Grade. The third ANCOVA used Cognitive, Social and Teacher Presence as covariates. According to the results, Format remains a significant determinant of the Grade ($F(4,1893) = 28.813$, $p < 0.001$) even after controlling for presence, out of which cognitive and social are significantly connected to grade ($p < 0.01$), while teacher presence was not significant ($p = 0.077$). ANCOVA was an effective tool through which to consider covariate variables in order to increase the statistical power of the Format → Grade association. The following Tables 29, 30, and 31 on the following page outline the ANCOVA results for each of the covariates mentioned above – each resulting in a higher explanatory power (R^2 value) for the Format → Grade relationship.

Table 29. ANCOVA – Mean Variance: Blend Format & Grade – Controlling for CGPA

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2570.575[a]	5	514.115	237.190	.000
Intercept	86.003	1	86.003	39.678	.000
GPA	2175.003	1	2175.003	1003.452	.000
Format	364.923	4	91.231	42.090	.000
Error	4161.641	1920	2.168		
Total	80852.000	1926			
Corrected Total	6732.216	1925			

Eta Squared = .382

Table 30. ANCOVA – Mean Variance: Blend Format & Grade – Controlling for Adoption Attitude

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	510.272[a]	5	102.054	31.656	.000
Intercept	7383.819	1	7383.819	2290.353	.000
student_adoption_attitude	112.194	1	112.194	34.801	.000
Format	349.828	4	87.457	27.128	.000
Error	6167.279	1913	3.224		
Total	80496.000	1919			
Corrected Total	6677.551	1918			

Eta Squared = .076

Table 31. ANCOVA – Mean Variance: Blend Format & Grade – Controlling for Presence

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	497.644[a]	7	71.092	21.850	.000
Intercept	2663.463	1	2663.463	818.598	.000
cognitive_presence	55.633	1	55.633	17.098	.000
social_presence	22.923	1	22.923	7.045	.008
teacher_presence	10.204	1	10.204	3.136	.077
Format	374.997	4	93.749	28.813	.000
Error	6149.473	1890	3.254		
Total	79636.000	1898			
Corrected Total	6647.117	1897			

Eta Squared = .075

5.5 Results Summary

Figure 19, which can be seen on the page that follows, seeks to illustrate significant findings from all of the analytic procedures described above. The strength indicators for SEM are taken from guidelines offered by statistical researchers (Acock, 2013; Blunch, 2013; Westland, 2015), and through an analysis of the reports on standardized path coefficients offered in the literature (Flanagan & Alfonso, 2016; Weigl, 2008). While varying in strength, the standardized path coefficients indicated in this visual summary were all found to be significant to at least a 95% confidence interval, with the

majority having p-values < 0.001. The weakest SEM results (indicated in red) included the mediated relationship between adoption attitudes and grades, with presence as the intermediary, which yielded an indirect association value of -0.066 ($p < 0.001$), which is weak, but still statistically significant.

The only course-level latent variable (Quality of Online Course Design) in the SEM, when tested in association with presence, yielded a coefficient of 0.092 ($p < 0.001$), indicating a weak, but significant effect of online course design on presence. When the same variable was tested in connection to achievement, with presence acting as a mediating variable, the indirect association weakened to 0.015 ($p < 0.001$). When the quality of the online design was tested in connection to student adoption attitudes the results yielded a coefficient (-0.051, $p = 0.028$), which is a weak association, but statistically significant given this study's alpha threshold of 0.05. These values need to be considered in relation to their significance, and within the context of course-level versus student-level data, as both the presence and achievement variables were comprised of student-level data.

The F-statistic results indicated in this summary were all found to be significant to at least a 95% confidence interval, with the majority having p-values < 0.001. Strength intervals for the F-statistic are connected to the absolute values found in the analysis and their distance from 1, in order to highlight amount of variance. The weakest ANOVA results (indicated in red) were between blend format and social presence ($F (4,1893) = 2.372$, $p = 0.05$), and between blend format and student adoption attitudes ($F (4,1918) = 8.240$, $p <0.001$), each surpassing 1, and producing a significant result.

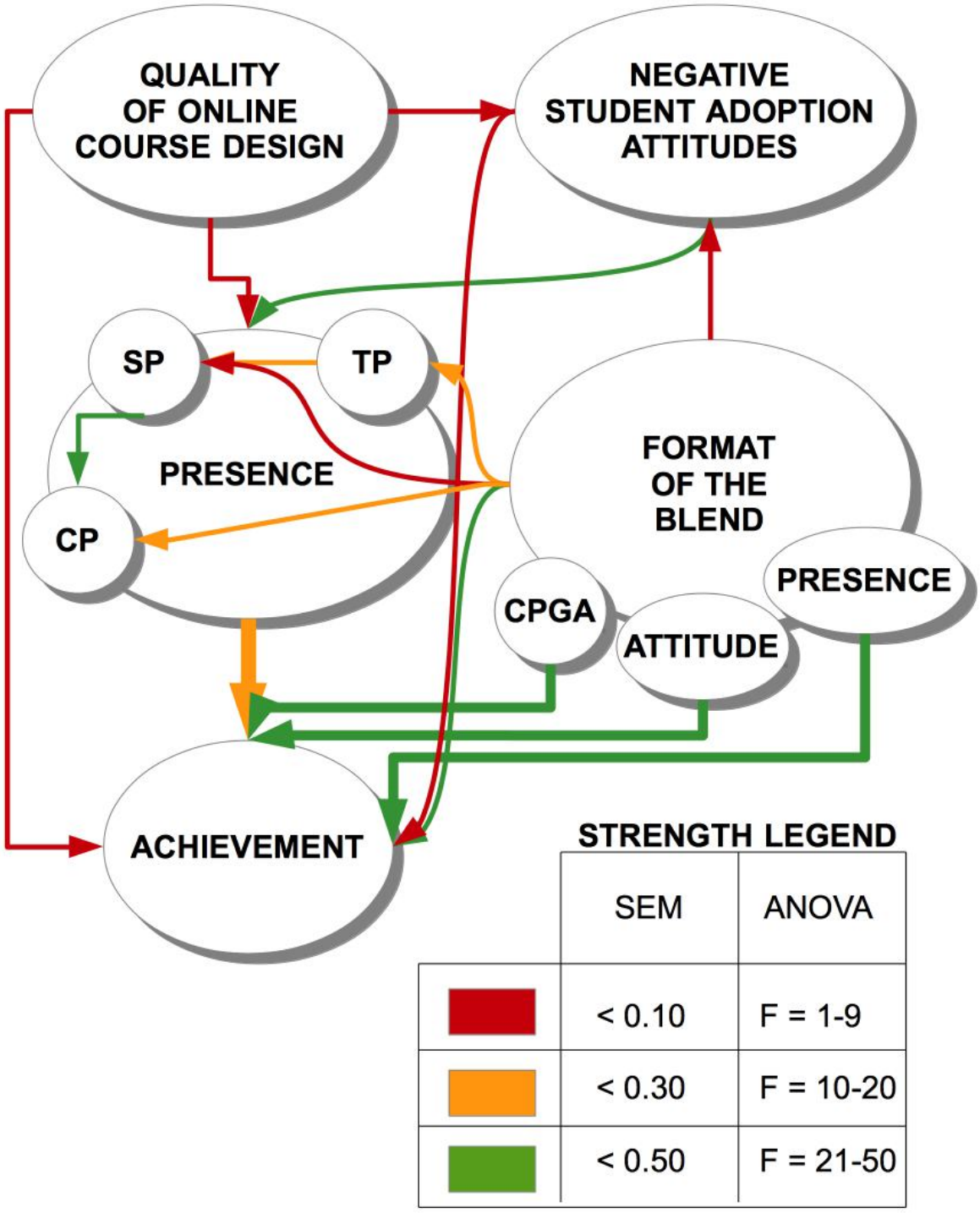


Figure 14. Summary of Significant Results

CHAPTER 6: Discussion

This study sought to unpack the student experience in blended higher education courses. The theoretical notion of presence (cognitive, social, and teacher) provided a framework through which to design a statistical analysis on approximately 2,000 student responses to surveys over a three-year period within a large, diverse, and urban Canadian university. The results of this analysis have yielded a number of findings, stemming from the significant relationship discovered between student perceptions of presence and final course grades. This chapter seeks to discuss the connections between this study's results and the literature surrounding each research question. Employing a critical lens to the study results will allow me to question, and consider different interpretations. Through academic argumentation, results from this study will be better situated within the larger context of blended learning research.

Similar to previous sections, the discussion will be structured by research question, beginning with the fundamental relationship between presence and achievement (grade). Results will be considered in connection to literature on each individual form of presence, and around the interrelationships between these three distinct forms in the construction of overall presence. Results pertaining to the impact of online course designs on the presence-achievement relationship will be discussed in the context of previous literature on the student experience in blended classrooms using a learning management system (Moodle), and on the role of an LMS on student adoption attitudes.

Research on perceived ease of use (PEoU) and technology acceptance (TAM) will inform a discussion around my third research question focused on the role of student adoption attitudes on the presence-achievement relationship, and lastly, the question asking about the impact of blend format on achievement will be situated in the limited research available on the subject of blend ratios, while potentially offering areas for future research development given the discussion between established academic perspectives taken on the subject, and the results obtained from this study.

6.1 Question #1: Student Perceptions of Presence → Achievement

For Garrison, Anderson, and Archer (2000), the process of inquiry is a network with three interdependent elements – social, cognitive, and teaching presence, each with their own distinct role in creating a deep and meaningful learning experience. This study found that presence as a vector was in fact, directly correlated to achievement in the blended classrooms under examination (path coefficient of 0.16, $p < 0.001$). Under what conditions is this true however?

On the one hand, the longitudinal nature of this study affords a large cross-section of the undergraduate student population specific to the faculty of fine arts, and researchers have found that student perceptions of the blended experience can vary across disciplines (Glazer, 2012; Martinez-Caro & Campuzano-Bolarin, 2011; Smith, Heindel, & Torres-Ayala, 2008). On the other hand, Arbaugh (2006) argues, that regardless of discipline the CoI framework has been widely cited in the literature across higher education due to its adaptable, and flexible nature as both a theory as well as a measurement tool. Glazer (2012) agrees that it might not be that blended learning differs across disciplines, but that pedagogical interpretations of the blended model are what change. Given that rationale, SEM results will be discussed as data on the presence-achievement relationship given varying pedagogical choices in format as opposed to a specific discipline or content area.

There are a multitude of studies that highlight the role of "student satisfaction" in connection to achievement (Cleveland-Innes & Campbell, 2012; Dziuban, Houghton, Cooney, Casey, Moskal, Bradford, Brophy-Ellison, & Groff, 2010), but the interpretation of presence as educational experience, moves away from this traditionally researched area and towards a deeper understanding of experience (Garrison & Vaughan, 2008; Museus, 2012; Snart, 2010; Vaughan, Cleveland-Innes, & Garrison, 2013). Beginning with the coefficient results pertaining to the modeling of the presence variable [social (0.11), teacher (0.71), and cognitive presence (0.49)], it can be said that in order for the presence variable to be 'true' from a statistical standpoint (yielding good model fit), teacher presence was the most influential factor, followed by cognitive presence, and lastly social presence. This result uniquely

identifies teacher presence as a significant component to presence and in turn the student experience. It is important to be critical of one's findings however, and this model fit is contingent on the study population and conditions (Westland, 2015), meaning that a high level of variance in the teacher presence variable would have yielded a higher level of responsibility in accounting for variance in the overall latent variable. To compliment that argumentation however, previous studies have already identified that teacher presence significantly impacts cognitive presence (as mediated through social presence) (Garrison, 2007; Kozan & Richardson, 2014; Shea & Bidjerano, 2009; Sheridan & Kelly, 2010), and results from this study echo that finding with a positive, moderate, and significant association between teacher presence and social presence 0.23 ($p < 0.001$), and a strong, positive, direct, and significant association between social presence and cognitive presence 0.45 ($p < 0.001$). This is consistent with previous studies, that concluded students who had a higher overall perception of social presence scored higher when asked about perceived learning and perceived satisfaction (Arbaugh, 2008; Richardson & Swan, 2003; Swan & Shih, 2005). However, there are findings that revealed no correlation between social presence and student-perceived learning (Akyol & Garrison, 2008; Joo, Lim, & Kim, 2001; Shin, 2003), meaning this result might also be explained by variables outside of this study's parameters.

Teacher presence was tested for significance in relation to cognitive presence, where social presence served as a mediating variable, and results indicated a coefficient of 0.10 ($p < 0.001$), a weak, but statistically significant association. Oter studies have supported the notion that teacher presence is not only a trigger for cognitive presence (Garrison & Anderson, 2003; Garrison & Cleveland-Innes, 2005), but also a catalyst towards building an environment of social presence (Rourke, Anderson, Garrison, & Archer, 2001; Swan & Shih, 2005). Kozan and Richardson (2014) however, looked at pairwise relationships within presence, and found that cognitive presence, when paired with social presence, seems to be virtually unaffected by teacher presence, lending them to conclude that social presence, not teacher presence, is in fact the lynchpin to cognitive presence and perceived learning.

Previous research looking at the impact of the student experience on achievement in blended spaces in higher education have focused on latent variables such as "student satisfaction" or "perceptions of engagement" as reported by Owston, York, and Murtha (2013). In their ANOVA, which yielded eta-squared values (η^2), which is comparable to an R^2 value for a linear regression with the following articulated strength intervals: .02 ~ small, .13 ~ medium, .26 ~ large, Owston et. al (2013) showed that perceptions of engagement were significantly associated with final course grades ($\eta^2 = 0.153$). This moderate correlation is echoed by the path coefficient of this study (0.16).

In Vaughan's (2014) article looking at engagement in blended spaces in connection to assessment, he utilized Pearson's correlation coefficient (R^2) to articulate the relationship between engagement measures and academic achievement (final course grades). Findings include a .303 ($p < 0.001$) relationship between engagement in effective educational practices and final course grade, where generally articulated R^2 strength values are as follows: .2 ~ small, .4 ~ medium, .6 ~ large (Gross, 2003; Neter & Wasserman, 1983; Serber, 1977). Again, echoing this study's findings – a moderate and significant impact of experience on achievement in blended spaces. Results from this study are situated in these discussions around the presence interrelationship, and the impact of presence on achievement in blended higher education.

6.2 Question #2: Online Course Designs → Presence → Achievement

The quality of the online course design was found to significantly impact presence (0.092, $p < 0.001$), and student adoption attitudes (-.051, $p < 0.000$), expected results stating that the worse the quality of the online design, the worse the students felt about the technology, and the lower their perceptions of presence. This is consistent with Wan, Wang, and Haggerty (2008) who found that "learning effectiveness" defined as a student's perception of achievement, was positively influenced by a student's "ICT experience", while Mcgill and Klobas (2009) chose to describe the user experience online as "task-technology fit", and stated that student grades in the blended courses under examination were determined through an association between that experience and "e-learning use".

These varying experiences with online course designs have been shown to directly contribute to learning outcomes. Positive correlations have been found between the quality of interaction within an online course design and students final grades (Chou & Chou, 2011; Kember et.al, 2010; Lopez-Perez, et. al, 2011; Reiss & Steffens, 2010), indicating that quality can play a role in the LMS-achievement relationship. The mediated relationship found in this study between the quality of online course design and achievement (mediated by presence) (0.015, $p < 0.001$), supports this discussion. As stated in the results section however, it is important to note that results could have been weak due to varying indicator compositions. While the variables of presence and achievement were comprised of 1,926 student observations, the quality of online course design was compiled from course-level data (a set of 20 indicators for each course in years 2 and 3, yielding a total of 200 observations).

Rubin, Fernandes, and Avgerinou (2013) conducted a study where the effect of a LMS was measured in relation to scores of presence within a large urban North American university. They found that there are many ways in which a LMS impacts presence (i.e. organizing and integrating content), and that while LMS platforms differ greatly from one to the other, the crucial piece of the puzzle was not the technology itself, but what instructors chose to do with it. In that regard, the role of the teacher is again highlighted in the cultivation of presence and ultimately performance, as Rubin and her colleagues note, satisfaction with the LMS predicted course satisfaction. Findings on the quality of online course design in this study however, indicate weak correlations between online course designs, presence, and achievement. This result could be explained by Farley, Jain, and Thomson's (2011) findings that students perceive the online course component as purely supplementary space for the storage and retrieval of resources as opposed to environments where learning occurs. The results from this study are situated in this discussion around how best to measure LMS efficacy, and then in turn, how best to design a LMS to promote presence. More research on specific indicators for a LMS template that supports presence will be offed in concluding comments regarding future research.

6.3 Question #3: Student Adoption Attitudes → Presence → Achievement

The significant and strong role of student adoption attitudes on perceptions of presence (-0.41, $p < 0.001$) echoes Owston et. al. (2012) who report that there was a strong relationship between perception/attitude and grades in blended higher education classrooms. High-achievers were more satisfied with the blended experience, and they felt that the technology was "convenient" and "engaging" as opposed to low-achieving students who described the course as "overwhelming" or "frustrating". Decades of research examining the impact of technology suggest that indeed, it does have the potential to enhance student learning (Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011). However, research also shows that some students truly struggle (Bullen, & Janes, 2007; Bonk, Kim, & Zeng, 2004; Owston, York, & Murtha, 2013).

Study findings contribute to the Technology Acceptance Model (TAM) and Perceived Ease of Use (PEoU) theories discussed in the literature (Islam, 2013; Lin, 2011; Wan, Wang, & Haggerty, 2008), where a lack of student preparedness, coupled with an increased expectation to self-regulate their own learning can make students feel overwhelmed by their online workload (Poon, 2012), and as a result, disengage from the technology used in learning (Collopy & Arnold, 2009, York, Owston, Murtha, & Finkel, 2014). Results also build off of the literature around mixed outcomes, where high achievers are more likely to find blended courses more satisfying and freeing in relation to learning flexibility (Owston, York, & Murtha, 2013), while low achievers are often left feeling lost.

This study looks at student adoption attitudes as an isolated entity, but as the literature states, there are variables impacting the perception of ease for students in blended courses that were not explored in this study, such as the impact of teacher adoption attitudes (Beetham, & Sharpe, 2013; Carbonell, Dailey-Hebert, & Gijselaers, 2013; Vance, & Crawford, 2013), or the level of technical difficulty associated with the technology (Davis, 1989; Henderson, & Divett, 2003). Regardless of that limitation, study findings indicate a need to continue the discussion around student support and readiness in order to mitigate negative student adoption attitudes, and promote outcomes.

6.4 Question #4: Format of the Blend → Presence, Attitude, and Achievement

The format of the blend was a significant indicator of grade, even after controlling for other variables that were themselves significantly correlated with grade, such as CGPA ($F(4,1921) = 42.090$, $p < 0.000$). These findings are unique in the literature around varying blend combinations. It is important to remember however, that blend format for the purpose of this study was categorized around ratios of online versus F2F instruction and assessment as outlined in the syllabi, these formats however, are also subject specific. Another possible explanation of the variance in grade could be the different content/subject areas under examination, or as outlined by Glazer (2012) earlier, the varying pedagogical styles or interpretation of the blended model present in each course.

Given that critical lens, results indicate that the two highest performing blend formats are not significantly different from one another, but are significantly different from the two lowest performing formats. These two distinct high achieving blends were: F2 (In-class lectures + blended tutorials), and F5 (Fully online + with optional F2F tutorials). The lowest performing blend was: F4 (Online lectures + F2F tutorials), followed by F1 (Web-enhanced). As expected, F1 and F4, the two lowest achieving formats were also associated with the highest means for negative adoption attitudes. The top three performing courses (F2, F5, and F3) were the lowest scoring in negative attitudes, where the highest achieving format F2 (In-Class Lectures + Blended Tutorials), corresponded to the most positive adoption attitudes and showed a significant difference from the two lowest achieving formats (F1 and F4). The consistency between high scoring formats and low levels of student negativity connects to the discussion above regarding adoption attitudes and their impact on student achievement. While there is limited literature looking exclusively as blend formats and achievement, this study contributes to that gap in two distinct ways; firstly, building off of York, Owston, Murtha, and Finkel's (2014) definitions of formats, and secondly, the distinct finding that I am calling "The Tutorial Blend".

To begin the discussion, I will focus on the two highest achieving formats (F2 and F5). The direct instruction component of each formats differed (one being in-class lectures, and the other being

fully online lectures) – which would not support the literature around student preferences for in-class instruction (Farley, Jain, & Thomson, 2011). This divergence was echoed in the two lowest performing formats, where one was based in F2F instruction, while the other was designed around online lectures. Perhaps the conditions of these results are that the large-enrolment and undergraduate nature of the courses has created a similar direct instruction format no matter the delivery method. For example, the experience of listening to a lecture delivered in-person to 200 students feels very similar to watching a video of that same lecture at home.

Even with competing narratives around optimal lecture delivery methods within blended classrooms, there is some consensus in the literature around tutorials, where peer-to-peer interaction within these spaces has been shown to improve with F2F settings (Moore & Gilmartin, 2010; Smyth et. al, 2012). Findings from this study however, indicate that the two lowest achieving formats were also the two that had exclusively F2F tutorials, while the two highest achieving had blends when it came to the tutorial section of the course design. The tutorial format for each of the two highest achieving formats will now be considered. Highlights will include the purposeful integration of the course director role with work done by the TA's, the clarity in expectations offered to the students, and how even with each course switching tutorial formats over the course (F2: blended tutorials, F5: with a F2F tutorial option), a consistent narrative was communicated to the students concerning both the objective and structure of their tutorial element.

In the highest achieving blend format (F2: In-class lecture + blended tutorial) explicit connections were made for students about the purpose of the F2F time versus their LMS-based tasks, and in relation to course content:

> At the weekly class meetings, the course director will support lectures with audio-visual presentations including film screenings and discussions with guest lectures. Tutorial leaders will help students further explore the course material via online discussions, readings, film analyses and reviews, and various assignments (Course syllabus, pg.1).

This articulation of how the F2F and online components compliment one another was then tied directly to learning objectives "…creativity and written communication will be strengthened through assignments, and tutorials will develop students' analytical and communication skills" (pg.1). This explicit integration of both components into one educational experience was then brought through to each week's course outline "WEEK 1 - INTRODUCTION TO THE COURSE: TUTORIALS (ONLINE THIS WEEK): Submit your photo as well as a brief summary of your background, the reasons you enrolled in the course, and what you hope to get out of it on Moodle" (Course syllabus, pg.2). This clarity in integration was echoed by clarity in communication with the inclusion of purposeful comments on the first page of the syllabus under the heading of "Communication", enabling students to better understand the consistent nature of the blended course structure (i.e. "You will submit all of your assignments on Moodle"):

> Announcements about the course as well as assignment information will be posted on Moodle. Be sure you access Moodle regularly so you don't miss crucial information. You will also submit all your assignments on Moodle and must ensure that you have Internet access on a regular basis, and a back-up plan in case your Internet is not working when you need it.We may also occasionally send information e-mails to the entire class or tutorial sections via Moodle. If you regularly use a non-York e-mail account like Gmail, Hotmail, Yahoo, Rogers, etc., you MUST use York's e-mail forwarding service (Course syllabus, pg.1)

Followed by a detailed description of preferred communication methods within the course, based on the needs of the student:

> To resolve an issue, first check if the answer to your question has already been provided in the Question and Answer forum of our Moodle course. If not, please pose the question there. If the issue is a personal one, please contact your own tutorial leader first (by email), then, only if still necessary, the course director (at the end of lecture or by email) (pg.1).

The second highest achieving blend format was F5 (fully online + with a F2F tutorial option), where tutorials met online each week, and participation in online tutorial activity (forums, discussions) was mandatory, while F2F meetings were possible with large group interest or individual office hour meetings were provided F2F upon requested. In the F5 format, integration, clarity, and communication for consistency were also built into the design. The first section of the course syllabi explicitly explains the integrated nature of the course director and the TA's, through a weekly staff meeting "Please direct all questions to your TA. They will discuss various issues with me during our weekly meetings and bring answers back to an office hour appointment, or email you directly, depending on the nature of the question" (pg.1). This statement not only says to the student that the staff concerned with lectures and the staff concerned with tutorials are connected, but that their individual questions will be considered and that that consideration will be communicated to them in the format that best suits them.

Similar to F2, the F5 format clearly contextualizes the work done or assessed within the tutorial to the course objectives in order to assist students in making a more informed decision about what support they might require:

> This course provides a primarily web-based introduction to key themes…Learning will be supported through discussion in tutorials, as well as forums lead by TAs and through short writing assignments and quizzes online. Every effort has been made to provide clear instructions regarding assignments and due dates, as well as dates when course work will be returned. Before asking a question about administrative matters such as these, please check both the course outline and the postings about individual assignments. Questions about course content are best asked to your TA (Course syllabus, pg.1).

Through an illustration of the consistent methods of assessment along with bolded reminders of submission method "**Due on-line or to TA by Oct. 5**, **Due Oct. 23 – use Moodle to submit**…" pg.2, the F5 method consistently communicates the blend format expectations clearly for their students, potentially playing a role in the higher performance displayed by its students.

Given the preceding discussion regarding the two highest performing blend formats, some findings around presence and format were expected, while others are potential sources of further research. Previous research has connected cognitive presence to outcomes (Akyol & Garrison, 2011; Garrison & Akyol, 2013; Maddrell, Morrison, & Watson, 2011; Shea & Bidjerano, 2012). It is no surprise then that F5 (a high performing format in achievement) scored significantly higher in cognitive presence than the bottom three formats. It is also no surprise then that within those bottom three formats; we see the two lowest performing formats (F1 and F4). What is surprising however, is that the lowest scoring format for cognitive presence was F2, the highest performing format in achievement. The unexpected findings contribute to the following two discussions in the literature: firstly, that cognitive presence is becoming increasingly difficult to measure given the diversity of technology being used (Azevedo, 2005; Yen & Lee, 2011), and the diverse user experiences with that technology (Lust, Elen, & Clarebout, 2013; Zhou & Winne, 2012); and secondly, that there is a shift in examining cognitive presence to examining metacognitive presence, which involves the integration of cognitive, teacher, and social presence (Akyol & Garrison, 2011; Wanstreet and Stein, 2011).

Social presence was found not to be significantly different across the top four formats, with the lowest score reserved for the only format with strictly online tutorials (F3: in-class lectures + online tutorials). As expected the top two achieving formats (F2 and F5) were amongst the top three formats for social presence, but surprisingly, F4 (with strictly F2F tutorials) was not significantly higher than F5 (F2F tutorial option), contributing to the notion of F2F preferences in relation to the cultivation of social presence specifically (Lowenthal & Dunlop, 2014; Minor, & Swanson, 2014).

Teacher presence was the only element of presence that remained consistent with outcomes, where the top three achieving formats were also the top three formats for teacher presence, while the two lowest scoring formats (F1 and F4) were significantly ($p < 0.000$) lower in value. This is consistent with the literature tying together the role of the teacher with student satisfaction and skill acquisition (Museus, 2012; Snart, 2010; Vaughan, Cleveland-Innes, & Garrison, 2013).

CHAPTER 7: Implications, Limitations, and Conclusion

This study sought to unpack the student experience in blended higher education courses along the lines of presence (cognitive, social, and teacher). The implications outlined in this final chapter begin with possible study contributions to the CoI literature, followed by a comprehensive look at how the presence → achievement findings could contribute to a better understanding of how to support more consistent student outcomes. In particular, through the promotion of social presence, the cultivation of teacher presence, and the use of a yet untapped resource in blended higher education – online course designs that cultivate communities of inquiry.

Implications concerned with blend format will contribute to the work done by York, Owston, Murtha, and Finkel (2014) to specifically define varying blend combinations, and design blends that can potentially support both positive student adoption attitudes, and student outcomes. Results correlating high teacher presence with high grades in certain blend formats will connect to pedagogical understandings, and have implications around the role of the tutorial as a potential lynchpin to supportive blended pedagogy. Given the macro factors outlined in the introduction of this dissertation, findings will lastly be considered within the two broader themes of improved student training and teacher development in order to more effectively respond to a shifting economic landscape, and the rapid institutional adoption of technology.

After clearly stating the limitations of this study, which will assist with the interpretation of results, I will offer concluding remarks. The conclusion, which will hopefully serve as a study summary, seeks to return to a wider academic perspective, where findings can be viewed in the context of broad literature contributions, and lessons learned. Unresolved questions, and possible new research opportunities will be offered to continue the development of both the CoI theoretical framework and the practice of blended learning in higher education.

7.1 Implications

7.1.1 EXPERIENCE AS PRESENCE

With a significant and moderately strong connection between presence and achievement (path coefficient of 0.16, $p < 0.001$), this study serves to situate itself in the literature that considers the CoI framework as a valid measurement of the educational experience (Akyol & Garrison, 2008; Garrison & Archer, 2000; Swan, Shea, Richardson, Ice, Garrison, Cleveland-Innes, & Arbaugh, 2008; Vaughan, 2010a). The measurement of presence based on the indicators of the CoI survey also builds off of the research validating the operationalized tool for the theoretical framework (Arbaugh, Cleveland-Innes, Diaz, Garrison, Ice, Richardson, & Swan, 2008; Moreira, Ferreira, & Almeida, 2013; Yu, & Richardson, 2015). The measurement of social, cognitive, and teacher presence through a post-hoc application of these indicators onto a student survey that was not originally created for that purpose, contributes to the measurement literature insofar as to offer a potential flexibility within the prescribed indicators for each presence; the premise of presence being captured in wording that differs slightly from the original scripting, but remains true to the definitions and goals of each form of presence.

The influence of online course designs and negative student adoption attitudes were also considered in connection to presence, and as expected the learning experience was significantly impacted by both of these exogenous variables. The fact that online course design has a weak, but significant effect (0.092, $p < 0.001$), and negative adoption attitudes displays a strong and significant association (-0.41, $p < 0.001$), indicates that the more negative a student feels about the technology in their course, or the less adequate the LMS, the lower the scores of presence. This pattern of correlations continues to support the role of presence as a valid articulation of the learning experience.

7.1.2 PRESENCE AS A CONTRIBUTING FACTOR TO ACHIEVEMENT

This study's significant and moderately strong connection between presence and achievement (path coefficient of 0.16, $p < 0.001$) indicates that achievement can now in fact be seen as associated with student perceptions of cognitive, social, and teacher presence within a blended course. In an

attempt to cultivate more consistent student outcomes in blended courses, findings around the presence interrelationships previously discussed (TP→SP→CP), imply that a promotion of social presence in connection to cognitive tasks and an overall cultivation of teacher presence within the blended course design could in fact improve student perceptions of presence, and in turn, improve student outcomes. This highlighted role of the teacher and the pedagogical design of a blended course explicitly connects the student-teacher relationship to achievement through study findings, and implies that professional development programs could now be more targeted towards building an understanding of teacher presence (in both online and F2F settings), as a mechanism in support of outcomes in a blended course.

With online course design having a significant, mediated relationship with achievement, findings imply a connection between pedagogical designs online and student perceptions of presence. The discussion in the literature has shown that these online course designs have yet to be leveraged consistently by instructors due to constraints of time and training, leading to students perceptions of these spaces as information storage spaces versus constructivist learning spaces. Future research deconstructing the design of online course structures (websites, learning management systems, learning hubs) and tying specific indicators to presence and/or achievement, will enable researchers to better target the design of a "best practice" template for online course designs, ultimately leading to less time and technological barriers for teachers attempting to cultivate presence online.

7.1.3 BLENDING TO PROMOTE THE PRESENCE-ACHIEVEMENT RELATIONSHIP

As expected, the two highest performing formats were also low scoring formats for negative student adoption attitudes (F2 having a mean of 2.78, and F5 = 2.83), while the two lowest performing formats were found to have the highest results for negative student adoption attitude (F1 = 2.94, and F4 = 2.97). F2 (in-class lectures + blended tutorials) varied significantly from both the F1 (-0.22086, $p = 0.007$), and the F4 (-0.24193, $p < 0.000$) formats. These findings on the importance of instructional integration (between lectures and tutorials), clarity of expectations (in regards to assessment), and consistency of format, echo York, Owston, Murtha, and Finkel (2014) who state that the most

important factor in blended format satisfaction, might not be the type of blend at all, but instead the consistency and clarity of the format chosen.

"The Tutorial Blend" is also of interest to future researchers, where the differentiating factor within the instructional make-up of the two highest achieving formats, was the fact that there were alternatives when it came to the tutorial component. It is surprising that students felt less overwhelmed or frustrated, in courses where the format of the tutorial changed depending on the timetable or task, but findings from this study would imply that students are in-fact prepared to manage a course that offers an online tutorial presence, with occasional F2F tutorials, as long as there was a direct and clear communication of expectations, and integration of each component into the overall course objectives. In the case of F5 in particular, students were able to choose whether or not they wanted to meet F2F (individual or small group meetings), based on their experience of the content (i.e. do I need help this week or not?). That element of choice within the tutorial blend could also be an implication for further research as to how best to blend F2F and online time within a blended instructional design.

As the only element of presence that remained consistent with outcomes, teacher presence was scored the highest for F5 (fully online + F2F tutorial option). Given the previous discussion around differences between the F2 and F5 formats, it is reasonable to assume that the choice in targeted supported offered in F5 (mandatory online tutorials, plus optional F2F meetings as a group, or as an individual) provided more opportunities each week for student interactions with their instructors/TA; while the F2 format, which was also designed in an integrated, clear, and consistent fashion, similar to F5, simply switched between F2F and online tutorials in a predetermined fashion listed on the syllabus and depending on that week's content, as opposed to offering both options each week. Implications for design around presence and format can be summarized in the following design considerations: to shift towards promoting and measuring achievement online as a combination of social and cognitive presence in relation to learning outcomes, and to promote social and teacher presence within a blend by providing diverse weekly options for interaction (both online and F2F options).

7.1.5 IMPROVING STUDENT ADOPTION ATTITUDES

With the student experience at the centre of this study, student adoption attitudes were integral in the discussion of results. Attitude was found to greatly impact perceptions of presence and in turn achievement levels, the quality of online designs directly impacted adoption attitudes, and attitude also varied in relation to blend format (i.e. formats with high negative attitudes were also low performing).

With research demonstrating that increased exposure to technology increases students perception of ease and overall acceptance (Farley, Jain, & Thompson, 2011; Parkes, Stein, & Reading, 2014; Vaughan et.al, 2013), and previous research calling for more information on student skill levels (Anderson, Lankshear, Courtney, & Timms, 2008; Bain & Rice, 2006; Bellanca, 2010), findings from this research support the following recommendation: diagnostic assessments for students prior to entering a blended program that assess their ICT comfort and technical skill level, as well as their ability to employ the skills of self-regulation within a learning environment. Additional study implications suggest the need to make support programs available to students in order to provide them with the opportunity to practice and familiarize themselves with an LMS system that might be new to them as undergraduate students. These recommendations, given the empirical connections found between student adoption attitudes and presence as well as achievement, could potentially trigger higher perceptions of presence and in turn, more consistent student outcomes in blended courses.

7.1.6 CULTIVATING TEACHER PRESENCE

The significant role of the teacher in the interrelationships of presence, and in connection to outcomes (TP→SP→CP→Grade) speaks to the importance of cultivating teacher presence in both online and F2F settings. Literature supports the concept of teacher presence as a set of skills that enable consistent and formative interactions between instructor and student, and also as the more complex interactivity between social presence, and potentially metacognition. Findings from this study highlight that teacher presence does indeed involve integrated forms of interaction described in the literature as "the act of designing, facilitating, and orienting cognitive and social processes to create an effective

educational experience" (Garrison & Anderson, 2003, p.57), and serves to redefine the role of a blended teacher as the conductor of an "online instructional orchestra" (Rubin, Fernandes, and Avgerinou, 2013), or an "instructional social presence" (Pollard, Minor, & Swanson, 2014).

It is promising to see research demonstrating increased opportunities to cultivate teacher presence online (Bowers and Kumar's 2015; Vaughan, Cleveland-Innes, & Garrison, 2013). Findings on the quality of online course design in this study however, indicate weak correlations between online course designs, presence, and achievement. This important finding reflects the failure of current blends in promoting peer-to-peer and student-teacher interactions online – social and teacher presence – aspects of the learning process that students still overwhelmingly attribute to face-to-face instruction.

How do we blend well then for teacher presence, and in turn, to support achievement? As the form of presence that was the most tightly correlated to format ($F(4,1893) = 12.348$, $p < 0.001$, explanatory power $R^2 = 0.025$) we must look to the levels of integration, clarity, and communication within blended designs as the key – connecting these findings to the development of targeted professional training programs that build an understanding of teacher presence in both online, F2F, and blended settings.

7.3 Limitations

Studies hoping to articulate associations or correlations, even without generalizations, require a deep understanding of potential limitations from both a design and methodological perspective, for design characteristics of a study can have undue repercussions on the interpretation or application of findings (Brutus, Aguinis, & Wassmer, 2013). As researcher, I need to make clear two limitations in the design of this study. First, I have not personally collected this data set, but have inherited from another lead researcher working directly with the university's internal funding body. That disconnect between collection and analysis could lead to my possessing and "outsider's" perspective on the study. The design of the methods of analysis for this study have also been post-hoc in nature, where the student surveys distributed were not constructed to measure a priori concerning presence. One of the

main challenges of a post-hoc design is the need to perform multiple statistical tests to compensate for the fact that you are looking for patterns in the data that the tools were not explicitly set-up to test (Jaccard, & Becker, 1984). This necessitates a closer look on my behalf as researcher, around findings of significance (employing the Bonferroni Correction to account for Type 1 error in a post-hoc design) as I will be concerning myself with a smaller sub-group of the larger study population (only complete data profiles of students with each variable satisfied as a given value). Post-hoc analyses are important however, to broaden the scope of possible interpretations of a data set (Hayter, 1986). Especially in the case of approximately 2,000 student surveys that had been collected, this study serves as an avenue of examination for a set of a priori hypotheses that have the possibility of positively impacting the educational community. In all writing and publication of this research, the post-hoc nature of the design will be clearly stated to ensure transparency in knowledge transfer.

Methodological limitations of this study include the lack of random sampling, issues with survey implementation (voluntary response, non-response) and the fact that only one person coded the Moodle scores. Given that the validity of any conclusions drawn from statistical tests depends on the validity of the assumptions that underlie them, it is important to further examine where the data set is lacking. The three general categories of assumption discussed in this dissertation have been distributional, structural and in relation to cross-variations (Field, 2009). The assumption of normal distribution has already been discussed and satisfied through the findings of Quantile-Quantile plots for each variable within the large (n = 1,926) response population. Structural assumptions made in this study include the categorization of observed variables in relation to latent constructs. While empirical tests (EFA, CFA) have been carried out to assist with validating the constructs of presence (cognitive, social, and teacher) and student adoption attitudes, the Quality of Online Course Design faces challenges of inter and intracoder reliability (Neuendorf, 2007). While the Moodle rubric has been empirically validated as measuring one construct (internal reliability alpha of 0.802), the scores given to each course Moodle site in year two and year three were done by one single coder. With only one

coder, there is a possibility of bias in the scores and thus the latent construct as a whole. With the loss of access to those course Moodle sites, I was unable to independently code the sites myself, which would have provided a check on the validity of the original coder's ratings. This potential source or error must be taken into account in the analysis and interpretation of this variable.

Cross-variation assumptions include statistically independent observations or errors. Two variables are statistically independent of each other if the realization of one does not affect the probability distribution of the other (Field, 2009). With random sampling, this independence of observations is more likely than with convenience sampling, the technique employed in the collection of this data. With a non-probability sample drawn from a population that was readily available, the large sample size (n = 1,926) will hopefully afford the research more freedom to discuss associations and relationships (Anderson, 2001), as opposed to generalizations what would be possible with more independent observations. Credibility of my findings rests with the knowledge that the chosen sample is representative of the larger population from which they are drawn (Maxwell, & Delaney, 2004). Even with a large sample size, findings and associations will be articulated as translating to the specific context and conditions association with the sample population: undergraduate courses within the faculty of fine arts at a large, urban, Canadian university.

The last methodological limitation is in regards to survey sampling. Response bias (voluntary, non-responsive) occurs within the human element of survey participation (Furnham, 1986). If a participant self-selects to respond or not respond (they have choice), then it is possible that results will be biased towards those with stronger opinions than others. Also, the desire for participants to provide socially desirable responses has been a documented challenge in behavioural research (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In the case of this study, it is possible that students completing a survey on their experience within a blended course, were inclined not to be truthful in their responses even though it was not administered by their in-class professor, but by an independent researcher. Also, it is important to note in response to voluntary or non-response error, that no student present on the day

of administration, refused to complete the survey. Descriptive statistics are important here within the sample, to illustrate a range in the distribution of responses within each variable as well as the examination of the Likert-scale as a response system that given the inclusion of a "neutral" category, could potentially act to limit bias (Kalton, & Schuman, 1982). Lastly, through a process of regression validation that includes analyzing the goodness of fit (Glover, Jenkins, Williams, & Doney, 2008) of the structural equation model, this study attempted to mitigate the aforementioned methodological limitations and describe how these limitations may point to the need for further research.

7.2 Conclusions

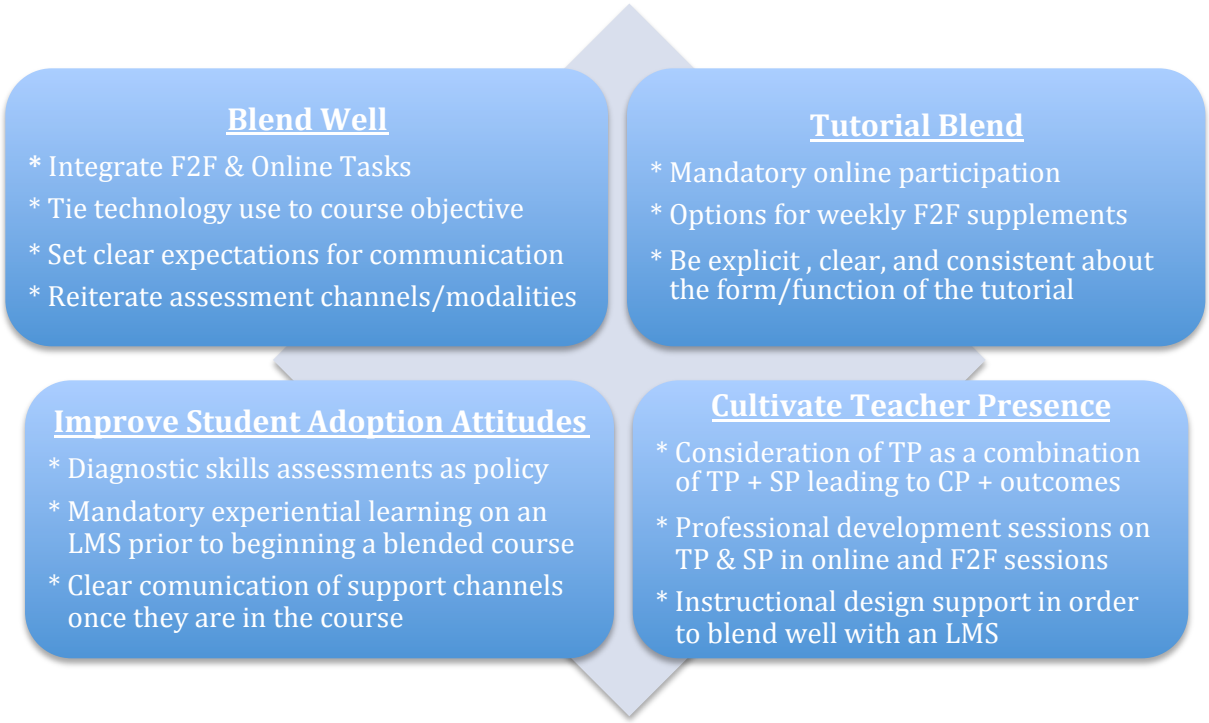


Figure 15. Considerations in the Support of a Presence – Achievement Relationship

Given the macro factors of a shifting economic landscape, and the rapid institutional adoption of ICT, blended learning is becoming the new norm in higher education (Griffin, 2012; Jenkins & Ford, 2013; Pelligrino, 2012; Trilling & Fadel, 2012). With current course designs falling short (Garrison & Kanuka, 2004; Owston, Lupshenyuk, Wideman, & Murphy, 2008; Owston, & York, 2012; Owston,

York & Finkel, 2013), this study was set to address research indicating mixed student attitudes (Al-Harbi, 2011; Snart, 2010) and achievement levels within blended courses (So & Bonk, 2010; Owston, York, & Murtha, 2013; Vaughan & Garrison, 2013). Through an analysis of the student "experience" as student perceptions of "presence" (Garrison, 2011), I was able to deconstruct a student's blended experience into cognitive, social, and teacher interactions, in order to inform the design of blended experiences that more consistently support positive student attitudes and outcomes.

Having empirically tied presence to achievement and tested for the significant impact of other variables on the presence-achievement relationship, this study allowed for a discussion of the blended educational experience in relation to student adoption attitudes, the quality of online course design, and varying blend formats. Significant findings include the role of teacher presence in promoting presence and achievement (TP→SP→CP→Grade), the importance of considering the quality of an online course design, and the role of a blended tutorial option (both F2F and online) in helping to cultivate presence, and in turn achievement. Student adoption attitudes were also highlighted as a key consideration in the presence-achievement relationship, as well as within the choice of blend format, where the more integrated, clear, communicative, and consistent a course was about expectations and assessments, the more comfortable students felt and in turn, the higher those formats performed.

There are still unresolved questions however, in these four key areas (outlined in the above graphic). In order to blend well, for example, is there currently adequate instructor support to re-design traditional F2F syllabi, within the context of technological enhancements? How does the consistency required for effective blended tutorials fit with current staffing regulations, or the roles and responsibilities of course directors and/or course TA's? If diagnostic assessments could be used to cultivate more positive student ICT adoption attitudes, then what assessment form would optimize institutional efficiency as well as improvements to student attitude (F2F, online, or blended testing formats)? At what point of the student experience should these tests be administered? And how can that student data be efficiently translated into knowledge that can be used by an instructor? How can a shift

in pedagogical mindset take place at the level of the instructor that results in an increased understanding of teacher presence, without increasing the time burden already placed on teachers? And what kinds of institutional support would be required to make such a shift sustainable?

Future research considerations based on these unresolved questions, limitations of this study, or the academic argumentation offered in the discussion of results, include a more targeted study isolating high vs. low achiever perceptions; a more detailed indicator-level analysis of online course designs in relation to attitude and achievement so as to contribute to a LMS template that is able to specifically target presence as a catalyst to performance (achievement); explorations into the measurement of metacognition as opposed to simply cognitive presence in relation to achievement; a cross-sectional analysis of student adoption attitudes in blended courses that had a diagnostic assessment, and pre-course technical skills training versus courses that did not; and a longitudinal study on the impact of professional development programs (focused on the integrated nature of teacher presence) on student attitudes and outcomes.

Policy recommendations based on the results of this study, and the discussion of their interpretation in relation to current research, include an institutional policy to run diagnostic assessments for students entering a blended program in order to help instructors better gauge the skill levels present within their classrooms; the design of accessible, experiential learning opportunities (during initial orientation and throughout the year) for students to better familiarize themselves with the technological hardware and software (LMS) required for their blended program, and the design of teacher training programs specially targeting an understanding and application of teacher presence as a blended “instructional orchestra”.

REFERENCES

Abramowitz, M., & David, P. A. (1996). Measuring performance of knowledge-based economy. In *Employment and growth in the knowledge-based economy* (pp. 35-60). Paris: OECD.

Abbott, J. (2012). *Some thoughts on the implications of technological change, and high levels of unemployment, on schools.* Bath, UK: The 21st century learning initiative. Retrieved May 15, 2015, from http://www.21learn.org/timeline/up-to-1987/some-thoughts-on-the-implications-of-technological-change-and-high-levels-of-une

Abels, E. (2010). *Interpersonal relations and social patterns in communication technologies discourse norms, language structures and cultural variables.* Hershey, Pa: IGI Global.

Abdous, M., & Yen, C. (2010). A predictive study of learner satisfaction and outcomes in face-to-face, satellite broadcast, and live video-streaming learning environments. *The Internet and Higher Education, 13*(4), 248-257. doi:10.1016/j.iheduc.2010.04.005

Adams, J. M., Hanesiak, R., Morgan. G., Owston, R., Lupshenyuk. D., & Mills, L. (2009). *Blended learning for soft skills development: Testing a four-level framework for integrating work and learning to maximize personal practice and job performance.* (Technical Report No. 2009-5). Institute for Research on Learning Technologies: York University.

Adelson, J., & McCoach, D. (2010). Measuring the mathematical attitudes of elementary students: The effects of a 4-point or 5-point Likert-type scale. *Educational and Psychological Measurement*, *70*(5), 796-807.

Ajjan, H., & Hartshorne, R. (2008). Investigating faculty decisions to adopt web 2.0 technologies: Theory and empirical tests. *The Internet and Higher Education, 11*(2), 71-80. doi:10.1016/j.iheduc.2008.05.002

Akkoyunlu, B., & Yilmaz-Soylu, M. (2008). Development of a scale on learners' views on blended learning and its implementation process. *The Internet and Higher Education, 11*(1), 26-32.

doi:10.1016/j.iheduc.2007.12.006

Akour, H. (2009). *Determinants of mobile learning acceptance: an empirical investigation in higher education* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (Accession Order No. AAT 3408682).

Akrcih, M., & Latour, B. (1992). A summary of a convenient vocabulary for the semiotics of human and nonhuman assemblies. In Bijker, W., & J. Law (Eds.), *Shaping technology/building society: Studies in socio-technical change.* (pp. 259-264). Cambridge, Mass: MIT Press.

Akyol, Z., & Garrison, D. R. (2008). The development of a community of inquiry over time in an online course: Understanding the progression and integration of social, cognitive and teaching presence. *Journal of Asynchronous Learning Networks, 12*(3), 3-22.

Akyol, Z., Garrison, D. R., & Ozden, M. Y. (2009). Online and blended communities of inquiry: Exploring the developmental and perceptional differences. *The International Review of Research in Open and Distributed Learning*, *10*(6), 65-83.

Akyol, Z., & Garrison, D. R. (2011a). Understanding cognitive presence in an online and blended community of inquiry: Assessing outcomes and processes for deep approaches to learning. *British Journal of Educational Technology, 42*(2), 233-250.

Akyol, Z., & Garrison, D. R. (2011b). The impact of course duration on the development of a community of inquiry. *Interactive Learning Environments, 19*(3), 231-246.

Akyol, Z., & Garrison, D. R. (2011c). Assessing metacognition in an online community of inquiry. *Internet & Higher Education, 14*(3), 183-190.

Al-Ani, W. T. (2013). Blended Learning Approach Using Moodle and Student's Achievement at Sultan Qaboos University in Oman. *Journal of Education and Learning, 2*(3), 96.

Al-Harbi, K. R. A. S. (2011). *Investigating factors influencing the adoption of e-learning: Saudi students' perspective* (Doctoral dissertation, University of Leicester).

Al-Qahtani, A. A., & Higgins, S. (2012). Effects of traditional, blended and e-learning on students'

achievement in higher education. *Journal of Computer Assisted Learning, 29*(3), 220-234.

Albrecht, S. (2006). Whose voice is heard in online deliberation: A study of participation and representation in political debates on the Internet. *Information, Communication & Society*, *9*(1), 62-82.

Allen, E., & Seaman, J. (2014). *Grade change: Tracking online education in the United States*. San Francisco, CA: Abson Survey Research Group and Quahog Research Group, LLC.

Alonso, F., Manrique, D., Martinez, L., & Vines, J. M. (2011). How blended learning reduces underachievement in higher education: An experience in teaching computer sciences. *IEEE Transactions on Education*, *54*(3), 471–478.

Alper, S., & Raharinirina, S. (2006). Assistive technology for individuals with disabilities: A review and synthesis of the literature. *Journal of Special Education Technology, 21*(2), 47- 64.

Alsabawy, A., Cater-Steel, A., & Soar, J. (2013). IT infrastructure services as a requirement for e-learning system success. *Computers & Education, 3*(1), 431-451.

American Association of Higher Education and Accreditation. (1996). *Nine principles of good practice for assessing student learning.* Retrieved from http://www.niu.edu/assessment/Manual/_docs/9Principles.pdf

Amin, A. (2007). Rethinking the urban social. In *City analysis of urban trends, culture, theory, policy, action. 1*(11), 100-114.

Amirault, R. J., & Visser, Y. L. (2009). The university in periods of technological change: A historically grounded perspective. *Journal of Computing in Higher Education, 21*(1)*,* 62–79.

Anderson, N.H. (2001). *Empirical direction in design and analysis.* Mahwah, NJ: Lawrence Erlbaum.

Anderson, T., Rourke, L., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. *Journal of Asynchronous Learning Networks, 5*(2), 2-17.

Anderson, N., Timms, C., Courtney, L., & Lankshear, C. (2008). Girls and information communication technology (ICT). In Yelland, G. Neal, & E. Dakich (Eds.), *Rethinking education with ICT:*

New directions for effective practice 2(3)*,* 181–201. Rotterdam, Netherlands: Senses Publishing.

Angeli, C., & Valanides, N. (2005). Pre-service elementary teachers as information and communication technology designers: An instructional systems design model based on an expanded view of pedagogical content knowledge. *Journal of Computer Assisted Learning, 21*(4), 292-302.

Arbaugh, J. B. (2006, August). *An empirical verification of the community of inquiry framework.* Paper presented to the Sloan Consortium Asynchronous Learning Network Invitational Workshop. Baltimore, MD.

Arbaugh, J. B. (2008). Does the community of inquiry framework predict outcomes in online MBA courses? *International Review of Research in Open and Distance Learning, 9,* 1–21.

Arbaugh, J. B., Bangert, A., & Cleveland-Innes, M. (2010). Subject matter effects and the community of inquiry (CoI) framework: An exploratory study. *The Internet and Higher Education, 13*(1-2), 37-44. doi:10.1016/j.iheduc.2009.10.006

Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, J.C, & 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.

Archer, W. (2010). Beyond online discussions: Extending the community of inquiry framework to entire courses. *The Internet and Higher Education, 13*(1-2), 69-69. doi:10.1016/j.iheduc.2009.10.005

Archibald, D. (2010). Fostering the development of cognitive presence: Initial findings using the community of inquiry survey instrument. *The Internet and Higher Education, 13*(1-2), 73-74. doi:10.1016/j.iheduc.2009.10.001

Arnold, N., & Paulus, T. (2010). Using a social networking site for experiential learning: Appropriating, lurking, modeling and community building. *The Internet and Higher Education, 13*(4), 188-196. doi:10.1016/j.iheduc.2010.04.002

Artino, A. R. (2009). Online learning: Are subjective perceptions of instructional context related to academic success? *The Internet and Higher Education, 12*(3-4), 117-125. doi:10.1016/j.iheduc.2009.07.003

Artino, A. R. (2010). Online or face-to-face learning? Exploring the personal factors that predict students' choice of instructional format. *The Internet and Higher Education, 13*(4), 272-276. doi:10.1016/j.iheduc.2010.07.005

Artino, A. R., & Jones, K. D. (2012). Exploring the complex relations between achievement emotions and self-regulated learning behaviors in online learning. *The Internet and Higher Education, 15*(3), 170-175. doi:10.1016/j.iheduc.2012.01.006

Artino, A. R., & Stephens, J. M. (2009a). Academic motivation and self-regulation: A comparative analysis of undergraduate and graduate students learning online. *The Internet and Higher Education, 12*(3-4), 146-151. doi:10.1016/j.iheduc.2009.02.001

Artino, A. R., & Stephens, J. M. (2009b). Beyond grades in online learning: Adaptive profiles of academic self-regulation among naval academy undergraduates. *Journal of Advanced Academics, 20*(4), 568–601.

Atchley, W., Wingenbach, G., & Akers, C. (2013). *The International Review of Research in Open and Distance Learning, 14*(4), 104-113.

Atkinson, J. K., & Blankenship, R. (2009). Online learning readiness of undergraduate college students: A comparison between male and female students. *The Journal of Learning in Higher Education, 5*(2), 49–56.

Azevedo, R. (2005). Using hypermedia as a metacognitive tool for enhancing student learning? The role of self-regulated learning. *Educational Psychologist*, *40*(4), 199–209.

Bailey, C. J., & Card, K. A. (2009). Effective pedagogical practices for online teaching: Perception of experienced instructors. *The Internet and Higher Education, 12*(3-4), 152-155. doi:10.1016/j.iheduc.2009.08.002

Bain, C. D., & Rice, M. L. (2006). The influence of gender on attitudes, perceptions, and uses of technology. *Journal of Research on Technology in Education, 39*(2), 119-132.

Bangert, A. W. (2009). Building a validity argument for the community of inquiry survey instrument. *The Internet and Higher Education, 12*(2), 104-111. doi:10.1016/j.iheduc.2009.06.001

Banner, D. J., & Albarrran, J. W. (2009). Computer-assisted qualitative data analysis software: A review. *Canadian Journal of Cardiovascular Nursing, 19*(3), 24–31.

Barab, S., Schatz, S., & Scheckler, R. (2004). Using activity theory to conceptualize online community and using online community to conceptualize activity theory. *Mind, Culture, and Activity, 11*(1), 25– 47.

Bari, A., & Chaouchi, M. (2014). *Predictive analytics for dummies*. Hoboken, N.J.: John Wiley.

Barkley, E. (2010). *Student engagement techniques: A handbook for college faculty*. San Francisco: Jossey-Bass.

Barnard, L., Lan, W. Y., To, Y. M., Paton, V. O., & Lai, S. (2009). Measuring self-regulation in online and blended learning environments. *The Internet and Higher Education, 12*(1), 1-6. doi:10.1016/j.iheduc.2008.10.005

Barnett, V. (1999). *Comparative statistical inference*. Chichester: Wiley.

Bartholomew, D., Knotts, M., & Moustaki, I. (2011). *Latent variable models and factor analysis: A unified approach* (3rd ed.). West Sussex, UK: John Wiley.

Bates, T., & Poole, G. (2003). *Effective teaching with technology in higher education: Foundations for success*. San Francisco, CA: Jossey-Bass.

Battaglino, T. B., Haldeman, M., & Laurans, E. (2012). *The costs of online learning*. Retrieved May 15, 2015, from http://www.edexcellencemedia.net/publications/2012/20120110-the-costs-of-online-learning/20120110-the-costs-of-online-learning.pdf

Battye, G., & Carter, H. (2009). *Report on the review of online and blended learning.* Canberra, ACT: University of Canberra. Retrieved June 25, 2012, from http://www.

canberra.edu.au/tlc/attachments/pdf/OBLR_FINAL-JUN09.pdf

Bauerlein, M. (2011). *The digital divide: Arguments for and against Facebook, Google, Texting, and the age of social networking*. New York: Tarcher Publishing.

Baym, N. (2010). *Personal connections in the digital age*. Cambridge, UK: Polity.

Beaudoin, M. (2013). The evolving role of the instructor in the digital age. In Katz, Y. (ed.), *Learning management systems and instructional design best practices in online education.* Hershey, PA: IGI Global.

Bedi, K. (2008). Measuring the teaching presence of online faculty in a blended program for entrepreneurs. In *Hello! Where are you in the landscape of educational technology? Proceedings ascilite Melbourne 2008.* Retrieved from http://www.ascilite.org.au/conferences/melbourne08/procs/bedi.pdf

Beck, M. (1995). *Data analysis: An introduction*. Thousand Oaks, CA: Sage.

Beckman, M. (1990). Collaborative learning: Preparation for the workplace and democracy. *College Teaching, 38*(4)*,* 128–133.

Beech, M., VanOverbeke, D., & Bonnstetter, R. (2009). Teacher education for the 21st century classroom: Spanning the digital divide. In *Proceedings of society for information technology and teacher education international conference* (pp. 3104-3111). Chesapeake, VA: AACE.

Beetham, H., & Sharpe, R. (2013). *Rethinking pedagogy for a digital age: Designing and delivering e-learning*. London: Routledge.

Bellanca, J. (2010). *21st century skills: Rethinking how students learn*. Bloomington, IN: Solution Tree Press.

Benson, R. (2010). *Online learning and assessment in higher education: A planning guide*. Oxford: Chandos Publishing.

Bereiter, C., & Scardamalia, M. (2006). Education for the knowledge age. In Alexander, P., & Winne, P., (Eds.), *Handbook of Educational Psychology* (pp. 695-713). Mahwah, N.J: Erlbaum.

Berelson, B. (1952). *Content analysis in communication research*. Glencoe, Ill: Free Press.

Berggren, A., Burgos, D., Fontana, J., & Hinkelman, D. (2005). Practical and pedagogical issues for teacher adoption of IMS learning design standards in Moodle LMS. *Journal of Interactive Media in Education, 9*(2), 197-206.

Bergman, M. (2008). *Advances in mixed methods research theories and applications*. Los Angeles, CA: Sage.

Bernard, R. M., P. Abrami C., E. Borokhovski, C. Wade A., R. Tamim M., M. Surkes A., and E. Bethel C. "A Meta-Analysis of Three Types of Interaction Treatments in Distance Education." *Review of Educational Research* 79.3 (2009): 1243-289. Web.

Bernard, Robert M., Eugene Borokhovski, Richard Schmid F., Rana Tamim M., and Philip Abrami C. "A Meta-analysis of Blended Learning and Technology Use in Higher Education: From the General to the Applied." *J Comput High Educ Journal of Computing in Higher Education* 26.1 (2014): 87-122. Web.

Biggs, J. (1998). Assumptions underlaying new approaches to assessment. In P. Stimson & P. Morris (Eds.), *Curriculum and assessment in Hong Kong: Two components, one system* (pp. 351-384). Hong Kong: Open University of Hong Kong Press.

Bijker, W., & Law, J. (1992). *Shaping technology, building society: Studies in socio-technical change*. Cambridge: MIT Press.

Biocca, F., Harms, C., & Burgoon, J. (2003). Towards a more robust theory and measure of social presence: Review and suggested criteria. Presence: Teleoperators and virtual environments. Mindlab. Retreived June, 2015 from http://www.mindlab.org/images/d/DOC716.pdf

Bishop, J. (n.d.). *Partnership for 21st century skills: Mission statement.* Retrieved November 23, 2014, from http://www.imls.gov/assets/1/AssetManager/Bishop%20Pre-Con%202.pdf

Black, E. W., Dawson, K., & Priem, J. (2008). Data for free: Using LMS activity logs to measure community in online courses. *The Internet and Higher Education, 11*(2), 65-70. doi:10.1016/j.iheduc.2008.03.002

Blackboard Exemplary Course Program (ECP). (2012). *Blackboard exemplary course rubric.* Retrieved August 14, 2014, from http://www.blackboard.com/getdoc/7deaf501-4674-41b9-

b2f2-554441ba099b/2012-Blackboard-Exemplary-Course-Rubric.aspx

Blankenship, R., & Atkinson, J. K. (2010). Undergraduate student online learning readiness. *International Journal of Education Research, 5*(2), 44–54.

Bleed, R. (2001). A campus for a new millennium. *Educause Review, 36* (1), 16-24.

Blessinger, P. (2013a). *Increasing student engagement and retention in e-learning environments Web 2.0 and blended learning technologies*. Bradford, UK: Emerald Group Publishing Limited.

Blessinger, P. (2013b). Learning-Scapes: Cultivating meaningful and sustainable learning ecosystems. *Insights*, *1*(3). Retrieved November 13, 2014, http://www.patrickblessinger.com/learning-scapes-cultivating-meaningful-and-sustainable-learning-ecosystems/

Blignaut, A. S., & Els, C. J. (2010). Comperacy assessment of postgraduate students' readiness for higher education. *The Internet and Higher Education, 13*(3), 101-107. doi:10.1016/j.iheduc.2010.02.007

Bliuc, A. M., Goodyear, P., & Ellis, R. A. (2007). Research focus and methodological choices in studies into students' experiences of blended learning in higher education. *The Internet and Higher Education, 10*(4), 231-244. doi:10.1016/j.iheduc.2007.08.001

Bliuc, A. M., Ellis, R. A., Goodyear, P., & Piggott, L. (2011). A blended learning approach to teaching foreign policy: Student experiences of learning through face-to-face and online discussion and their relationship to academic performance. *Computers in Education, 56*, 856–864.

Blunch, N. J. (2013). *Introduction to structural equation modeling using IBM SPSS statistics and AMOS*. London: SAGE.

Bonk, C., Kim, K., & Zeng, X. (2004). Future directions of blended learning in higher education and workplace learning settings. In C. J. Bonk & C. R. Graham, C. R. (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 550–568). San Francisco, CA: John Wiley.

Bonk, C. (2006). *The handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer.

Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher, 33*(8), 3-15.

Borup, J., West, R. E., & Graham, C. R. (2012). Improving online social presence through asynchronous video. *The Internet and Higher Education, 15*(3), 195-203. doi:10.1016/j.iheduc.2011.11.001

Bouchard, P. (2013). Education without a distance: Networked learning. In T. Nesbit, S. M. Brigham, N. Taber, & T. Gibb. (Eds.), *Building on critical traditions: Adult education and learning in Canada.* Toronto: Thompson Educational Publishing.

Boud, D., & Prosser, M. (2002). Appraising new technologies for learning: A framework for development. *Education Media International*, *39*(3/4), 237-245.

Bourdieu, P. (1986). The forms of capital. In J. G. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241–258). New York, NY: Greenwood Press.

Boston, W., Diaz, S. R., Gibson, A., Ice, P., Richardson, J., & Swan, K. (2009). An exploration of the relationship between indicators of the community of inquiry framework and retention in online programs. *Journal of Asynchronous Learning Networks, 13*(3)*,* 67–83.

Bowers, C. A. (2000). *Let them eat data: How computers affect education, cultural diversity, and the prospects of ecological sustainability.* Athens, GA: The University of Georgia Press.

Bower, M. (2008). Affordance analysis - Matching learning tasks with learning technologies. *Educational Media International, 45*(1), 3–15.

Bowers, J., & Kumar, P. (2015). Students' Perceptions of Teaching and Social Presence: A Comparative Analysis of Face-to-Face and Online Learning Environments. *International Journal of Web-Based Learning and Teaching Technologies (IJWLTT), 10*(1), 27-44. doi:10.4018/ijwltt.2015010103

Boyd, D., Lankford, H., Loeb, S., & Wyckoff, J. (2013). Measuring test measurement error: A general approach. *Journal of Educational and Behavioural Statistics, 38*(6), 629-663.

Bradford, G., & Wyatt, S. (2010). Online learning and student satisfaction: Academic standing, ethnicity and their influence on facilitated learning, engagement, and information fluency. *The Internet and Higher Education, 13*(3), 108-114. doi:10.1016/j.iheduc.2010.02.005

Brauer, B. T. (2010). Twenty-first century skills: Learning for life in our times. *The Journal of General Education 59*(1), 82-84. Penn State University Press. Retrieved November 24, 2014, from Project MUSE database.

Brew, L. S. (2008). The role of student feedback in evaluating and revising a blended learning course. *The Internet and Higher Education, 11*(2), 98-105. doi:10.1016/j.iheduc.2008.06.002

Brinkley, I. (2006). *Defining the knowledge economy: Knowledge economy programme report*. Lancaster, UK: The Work Foundation.

Bronack, S., Sanders, R., Cheney, A., Riedl, R., Tashner, J., & Matzen, N. (2008). Presence pedagogy: Teaching and learning in a 3D virtual immersive world. *International journal of teaching and learning in higher education*, *20*(1), 59-69.

Brooks, R. (2012). *Changing spaces of education: New perspectives on the nature of learning*. New York: Routledge.

Brown, J. S., & Adler, R. P. (2008). Minds on fire: Open education, the long tail, and learning 2.0. *Educause review,* 17–32.

Brown, J. (2005). *Storytelling in organizations: Why storytelling is transforming 21st century organizations and management*. Boston: Elsevier Butterworth-Heinemann.

Brown, G., Smith, T., & Henderson, T. (2007). Student perceptions of assessment efficacy in online and blended classes. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended learning: Research perspectives* (pp. 145–160). Needham, MA: Sloan Consortium.

Brown, S., & Melamed, L. (1990). *Experimental design and analysis*. Newbury Park, CA: Sage.

Brutus, S., Aguinis, H., & Wassmer, U. (2013). Self-reported limitations and future directions in scholarly reports: Analysis and recommendations. *Journal of Management, 39*(1), 48-75.

Bryman, A. (2006). *Mixed methods*. London: Sage.

Bullen, M., & Janes, D. (2007). *Making the transition to e-learning: Strategies and issues*. Hershey, PA: IGI Global.

Bullen, M., Morgan, T., & Qayyam, A. (2011). Digital learners in higher education: Generation is not the issue. *Canadian Journal of Learning and Technology*, *37*(1), 111 – 135.

Burns, A., & Burns, R. (2008). *Basic Marketing Research*. New Jersey: Pearson Education.

Callon, M. (1993). Variety and irreversibility in networks of technique conception and adoption. In D. Foray, & C. Freeman (Eds.), *Technology and the wealth of nations: The dynamics of constructed advantage* (pp. 232-268). London: Pinter Publishers.

Caracelli, V., & Greene, J. (1993). Data analysis strategies for mixed method evaluation designs. *Educational Evaluation and Policy Analysis, 15*(2) 195-207.

Carbonell, K.B., Dailey-Hebert, A., & Gijselaers, W. (2013). Unleashing the creative potential of faculty to create blended learning. *Internet and Higher Education, 18*, 29-37.

Carey, T., & Trick, D. (2013). *How online learning affects productivity, cost and quality in higher education: An environmental scan and review of the literature.* Toronto: Higher Education Quality Council of Ontario.

Carlsen, R. (2007). *Proceedings of Society for Information Technology & Teacher Education International Conference.* Chesapeake, VA: Association for the Advancement of Computing in Education.

Carr, N. (2010). *The shallows: What the Internet is doing to our brains*. New York: W.W. Norton.

Carr, S. (2000). As distance education comes of age, the challenge is keeping the students. *Chronicle of Higher Education, 46(*23), 39-41.

Carvalho, A., Areal, N., & Silva, J. (2011). Students' perceptions of Blackboard and Moodle in a Portuguese university. *British journal of educational technology*, *42*(5), 824-841.

Casella, G., & Berger, R. (2002). *Statistical inference*. Melbourne: Thomson Learning.

Castle, S. R., & McGuire, C. J. (2010). An analysis of student self-assessment of online, blended, and face-to-face learning environments: Implications for sustainable education delivery. *International Education Studies*, *3*(3), 36–40.

Cator, K., Schneider, C., & Vander Ark, T. (2014). *Preparing teachers for deeper learning: Competency-based teacher preparation and development*. Menlo Park, CA: William and Flora Hewlett Foundation.

Caulfield, J. (2011). *How to design and teach a course achieving student-centred learning through blended classroom, online, and experiential activities*. Sterling, VA: Stylus Pub.

Cavanagh, T. B. (2011). The blended learning toolkit: Improving student performance and retention. *Educause Review*, *34*(4). Retrieved August 25, 2012, from http://www.educause.edu/ero/article/blended-learning-toolkit-improving-student-performance-and-retention

Chai, C. S., & Lim, C. P. (2011). The internet and teacher education: Traversing between the digitized world and schools. *The Internet and Higher Education, 14*(1), 3-9. doi:10.1016/j.iheduc.2010.04.003

Chakraborty, J., & Bosman, M. (2002). Race, income, and home PC ownership: A regional analysis of the digital divide. *Race and Society, 5*(2), 163-177.

Chan, K., Cheung, G., Brown, I., & Luk, G. (2015, June). Synthesizing technology adoption and learners' approaches towards active learning in higher education. In *ICEL2015-10th International conference on e-learning: ICEL 2015* (p. 66). Academic Conferences and Publishing Limited.

Cheung, M. (2004). *Innovations in online learning: An evaluation of a blended online learning strategy for student satisfaction*. Toronto: Institute for Research on Learning Technologies, York University.

Chen, P., & Popovich, P. (2002). *Correlation: Parametric and nonparametric measures*. Thousands Oaks, CA: Sage.

Cho, M. H., Shen, D., & Laffey, J. (2010). Relationships between self-regulation and social experiences in asynchronous online learning environments. *Journal of Interactive Learning Research, 21*, 297–316.

Cho, M., & Cho, Y. (2014). Instructor scaffolding for interaction and students' academic engagement in online learning: Mediating role of perceived online class goal structures. *The Internet and Higher Education, 21*, 25-30. doi:10.1016/j.iheduc.2013.10.008

Cho, M., & Kim, B. J. (2013). Students' self-regulation for interaction with others in online learning environments. *The Internet and Higher Education, 17*, 69-75. doi:10.1016/j.iheduc.2012.11.001

Chou, A. Y., & Chou, D. C. (2011). Course management systems and blended learning: An innovative learning approach. *Decision Sciences Journal of Innovative Education, 9*(3), 463–484.

Christenson, S. (2012). *Handbook of research on student engagement*. New York: Springer.

Christensen, R., & Christensen, R. (2001). *Advanced linear modelling: Multivariate, time series, and spatial data; nonparametric regression and response surface maximization*. NY: Springer.

Clarebout, G., Elen, J., Collazo, N. A. J., Lust, G., & Jiang, L. (2013). Metacognition and the use of tools. In R. Azevedo, & V. Aleven (Eds.), *International handbook of metacognition and learning technologies. No. 28 in Springer international handbooks of education.* (pp. 187–195). New York: Springer.

Clark, C., & Gorski, P. (2001). Multicultural education and the digital divide: Focus on race, language, socioeconomic class, sex, and disability. *Multicultural Perspectives, 3*(1), 39-44.

Clark, V. (2008). *The mixed methods reader*. Thousand Oaks, CA: Sage.

Cleveland-Innes, M., & Emes, C. (2005). Social and academic interaction in higher education contexts and the effect on deep learning. *National Association of Student Personnel Administrators Journal, 42*(2)*,* 241-262.

Cleveland-Innes, M., & Garrison, D. R. (2009). The role of learner in an online community of inquiry: Instructor support for first-time online learners. In N. Karacapilidis (Ed.), *Solutions and*

innovations in web-based technologies for augmented learning: Improved platforms, tools and applications. Hershey, PA: IGI Global.

Cleveland-Innes, M., & Garrison, D. R. (2011). Higher education and post-industrial society: New ideas about teaching, learning, and technology. In L. Moller & J. Huett (Eds.), *The next generation of distance education: Unconstrained learning.* New York: Springer.

Cleveland-Innes, M., & Campbell, P. (2012). Emotional presence, learning, and the online learning environment. *International Review of Open and Distance Learning*, *13*(4), 269-292.

Cohen, D., & Hill, H. (2001). *Learning policy: When state education reform works.* New Haven, CT: Yale University Press.

Cohen, A., & Nachmias, R. (2006). A quantitative cost effectiveness model for academic instruction. *The Internet and Higher Education, 9*, 81–90.

Cohen, A., & Nachmias, R. (2009). Implementing a cost effectiveness analyser for web-supported academic instruction: A campus wide analysis. *European Journal of Open, Distance and E-Learning (EURODL)*, 1–14.

Cohen, A., & Nachmias, R. (2011). What can instructors and policy makers learn about web-supported learning through web-usage mining. *The Internet and Higher Education, 14*, 67–76.

Community of Inquiry. (n.d.). CoI Questionnaire. Retrieved March 30, 2015, from https://coi.athabascau.ca/coi-model/coi-survey/

Collins, A., & Halverson, R. (2009). *Rethinking education in the age of technology: The digital revolution and schooling in America*. New York: Teachers College Press.

Collis, B. (November, 2002). *The net as a tool for blended learning. What are the ingredients for success?* Paper presented at Netlearning, Ronneby, Sweden.

Collopy, R. M. B., & Arnold, J. M. (2009). To blend or not to blend: Online and blended learning environments in undergraduate teacher education. *Issues in Teacher Education, 18*(2), 85-101.

Conole, G. (2013) Tools and resources to guide practice. In H. Beetham, & R. Sharpe, (Eds.),

Rethinking pedagogy for a digital age: Designing and delivering e-learning. London: Routledge.

Conole, G., & Culver, J. (2010). The design of cloudworks: Applying social networking practice to the exchange of learning and teaching ideas and designs. *Computers and Education, 54*, 679-692.

Cooper, J. (2006). The digital divide: The special case of gender. *Journal of Computer Assisted Learning, 22,* 320–344.

Cook, K., Owston, R., & Garrison, D.R. (2004). *Blended learning practices at COHERE universities.* York Institute for Research on Learning Technologies, Technical Report 2004-5.

Cook, R. (1998). *Regression graphics: Ideas for studying regressions through graphics*. New York: Wiley.

Cook, R., & Weisberg, S. (1982). *Residuals and influence in regression*. New York: Chapman and Hall.

Cook, R., & Weisberg, S. (1999). *Applied regression: Computing and graphics*. New York: Wiley.

Cope, B. (2000). *Multiliteracies: literacy learning and the design of social futures*. London: Routledge.

Cope, M. (2009). *Qualitative GIS: a mixed methods approach*. Los Angeles, CA: SAGE.

Cornelius, S., & Gordon, C. (2008). Providing a flexible, learner-centred programme: Challenges for educators. *The Internet and Higher Education, 11*(1), 33-41. doi:10.1016/j.iheduc.2007.11.003

Cox, D. R., & Solomon, P. J. (2003). *Components of variance*. Boca Raton, FL: Chapman & Hall/CRC.

Cox, M. (2004). *Building faculty learning communities*. San Francisco: Jossey-Bass.

Creswell, J. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research.* Upper Saddle River, NJ: Pearson Education.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research*. Los Angeles, CA: Sage.

Creswell, J. (2014). *Research design: Qualitative, quantitative, and mixed method approaches*.

Thousand Oaks, CA: Sage.

Curry, M. (2008). Critical friends groups: The possibilities and limitations embedded in teacher professional communities aimed at instructional improvement and school reform. *Teachers College Record, 110*(4), 182-198.

D'agostino, R. B., & Russell, H. K. (2005). Screen Test. *Encyclopedia of Biostatistics*. *1*(7), 34-53. Hoboken, NJ: Wiley.

Dabbagh, N., & Kitsantas, A. (2012). Personal learning environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning. *Internet and Higher Education, 15*(1), 3-8.

DalBlend. (n.d.). *Redesigning your course for blended learning*. Retrieved June 16, 2014, from http://elab.learningandteaching.dal.ca/blendedlearning/

Davis, N., Roblyer, M. D., Charania, A., Ferdig, R., Harms, C., Compton, L. K. L., & Cho, M. O. (2007). Illustrating the "virtual" in virtual schooling: Challenges and strategies for creating real tools to prepare virtual teachers. *The Internet and Higher Education, 10*(1), 27-39. doi:10.1016/j.iheduc.2006.11.001

de Castell, S., & Jenson, J. (in press). New epistemologies? Rethinking ways of knowing in a digital culture. In P. Trifonas (Ed.), *Digital literacy and new media.* New York: Routledge.

Delaney, A. M. (2008). Why faculty–student interaction matters in the first year experience. *Tertiary Education and Management*, *14*(3), 227–241.

de Millo, R. (2012). *Higher ed lab notebook.* [Web log entry]. Retrieved November 25, 2014, from http://c21u.gatech.edu/news/notebook/10-01-12

Derringer, P. (2009). When free isn't free: The realities of running open source in school. *Technology and Learning, 29*(9), 19-25.

Deutsh, N. (2010). *Instructor experiences with implementing technology in blended learning courses*. Lexington, KY: CreateSpace

De Wever, B., Van Keer, H., Schellens, T., & Valcke, M. (2011). Assessing collaboration in a wiki: The reliability of university students' peer assessment. *The Internet and Higher Education, 14*(4), 201-206. doi:10.1016/j.iheduc.2011.07.003

Díaz, S. R., Swan, K., Ice, P., & Kupczynski, L. (2010). Student ratings of the importance of survey items, multiplicative factor analysis, and the validity of the community of inquiry survey. *The Internet and Higher Education, 13*(1-2), 22-30. doi:10.1016/j.iheduc.2009.11.004

Diez, D., & Barr, C. (2012). *OpenIntro statistics*. Lexington, KY: CreateSpace.

Dimitrov, D. (2009). *Quantitative research in education: Intermediate & advanced methods*. Oceanside, NY: Whittier Publications.

Doering, A., & Veletsianos, G. (2008). What lies beyond effectiveness and efficiency? Adventure learning design. *The Internet and Higher Education, 11*(3-4), 137-144. doi:10.1016/j.iheduc. 2008.07.004

Downes, S. (2004). Educational blogging. *Educause Review, 39*(5), 14–26.

Downes, S. (2015). *New learning, new society*. Paper presented at The Chang School Talks, Toronto, Canada. Retrieved July 14, 2015, from http://www.downes.ca/presentation/354

Duderstadt, J., Atkins, D., & Van Houweling, D. (2002). *Higher education in the digital age: Technology issues and strategies for American colleges and universities*. Westport, CONN: Greenwood Press.

DuFour, R., DuFour, R., Eaker, R., & Many, T. (2010). *Learning by doing: A handbook for professional learning communities at work.* Bloomington, IN: Solution Tree Press.

Dringus, L. P., Snyder, M. M., & Terrell, S. R. (2010). Facilitating discourse and enhancing teaching presence: Using mini audio presentations in online forums. *The Internet and Higher Education, 13*(1-2), 75-77. doi:10.1016/j.iheduc.2009.11.001

Driscoll, M. (2002). Blended learning: Let's get beyond the hype. *Elearning 2*(3), 54.

Drysdale, J. S., Graham, C. R., Spring, K. J., & Halverson, L. R. (2013). An analysis of research trends

in dissertations and theses studying blended learning. *The Internet and Higher Education, 17*, 90-100. doi:10.1016/j.iheduc.2012.11.003

Dziuban, C. D., Hartman, J., & Moskal, P. D. (2004). Blended learning. *Educause Center for Applied Research (7),* 1–12.

Dziuban, C. D., Hartman, J., Juge, F., Moskal, P. D., & Sorg, S. (2006). Blended learning enters the mainstream. In C. J. Bonk, & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs (*pp. 195–208). San Francisco, CA: Pfeiffer.

Dziuban, C. D., Moskal, P. D., Bradford, G. R., Brophy-Ellison, J., & Groff, A. T. (2010). Constructs that impact the net generation's satisfaction with online learning. In R. Sharpe, H. Beetham, & S. De Freitas (Eds.), *Rethinking learning for a digital age: How learners are shaping their own experiences.* New York: Routledge.

e-Learning Working Group. (2010). *e-Learning business case for York University (occasional report)*. Toronto, ON: Institute for Research on Learning Technologies. Retrieved September 15, 2012, from http://irlt.yorku.ca/reports/E-learningcasefinalversion.pdf.

Edmondson, A. (2012). *Teaming: How organizations learn, innovate, and compete in the knowledge economy*. San Francisco, CA: Jossey-Bass.

Ehlers, U. (2010). *Open learning cultures: A guide to quality, evaluation, and assessment for future learning*. New York: Springer.

Ellis, R. (2009). *Field guide to learning management systems.* Alexandria, VA: American Society for Training & Development (ASTD).

Entwistle, N. J. (2000). Approaches to studying and levels of understanding: The influences of teaching and assessment. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research, XV* (pp. 156–218). New York: Agathon.

Eom, S. (2006). The role of instructors as a determinant of students' satisfaction in university online education. In *Proceedings of the Sixth IEEE International Conference on Advanced Learning*

Technologies – ICALT (pp. 985–988). Washington, DC: IEEE Computer Society.

Exter, M. E., Wang, Y., Exter, M., & Damico, J. (2009). Designing a tool to support critical web reading. *TechTrends, 53*(1), 23-28.

Fadel, C. (2008). 21st century skills: How can you prepare students for the new global economy? Retrieved May 15, 2015, from http://www.oecd.org/site/educeri21st/40756908.pdf

Fahrmeir, L., & Tutz, G. (1994). *Multivariate statistical modelling based on generalized linear models*. New York: Springer-Verlag.

Fairlie, R. (2005). *Are we really a nation online: Ethnic and racial disparities in access to technology and their consequences.* Report for the Leadership Conference on Civil Rights Education Fund, Washington, DC.

Fairlie, R. (2004). Race and the digital divide. *Contributions in Economic Analysis & Policy, 3*(1), 3-9.

Farley, A., Jain, A., & Thomson, D. (2011). Blended learning in finance: Comparing student perceptions of lectures, tutorials and online learning environments across different year levels. *Economic Papers*, *30*(1), 99–108.

Felea, C. (2013). Blended Learning and ICT Integration in Higher Education. *Studia UBB Philologia, 18*(2), 7-21.

Fenwick, T. (2013). Work and learning: Perspectives from Canadian adult educators. In T. Nesbit, S. M. Brigham & N. Taber (Eds.), *Building on Critical Traditions: Adult Education and Learning in Canada.* Toronto: Thompson

Flavell, J. (1979). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist, (2)*1, 906-911.

Fleck, J. (2012). Blended learning and learning communities: Opportunities and challenges. *The Journal of Management Development*, *31*(4), 398–411.

Foundation Coalition. (2002). *Peer assessment and peer evaluation.* Retrieved May 10, 2015, from http://www.foundationcoalition.org/publications/ brochures/2002peer_assessment.pdf

Foray, D., & Lundvall, B. (1996). *The knowledge-based economy: From the economics of knowledge to the learning economy*. Aalborg University: Department of Business Studies.

Foray, D. (2004). *Economics of knowledge*. Cambridge, MASS: MIT Press.

Foray, D. (2009). *The new economics of technology policy*. Cheltenham, UK: Edward Elgar.

The Partnership for 21st Century Skills. (2011). *Framework for 21st century learning.* Retrieved September 10, 2014 from http://www.p21.org/about-us/p21-framework

Frand, J. (2000). The information-age mindset: Changes in students and implications for higher education. *Educause Review, 35,* 14-24.

Frane, A. (2015). Power and type I error control for univariate comparisons in multivariate two-group designs. *Multivariate Behavioural Research, 50*(3), 233-247. doi:10.1080/00273171.2014.968836.

Franklin, U. (1999). *The real world of technology*. New York: House of Anansi Press.

Fraser, K. (2014). *The future of learning and teaching in next generation learning spaces*. Bradford: Emerald Group Publishing Limited.

Frechette, J. (2002). *Developing media literacy in cyberspace pedagogy and critical learning for the twenty-first-century classroom*. Westport, CONN: Praeger.

Fried, J. (2012). *Transformative learning through engagement: Student affairs practice as experiential pedagogy*. Sterling, VA: Stylus.

Fripp G. (2014). *Understanding perceptual maps for marketing.* Retrieved October 4, 2014 from http://www.perceptualmaps.com/free-templates/multidimensional-perceptual-maps/multi-attribute-perceptual-maps/

Fuller, W.A. (2009). *Sampling Statistics*. Hoboken, NJ: Wiley.

Fung, H., & Yuen, A. (2012). Factors affecting students' and teachers' use of LMS – Towards a holistic framework. In S. Cheung (2012), *Proceedings from: Blended learning 5th International Conference.* Berlin: Springer.

Furnham, A. (1986). Response bias, social desirability and dissimulation. *Personality and Individual Differences 7*(3)*,* 385-400.

Galileo Educational Network. (2011). *What is inquiry?* Retrieved September 14, 2014, from http:// www.galileo.org /inquiry-what.html

Gallagher, S., & Berking, P. (2013). *Choosing a LMS*. Orlando, FL: Advanced Distributed Learning Co-Laboratories.

Garner, J. K., & Bol, L. (2011). T*he challenges of e-learning initiatives in supporting students with self-regulated learning and executive function difficulties.* Paper presented at the International Congress for School Effectiveness and Improvement (ICSEI), Limassol, Cyprus. Retrieved November 11, 2015, from http://www.icsei.net/icsei2011/fullpapers.

Garrison, D. (2007). Social, cognitive, and teacher presence issues. *Journal of Asynchronous Learning Networks, 11*(1), 61-72.

Garrison, D. R. (2011). *E-Learning in the 21st century: A framework for research and practice*. London: Routledge/Taylor and Francis.

Garrison, D.R., & Anderson, T. (2003). *E-learning in the 21st century: A framework for research and practice.* London: Routledge.

Garrison, D., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2-3), 87-105. doi:10.1016/S1096-7516(00)00016-6

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education*.

Garrison, D. R., Anderson, T., & Archer, W. (2010). The first decade of the community of inquiry framework: A retrospective. *The Internet and Higher Education, 13*(1-2), 5-9. doi:10.1016/j.iheduc.2009.10.003

Garrison, D. R., & Akyol, Z. (2013). Toward the development of a metacognition construct for

communities of inquiry. *The Internet and Higher Education, 17*, 84-89. doi:10.1016/j.iheduc.2012.11.005

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *The Internet and Higher Education, 10*(3), 157-172. doi:10.1016/j.iheduc.2007.04.001

Garrison, D. R., & Archer, W. (2000). *A transactional perspective on teaching and learning: A framework for adult and higher education.* Oxford, UK: Pergamon.

Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: Interaction is not enough. *American Journal of Distance Education, 19*(3)*,* 133–148.

Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *The Internet and Higher Education, 13*(1-2), 31-36. doi:10.1016/j.iheduc.2009.10.002

Garrison, D. R., & Kanuka, H. (2004) Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education, 7*(2), 95-105.

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco: Jossey-Bass.

Garrison, D. R., & Vaughan, N. D. (2013). Institutional change and leadership associated with blended learning innovation: Two case studies. *The Internet and Higher Education, 18*, 24-28. doi:10.1016/j.iheduc.2012.09.001

Gee, J. P. (2013). *The anti-education era: Creating smarter students through digital learning*. New York: Palgrave McMillan.

Gee, J.P. (2003). What video games have to teach us about learning and literacy. *Situated Meaning & Learning, 3*(2)*,* 73-113

Gelman, A. (2005). Analysis of variance: Why it is more important than ever. *The Annals of Statistics*

33(1), 1–53. doi:10.1214/009053604000001048.

Georgakopoulos, H. (2015). *Quantitative trading with R: Understanding mathematical and computational tools from a quant's perspective*. New York: Palgrave Macmillan.

Georgina, D. A., & Olson, M. R. (2008). Integration of technology in higher education: A review of faculty self-perceptions. *The Internet and Higher Education, 11*(1), 1-8. doi:10.1016/j.iheduc.2007.11.002

Gibb, T., & Walker, J. (2013). Knowledge economy discourse and adult education in Canada: A policy analysis. In *Building on Critical Traditions: Adult Education and Learning in Canada.* Toronto: Thompson Educational Publishing.

Gibbs, G. (2006). How assessment frames student learning. In C. Bryan, & K. Clegg (Eds.), *Innovative assessment in higher education* (pp. 23–36). London, UK: Routledge.

Gibbs, G., & Simpson, C. (2004). Conditions under which assessment supports students' learning. *Learning and Teaching in Higher Education, 1,* 3–31.

Gibson, C. (2006). *Student engagement and information literacy*. Chicago: American Library Association.

Gikandi, J., Morrow, D., & Davis, N. (2011). Online formative assessment in higher education: A review of the literature. *Computers and Education, 57,* 2333-2351.

Gilbert, L., Whitelock, D., & Gale, V. (2011). *Synthesis report on assessment and feedback with technology enhancement.* York, UK: The Higher Education Academy.

Gilder, G. (2013). *Knowledge and power: The information theory of capitalism and how it is revolutionizing our world*. Salem, NJ: Regnery.

Ginns, P., & Ellis, R. (2007). Quality in blended learning: Exploring the relationships between on-line and face-to-face teaching and learning. *The Internet and Higher Education, 10*(1), 53-64. doi:10.1016/j.iheduc.2006.10.003

Ginsberg, B. (2011). *The fall of the faculty: The rise of the all-administrative university and why it*

matters. New York: Oxford University Press.

Glaser, C W., Rieth, H. J., Kinzer, C. K., Colburn, L. K., & Peter, J. (1999). A description of the impact of multimedia anchored instruction on classroom interactions. *Journal of Special Education Technology, 14*(2), 27-43.

Glass, G., & Stanley, J. (1995). *Statistical methods in education and psychology*. Boston, MASS: Pearson Allyn & Bacon.

Glazer, F. (2012). *Blended learning across the disciplines, across the academy*. Sterling, VA: Stylus.

Goertzen, P., & Kristjansson, C. (2007). Interpersonal dimensions of community in graduate online learning: Exploring social presence through the lens of systemic functional linguistics. *The Internet and Higher Education, 10*(3), 212-230. doi:10.1016/j.iheduc.2007.06.005

Goodfellow, R. (2009). *Learning cultures in online education*. London: Continuum International.

Goodyear, P. (2004). *Advances in research on networked learning*. Boston: Kluwer Academic.

Gorard, S. (2008). *Quantitative research in education*. Los Angeles, CA: SAGE.

Gorsky, P., Caspi, A., & Trumper, R. (2006). Campus-based university students' use of dialogue. *Studies in Higher Education, 31*(1), 71–87.

Gosper, M. (2013). *Curriculum models for the 21st century: Using learning technologies in higher education*. New York: Springer.

Graham, A. (2003). *Statistics*. Blacklick, Ohio: McGraw-Hill.

Graham, C. R. (2006). Blended learning systems: Definition, current trends, and future direction. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 3-21). San Francisco: Pfeiffer.

Graham, C.R., Dzuiban, C. (2008). Blended learning environments. In J. Spector, D. Merrill, J. Van Merriënboer, & M. Driscoll (Eds.), *Handbook of research on educational communications and technology* (pp. 269-276). New York: Lawrence Erlbaum.

Graham, C. R., Woodfield, W., & Harrison, J. B. (2013). A framework for institutional adoption and

implementation of blended learning in higher education. *Internet and Higher Education, 18,* 4-14.

Green, S. B., & Salkind, N. J. (2011). *Using SPSS for Windows and Macintosh: Analyzing and Understanding Data (6th ed.).* Upper Saddle River, NJ: Prentice Hall.

Greenhow, C., Robelia, B., & Hughes, J. E. (2009). Web 2.0 and classroom research: What path should we take now? *Educational Researchers, 38*(4), 246-259.

Greenstein, L. (2012). *Assessing 21st century skills: A guide to evaluating mastery and authentic learning*. Thousand Oaks, CA: Corwin Press.

Griffin, P. (2012). *Assessment and teaching of 21st century skills*. Dordrecht: Springer.

Glazer, F. (2011). *Blended learning*. Sterling, VA: Stylus.

Grayson, K., & Rust, R. (2001). Interrater Reliability. *Journal of Consumer Psychology, 10*(1&2), 71-73.

Gross, J. (2003). *Linear regression*. Berlin: Springer.

Gubbins, C., & MacCurtain, S. (2008). Understanding the dynamics of collective learning: The role of trust and social capital. *Advances in Developing Human Resources, 10*(4), 578-599. doi:10.1177/1523422308320372

Gunawardena, C. N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International journal of educational telecommunications, 1*(2/3), 147-166.

Gunawardena, C. & Zittle, F. (1997). Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *American Journal of Distance Education, 11,* 8-26.

Guo, R. X., Dobson, T., & Petrina, S. (2008). Digital natives, digital immigrants: An analysis of age and ICT competency in teacher education. *Journal of Educational Computing Research, 38*(3), 235-254.

Guri-Rosenblit, S. (2009). *Digital technologies in higher education: Sweeping expectations and actual*

effects. New York: Nova Science.

Gutiérrez-Santiuste, E., Rodríguez-Sabiote, C., Gallego-Arrufat, M. J. (2015). Cognitive presence through social and teaching presence in communities of inquiry: A correlational-predictive study. *Internet and Higher Education, 3*(31), 349-362

Haase, R. (2011). *Multivariate general linear models.* Thousand Oaks, CA: Sage.

Hachey, A. C., Wladis, C., & Conway, K. (2015). Prior online course experience and G.P.A. as predictors of subsequent online STEM course outcomes. *The Internet and Higher Education, 25*, 11-17. doi:10.1016/j.iheduc.2014.10.003

Hadjerrouit, S. (2008). Towards a blended learning model for teaching and learning computer programming: A case study. *Informatics in Education, 7*(2), 181–210.

Hadwin, A., Jarvela, S., & Miller, M. (2011). Self-regulation, co-regulation, and socially shared regulation of learning. In B. J. Zimmerman, & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 65–84). New York: Routledge.

Hadwin, A., & Oshige, M. (2011). Self-regulation, co-regulation, and socially shared regulation: Exploring perspectives of social in self-regulated learning theory. *Teachers College Record, 113*(2), 240–264.

Häkkinen, P., & Hämäläinen, R. (2012). Shared and personal learning spaces: Challenges for pedagogical design. *The Internet and Higher Education, 15*(4), 231-236. doi:10.1016/j.iheduc.2011.09.001

Halverson, L. R., Graham, C. R., Spring, K. J., Drysdale, J. S., & Henrie, C. R. (2014). A thematic analysis of the most highly cited scholarship in the first decade of blended learning research. *The Internet and Higher Education, 20*, 20-34. doi:10.1016/j.iheduc.2013.09.004

Hamerly, D. (2012). *Review of: Inequity in the technopolis – Race, class, gender, and the digital divide in Austin.* Austin: University of Texas Press.

Hamid, S., Waycott, J., Kurnia, S., & Chang, S. (2015). Understanding students' perceptions of the

benefits of online social networking use for teaching and learning. *The Internet and Higher Education, 26*, 1-9. doi:10.1016/j.iheduc.2015.02.004

Hamza-Lup, F. G., & Stanescu, I. A. (2010). The haptic paradigm in education: Challenges and case studies. *The Internet and Higher Education, 13*(1-2), 78-81. doi:10.1016/j.iheduc.2009.12.004

Hargittai, E. (2002). Second-level digital divide: Differences in people's online skills. *First Monday, 7*(4), 12-18.

Hargittai, E., & Shaver, S. (2006). Differences in actual and perceived online skills: The role of gender. *Social Science Quarterly*, *87*(2), 432-448.

Harper, S. (2009). *Student engagement in higher education: Theoretical perspectives and practical approaches for diverse populations*. New York: Routledge.

Harper, K. A., & DeWaters, J. (2008). A quest for website accessibility in higher education institutions. *The Internet and Higher Education, 11*(3-4), 160-164. doi:10.1016/j.iheduc.2008.06.007

Harrington, R., & Loffredo, D. A. (2010). MBTI personality type and other factors that relate to preference for online versus face-to-face instruction. *The Internet and Higher Education, 13*(1-2), 89-95. doi:10.1016/j.iheduc.2009.11.006

Harris, P., Connolly, J. F., & Feeney, L. (2009). Blended learning: Overview and recommendations for successful implementation. *Industrial and Commercial Training*, *41*(3), 155–163.

Hartley, P. (2005). *Enhancing teaching in higher education: New approaches for improving student learning*. London: Routledge.

Hartman, J. (2010). The Promise and Practice of Blended Learning. Retrieved November 11, 2015, from http://hosted.mediasite.com/mediasite/Viewer/?peid=b093b6024bb349feae7ba771bd29d9b61d

Hartwell, R., & Barkley, E.F. (2012). Blended with a twist. In F. Glazer (2012), *Blended learning across the disciplines, across the academy* (pp. 115-126). Sterling, VA: Stylus.

Hassard, J., Law, J., & Lee, N. (1999). Preface. *Organization: Special Issue on Actor-Network Theory.*

6(3), pp. 387-390.

Hattie, J. (2009). Visible learning: A synthesis of over 800 meta-analyses relating to achievement. New York: Routledge.

Hedberg, J., & Corrent-Agostinho, S. (1999). Creating a postgraduate virtual community: Assessment drives learning. In B. Collis, & R. Oliver (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications* (pp. 1093–1098). Chesapeake, VA: Open Access.

Hiebert, J., Gallimore, R., & Stigler, J. W. (2002). A knowledge base for the teaching profession: What would it look like and how can we get one? *Educational Researcher, 31*(5), 315.

Hildreth, P. M. (2004). *Knowledge networks innovation through communities of practice*. Hershey, PA: Idea Group.

Hilton, M. (2002). *Enhancing undergraduate learning with information technology: A workshop summary*. Washington, D.C: National Academy Press.

Hixon, E., Buckenmeyer, J., Barczyk, C., Feldman, L., & Zamojski, H. (2012). Beyond the early adopters of online instruction: Motivating the reluctant majority. *The Internet and Higher Education, 15*(2), 102-107. doi:10.1016/j.iheduc.2011.11.005

Ho, C. H., & Swan, K. (2007). Evaluating online conversation in an asynchronous learning environment: An application of Grice's cooperative principle. *The Internet and Higher Education, 10*(1), 3-14. doi:10.1016/j.iheduc.2006.11.002

Hodgson, V. (2014). *The design, experience and practice of networked learning*. New York: Springer.

Holmfeld, L. (2012). *Exploring the theory, pedagogy and practice of networked learning*. New York: Springer.

Holmes, A., Polhemus, L., & Jennings, S. (2005). CATIE: A blended approach to situated professional development. *Journal of Educational Computing Research, 32*(4), 381−394.

Holsti, O.R. (1969). *Content Analysis for the Social Sciences and Humanities*. Reading, MA: Addison-

Wesley.

Hooks, B. (2009). *Belonging. A Culture of Place*. NY.: Routledge.

Hopkins, W. (2000). *New view of statistics: Type I & II errors*. Retrieved April 22, 2015, from http://www.sportsci.org/resource/stats/errors.html

Horvat, A., Dobrota, M., Krsmanovic, M., & Cudanov, M. (2013). Student perception of Moodle learning management system: A satisfaction and significance analysis. *Interactive Learning Environments, 23*(4), 515-527.

Hricko, M. (2006). *Online assessments and measurement foundations and challenges*. Hershey, PA: Information Science Pub.

Huang, W. D., Hood, D. W., & Yoo, S. J. (2013). Gender divide and acceptance of collaborative web 2.0 applications for learning in higher education. *The Internet and Higher Education, 16*, 57-65. doi:10.1016/j.iheduc.2012.02.001

Hughes, M., Ventura, S., & Dando, M. (2007). Assessing social presence in online discussion groups: A replication study. *Innovations in Education and Teaching International, 44*(1), 17-29.

Hsu, L. L. (2011). Blended learning in ethics education: A survey of nursing students. *Nursing Ethics*, *18*(3), 418–430.

Ice, P., Curtis, R., Phillips, P., & Wells, J. (2007). Using asynchronous audio feedback to enhance teaching presence and students' sense of community. *Journal of Asynchronous Learning Networks, 11*(2), 3–25.

Im, Y., & Lee, O. (2004). Pedagogical implications of online discussion for preservice teacher training. *Journal of Research on Technology in Education*, *36*, 155-170.

Ioannidis, J. (2007). Limitations are not properly acknowledged in the scientific literature. *Journal of Clinical Epidemiology, 60,* 324-329.

Irving, K. E. (2006). The impact of technology on the 21st century classroom. In J. Rhoton, & P. Shane, (Eds.), *Teaching science in the 21st century.* Arlington, VA: National Science Teachers

Association.

Islam, A. N. (2013). Investigating e-learning system usage outcomes in the university context. *Computers & Education*, *69*, 387-399.

Izenman, A. (2008). *Modern multivariate statistical techniques regression, classification, and manifold learning*. New York: Springer.

Jaccard, J., Becker, M. A., & Wood, G. (1984). Pairwise multiple comparison procedures: A review. *Psychological Bulletin 96*(3), 589. doi:10.1037/0033-2909.96.3.589.

Hayter, A. J. (1986). The maximum family wise error rate of Fisher's least significant difference test. *Journal of the American Statistical Association 81*(396), 1000–1004. doi:10.2307/2289074.

Jackson, L., Zhao, Y., Kolenic, A., Fitzgerald, H., Harold, R., & Eye, A. (2008). Race, gender, and information technology use: The new digital divide. *CyberPsychology & Behaviour, 11*(4), 437-442.

Jefferies, A., & Hyde, R. (2010). Building the future students' blended learning: Experiences from current research findings. *Electronic Journal of e-Learning, 8*(2), 133-140.

Jenkins, H., Ford, S., & Green, J. (2013). *Spreadable media creating value and meaning in a networked culture*. New York: University Press.

Jenkins, H. (2003). *Democracy and new media*. Cambridge, MASS: MIT Press.

Jenkins, H. (2006a). *Convergence culture: Where old and new media collide*. New York: New York University Press.

Jenkins, H. (2006b). *Fans, bloggers, and gamers: Exploring participatory culture*. New York: New York University Press.

Jenson, J., Fisher, S., & de Castell, S. (2011a). Tactics, confidence & leadership: Gender, play & performance. *International Journal of Gender, Science and Technology*, *3*(1), 146-169.

Jenson, J., & Fisher, S. (2011b). *Critical review and analysis of the issue of "skills, technology and learning" final report*. Ottawa, ON: Ontario Ministry of Education.

Johnson, L., Adams Becker, S., Estrada, V., and Freeman, A. (2015). NMC Horizon

Morrison, R. (2011). A comparison of online versus traditional student end-of-course critiques in resident courses. *Assessment & Evaluation in Higher Education, 36*(6), 627-641.

Johnson-Bailey, J., Baumgartner, L. M., & Bowles, T. A. (2010). Social justice in adult and continuing education: Labouring in the fields of reality and hope. In C. E. Kasworm, A. D. Rose, & J. M. Ross-Gordon (Eds.), *Handbook of adult and continuing education* (pp. 339-349). Los Angeles, CA: Sage.

Johnson, D. W., Johnson, R. T., & Smith, K. A. (1991). *Cooperative learning: Increasing college faculty instructional productivity.* ASHE–FRIC Higher Education Report No. 4. Washington, D.C: George Washington University.

Johnson, L., Levin, A., Smith, R., & Stone, S. (2010) *The 2010 horizon report*. Austin, TX: The New Media Consortium. Retrieved from www.nmc.org/pdf/2010-Horizon-Report.pdf.

Jones, C. (2015). *Networked learning: An educational paradigm for the age of digital networks.* New York: Springer.

Jones, S., Johnson-Yale, C., Millermaier, S., & Pérez, F. S. (2008). Academic work, the internet and U.S. college students. *The Internet and Higher Education, 11*(3-4), 165-177. doi:10.1016/j.iheduc.2008.07.001

Jones, C., & Shao, B. (2011). *The net generation and digital natives: Implications for higher education.* Milton Keynes: Open University/Higher Education Academy.

Jonsson, A., & Svingby, G. (2007). The use of scoring rubrics: Reliability, validity and educational consequences. *Educational Research Review,* (2), 130-144.

Joreskog, K. G. (2016). *Multivariate analysis with lisrel*. S.l.: Springer.

Kahin, B., & Foray, D. (2006). *Advancing knowledge and the knowledge economy*. Cambridge, MASS: MIT Press.

Kale, U. (2008). Levels of interaction and proximity: Content analysis of video-based classroom cases.

The Internet and Higher Education, 11(2), 119-128. doi:10.1016/j.iheduc.2008.06.004

Kaleta, R., Skibba, K., & Joosten, T. (2007). Discovering, designing, and delivering courses. In A. G. Picciano, & C. D. Dziuban (Eds.), *Blended Learning: Research Perspectives* (pp. 111–144). Needham, MA: Sloan Consortium.

Källkvist, M., Gomez, S., Andersson, H., & Lush, D. (2009). Personalized virtual learning spaces to support undergraduates in producing research reports: Two case studies. *The Internet and Higher Education, 12*(1), 35-44. doi:10.1016/j.iheduc.2008.10.004

Kalton, G, Schuman, H. (1982). The effect of the question on survey responses: a review. *J. R. statist. Soc. 154*. 42-73

Kane, R., & Francis, A. (2013). Preparing teachers for professional learning: Is there a future for teacher education in new teacher induction? *Teacher Development, 17*(3), 362-379.

Kanuka, H. (2005). An exploration into facilitating higher levels of learning in a text-based Internet learning environment using diverse instructional strategies. *Journal of Computer-Mediated Communication, 10*(3), 89-97.

Kaplan, D. (2008). *Structural equation modelling: Foundations and extensions*. London: SAGE.

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons, 53*(1), 59–68.

Karpova, E., Correia, A., & Baran, E. (2009). Learn to use and use to learn: Technology in virtual collaboration experience. *The Internet and Higher Education, 12*(1), 45-52. doi:10.1016/ j.iheduc.2008.10.006

Kats, Y. (2013). *Learning management systems and instructional design best practices in online education*. Hershey, PA: IGI Global.

Ke, F., & Xie, K. (2009). Toward deep learning for adult students in online courses. *The Internet and Higher Education, 12*(3-4), 136-145. doi:10.1016/j.iheduc.2009.08.001

Kear, K., Woodthorpe, J., Robertson, S., & Hutchison, M. (2010). From forums to wikis: Perspectives

on tools for collaboration. *The Internet and Higher Education, 13*(4), 218-225. doi:10.1016/j.iheduc.2010.05.004

Keen, A. (2007). *The cult of the amateur: How today's Internet is killing our culture.* New York: Doubleday.

Keeping College Within Reach: Improving higher education through innovation: Hearing before the Committee on Education and the Workforce. U.S. House of Representatives. 113th Cong. 1. (2013). Washington, D.C: U.S Government Printing Office.

Kelly, H. F., Ponton, M. K., & Rovai, A. P. (2007). A comparison of student evaluations of teaching between online and face-to-face courses. *The Internet and Higher Education, 10*(2), 89-101. doi:10.1016/j.iheduc.2007.02.001

Kember, D., McNaught, C., Chong, F. C., Lam, P., & Cheng, K. F. (2010). Understanding the ways in which design features of educational websites impact upon student learning outcomes in blended learning environments. *Computers in Education*, 55, 1183–1192.

Kennedy, D. M. (2005). Challenges in evaluating Hong Kong students' perceptions of Moodle. In *The Australasian Society for Computers in Learning in Tertiary Education Conference (ASCILITE) 2005.* (pp. 327-336). Proceedings of the 22nd Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education, Brisbane, Australia: Australasian Society for Computers in Learning in Tertiary Education.

Keppell, M., Souter, K., & Riddle, M. (2012). *Physical and virtual learning spaces in higher education concepts for the modern learning environment*. Hershey, PA: Information Science Reference.

Kerschenbaum, S. (2009). *LMS selection best practices.* Indianapolis, IN: Adyana.

Kim, H. (2011). Exploring freshmen preservice teachers' situated knowledge in reflective reports during case-based activities. *The Internet and Higher Education, 14*(1), 10-14. doi:10.1016/j.iheduc.2010.03.005

Kim, J., Kwon, Y., & Cho, D. (2011). Investigating factors that influence social presence and learning

outcomes in distance higher education. Computers in Education, *57*(2), 1512–1520.

Kim, M. K., Kim, S. M., Khera, O., & Getman, J. (2014). The experience of three flipped classrooms in an urban university: An exploration of design principles. *The Internet and Higher Education, 22*(Complete), 37-50. doi:10.1016/j.iheduc.2014.04.003

Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers*. New York: Associated Press.

Knowles, M. S. (1986). *Using learning contracts.* San Francisco: Jossey-Bass.

Knutsson, O., Blåsjö, M., Hållsten, S., & Karlström, P. (2012). Identifying different registers of digital literacy in virtual learning environments. *The Internet and Higher Education, 15*(4), 237-246. doi:10.1016/j.iheduc.2011.11.002

Koerts, J., & Abrahamse, A. (1969). *The correlation coefficient in the general linear model.* Rotterdam: Econometric University.

Kolb, D. (1984). *Experiential learning: experience as the source of learning and development.* Eaglewood Cliffs, NJ: Prentice Hall.

Kop, R. (2011). The challenges to connectivist learning on open online networks: Learning experiences during a massive open online course. *International Review of Research in Open and Distance Learning, 12*(3), 19-39.

Kowalewski, M.J., & Tye, J.B. (1990). *Statistical sampling: Past, present, and future theoretical and practical.* Philadelphia, PA: ASTM.

Korr, J., Derwin, E. B., Greene, K., & Sokoloff, W. (2012). Transitioning an adult-serving university to a blended learning model. *The Journal of Continuing Higher Education, 60*(1), 2–11.

Kozan, K., & Richardson, J. C. (2014). Interrelationships between and among social, teaching, and cognitive presence. *The Internet and Higher Education, 21*, 68-73. doi:10.1016/j.iheduc.2013.10.007

Kreijns, K., Kirschner, P. A., & Jochems, W. (2003). Identifying the pitfalls for social interaction in

computer-supported collaborative learning environments: A review of the research. *Computers in Human Behaviour, 19*(3), 335–353.

Kress, G., & Selander, S. (2012). Multimodal design, learning and cultures of recognition. *The Internet and Higher Education, 15*(4), 265-268. doi:10.1016/j.iheduc.2011.12.003

Krippendorff, K. (2004). *Content analysis: An introduction to its methodology*. Beverly Hills: Sage Publications.

Krippendorff, K. (2006). *The semantic turn: A new foundation for design*. Boca Raton: Taylor & Francis.

Kuh, G. D., Kinzie, J., Scuh, J. H., Whitt, E. J., & Associates. (2005). *Student success in college.* San Francisco: Jossey-Bass.

Kukulska-Hulme, A. (2012). How should the higher education workforce adapt to advancements in technology for teaching and learning? *The Internet and Higher Education, 15*(4), 247-254. doi:10.1016/j.iheduc.2011.12.002

Kuswara, A., Cram, A., & Reynolds, D. (2008). *Web 2.0 supported collaborative learning activities: Towards an affordance perspective.* Proceedings of the 3rd International LAMS & Learning Design Conference 2008 (pp. 70–80). Retrieved March, 2, 2015, from http://lams2008sydney.lamsfoundation.org/refereedpapers.html

Kvavik, R. B., & Caruso, J. B. (2005). *ECAR study of students and information technology, 2005: Convenience, connection, control, and learning.* Boulder, CO: Educause Center for Applied Research. Retrieved from https://net.educause.edu/ir/library/pdf/ERS0506/ekf0506.pdf

Ladson-Billings, G. (1997). I know why this doesn't feel empowering: A critical r*ace a*nalysis of critical pedagogy. In P. Freire (Ed.), *Mentoring the mentor: A critical dialogue with Paulo Freire* (pp. 127-142). New York: Peter Lang.

Lai, Y. C., & Ng, E. M. W. (2011). Using wikis to develop student teachers' learning, teaching, and assessment capabilities. *The Internet and Higher Education, 14*(1), 15-26.

doi:10.1016/j.iheduc.2010.06.001

Lambert, J., & Gong, Y. (2010). 21st century paradigms for pre-service teacher technology preparation. *Computers in the Schools, 27*(1), 54-70.

Lankshear, C., & Knobel, M. (2006). *New literacies: Everyday practices and classroom learning*. Maidenhead: Open University Press.

Latour, B. (1987). *Science in action: How to follow scientists and engineers through society.* Cambridge: Harvard University Press.

Latour, B. (2005). *Reassembling the social: An introduction to Actor-Network-Theory.* New York: Oxford University Press.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Law, J. (1992). Notes on the theory of the actor-network: Ordering, strategy, and heterogeneity. *Systems Practice, 5*(4), 379-393.

Leadbeater, W., et al. 2013. Evaluating the use and impact of lecture recording in undergraduates: Evidence for distinct approaches by different groups of students. *Computers & Education*, *61*, pp.185–192.

Lee, J. M., & Lee, Y. (2006). Personality types and learners' interaction in web-based threaded discussion. *Quarterly Review of Distance Education, 7*(1), 83-94.

Lee, S. (2014). The relationships between higher order thinking skills, cognitive density, and social presence in online learning. *The Internet and Higher Education, 21*, 41-52. doi:10.1016/j.iheduc.2013.12.002

Lee, N., & Brown, S. (1994). Otherness and the actor network: The undiscovered continent. *American Behavioral Scientist, 36*(6), 772- 790.

Lee, O. and Im, Y. (2006). The emergence of the cyber-university and blended learning in Korea. In C. J. Bonk, & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local*

*designs (*pp. 281–295). San Francisco, CA: Pfeiffer Publishing.

Lee, S. J., Srinivasan, S., Trail, T., Lewis, D., & Lopez, S. (2011). Examining the relationship among student perception of support, course satisfaction, and learning outcomes in online learning. *The Internet and Higher Education, 14*(3), 158-163. doi:10.1016/j.iheduc.2011.04.001

Lefoe, G. and Hedberg, J. G. (2006). Blending on and off campus: A tale of two cities. In C. J. Bonk, & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs (*pp. 325–337). San Francisco, CA: Pfeiffer Publishing.

Leger, A., Godlewska, A., Adjei, J., Schaefli, L., Whetstone, S., Finlay, J., … & Massey, J. (2013). *Large first-year course re-design to promote student engagement and student learning*. Toronto: Higher Education Quality Council of Ontario.

Lehmann, W. (2009). University as vocational education: Working-class students' expectations for university. *British Journal of Sociology of Education, 30*(2), 137-149.

Lemeshow, S., & Levy, P. S. (1991). *Sampling of populations: Methods and applications.* New York: Wiley.

Lenhart, A., Purcell, K., Smith. A., & Zickuhr, K. (2010). *Social media and mobile internet use among teens and young adults.* Washington, D.C: Pew Internet & American Life Project.

Lessig, L. (2004). *Free culture: How big media uses technology and the law to lock down culture and control creativity*. New York: Penguin Press.

Lessig, L. (2008). *Remix: Making art and commerce thrive in the economy*. New York: Penguin Press.

Leuf, B., & Cunningham, W. (2001). *The wiki way: Quick collaboration on the web.* New York: Addison-Wesley.

Levin, I. (1999). *Relating statistics and experimental design an introduction*. Thousand Oaks, CA: Sage.

Leydesdorff, L. (2006a). *The knowledge based economy: Modeled, measured, simulated*. Boca Raton, FL: Universal.

Leydesdorff, L. (2006b). *Triple helix indicators of knowledge-based innovation systems: Special issue*. Amsterdam: Elsevier.

Lim, C. P. (2013). Strengthening the research-practice nexus: A special issue as a springboard for building the capacity of teacher education institutions in Asia. *The Internet and Higher Education, 16*, 32-35. doi:10.1016/j.iheduc.2011.10.005

Lim, C. P., & Lee, J. C. (2014). Teaching e-portfolios and the development of professional learning communities (PLCs) in higher education institutions. *The Internet and Higher Education, 20*, 57-59. doi:10.1016/j.iheduc.2013.10.002

Lim, D. H., Morris, M. L., & Kupritz, V. W. (2006). Online vs. blended learning: Differences in instructional outcomes and learner satisfaction. *Journal of Asynchronous Learning Networks, 11*(2), 27–42.

Lin, G. Y. (2004). *Social presence questionnaire of online collaborative learning: Development and validity.* Paper presented at the annual meeting of the Association for Educational Communications and Technology, Chicago, IL.

Lin, Q. (2008). Student satisfactions in four mixed courses in elementary teacher education program. *The Internet and Higher Education, 11*(1), 53-59. doi:10.1016/j.iheduc.2007.12.005

Lin, W. S., & Wang, C. H. (2012). Antecedences to continued intentions of adopting e-learning systems in blended learning instruction: A contingency framework based on models of information system success and task-technology fit. *Computers in Education, 58*, 88–99.

Lipman, M. (2003). *Thinking in education*. Cambridge, UK: Cambridge University Press.

Livingstone, D.W. (2001). *Adults' informal learning: Definitions, findings, gaps and future research.* WALL Working Paper No.21, Toronto: Centre for the Study of Education and Work.

Lloyd, L. (2005). *Best technology practices in higher education*. Medford, N.J: Information Today.

Lo, C. C. (2010). How student satisfaction factors affect perceived learning. *Journal of the Scholarship of Teaching and Learning, 10*(1), 47–54.

Lockard, J. (2007). *Brave new classrooms: Democratic education & the internet*. New York: Lang.

Lonn, S., & Teasley, S. D. (2009). Podcasting in higher education: What are the implications for teaching and learning? *The Internet and Higher Education, 12*(2), 88-92. doi:10.1016/j.iheduc.2009.06.002

López-Pérez, M. V., Pérez-López, M. C. & Rodríguez-Ariza, L. (2011). Blended learning in higher education: Perceptions in relation to outcomes. *Computers & Education, 56*(3), 818-826.

Lotherington, H. & Chow, S. (2006). Rewriting Goldilocks in the urban, multicultural elementary school. *The Reading Teacher*, *60*(3), 244-252.

Lowenthal, P. R. (2012). *Social presence: What is it? How do we measure it?* (Doctoral dissertation). University of Colorado Denver, Denver, Colorado.

Lowenthal, P. (2010). Social Presence. In *Social Computing: Concepts, methodologies, tools, and applications* (p. 2365). New York: Information Science Reference.

Lowenthal, P. R., & Dunlap, J. C. (2010). From pixel on a screen to real person in your students' lives: Establishing social presence using digital storytelling. *The Internet and Higher Education, 13*(1-2), 70-72. doi:10.1016/j.iheduc.2009.10.004

Lu, F.L., & Jeng, L. (2006). Knowledge construction in inservice teacher online discourse: Impacts of instructor roles and facilitative strategies. *Journal of Research on Technology in Education*, *39*, 183-202.

Lust, G., Elen, J., & Clarebout, G. (2013a). Regulation of tool-use within a blended course: Student differences and performance effects. *Computers & Education, 60*(1), 385–395.

Lust, G., Elen, J., & Clarebout, G. (2013b). Students' tool-use within a web enhanced course: Explanatory mechanisms of students' tool-use pattern. *Computers in Human Behavior, 29*(5), 2013–2021.

Lust, G., Juarez Collazo, N.A., Elen, J., & Clarebout, G. (2012). Content management systems: Enriched learning opportunities for all? *Computers in Human Behavior, 28*(3), 795–808.

Lust, G., Vandewaetere, M., Ceulemans, E., Elen, J., & Clarebout, G. (2011). Tool-use in a blended undergraduate course: In search of user profiles. *Computers & Education, 57*(3), 2135–2144.

MacDonald, J. (2008). *Blended learning and online tutoring: Planning learner support and activity design*. Aldershot: Gower.

Mack, R. (2001). *The digital divide: Standing at the intersection of race & technology*. Durham, N.C: Carolina Academic Press.

Maclachlan, J., Brodeur, J.J., Bagg, J.L., Chiappetta-Swanson, C., Vine, M.M., Vajoczki, S. (2014). *An Assessment of a blended learning model for information and geospatial literacy.* Toronto: Higher Education Quality Council of Ontario.

Maddrell, J. A., Morrison, G. R., & Watson, G. S. (2011). *Community of inquiry framework and learner achievement.* Paper presented at the Annual Meeting of the Association of Educational Communication & Technology, Jacksonville, FL. Retrieved from http://www.jennifermaddrell.com/wp-content/uploads/2011/11/MADDRELL-MORRISON-WATSON-AECT-Featured-Research-Paper-FINAL-20111110.pdf

Malikowski, S. R. (2008). Factors related to breadth of use in course management systems. *The Internet and Higher Education, 11*(2), 81-86. doi:10.1016/j.iheduc.2008.03.003

Marchand, G. C., & Gutierrez, A. P. (2012). The role of emotion in the learning process: Comparisons between online and face-to-face learning settings. *The Internet and Higher Education, 15*(3), 150-160. doi:10.1016/j.iheduc.2011.10.001

Marshall, S. (2011). Change, technology and higher education: Are universities capable of organizational change? *Australasian Journal of Educational Technology, 26*(8), 12-22.

Martindale, T., & Dowdy, M. (2010). Personal learning environments. In G. Veletsianos (Ed.), *Emerging technologies in distance education* (pp. 177–193). Edmonton: Athabasca Press.

Martinez-Caro, E., & Campuzano-Bolarin, F. (2011). Factors affecting students' satisfaction in engineering disciplines: Traditional vs. blended approaches. *European Journal of Engineering*

Education, 36(5), 473–483.

Marx, G. (2014). *Twenty-one trends for the 21st century: Out of the trenches and into the future, their profound implications for students, education, communities, and the whole of society*. Bethesda, MD: Editorial Projects in Education.

Mason, R., & Rennie, F. (2007). Using web 2.0 for learning in the community. *The Internet and Higher Education, 10*(3), 196-203. doi:10.1016/j.iheduc.2007.06.003

Masterman, L. (2013). The challenge of teachers' design practice. In H. Beetham, & R. Sharpe (Eds.), *Rethinking pedagogy for a digital age: Designing and delivering e-learning* (pp. 234-259). London: Routledge.

Matloff, N. (2011). *The art of R: Programming tour of statistical software design*. San Francisco: No Starch Press.

Maxwell, S.E., & Delaney, H.D. (2004). *Designing experiments and analyzing data: A model comparison perspective*. Mahwah, NJ: Laurence Erlbaum Associates.

McArdle, J., & Ritschard, G. (2013). *Contemporary issues in exploratory data mining in the behavioural sciences*. Hoboken, N.J: Taylor and Francis.

McCarthy, J. (2010). Blended learning environments: Using social networking sites to enhance the first year experience. *Australasian Journal of Educational Technology*, *26*(6), 729–740.

McGill, T. J., & Klobas, J. E. (2009). A task–technology fit view of learning management system impact. *Computers & Education*, *52*(2), 496-508.

McGreal, R. (2004). *Online education using learning objects*. London: Routledge.

McGreal, R., & Anderson, T. (2007). E-Learning in Canada. *Journal of Distance Education Technologies, 5*(1), 1-6.

McVay, M. (2000). *Developing a web-based distance student orientation to enhance student success in an online bachelor's degree completion program.* Unpublished practicum report presented to the Ed.D. Program. Florida: Nova Southeastern University.

McVay, M. (2001). *How to be a successful distance learning student: Learning on the internet.* New York: Prentice Hall.

Melton, B., Graf, H., & Chopak-Foss, J. (2009). Achievement and satisfaction in blended learning versus traditional general health course designs. *International Journal for the Scholarship of Teaching and Learning, 3*(1). Retrieved from http://academics. georgiasouthern.edu/ijsotl/v3n1/articles/PDFs/Article_MeltonGrafChopak-Foss.pdf

Mertens, D. (2007). Transformative paradigm: Mixed methods and social justice. *Journal of Mixed Methods Research, 2*(1)*,* 212-225.

Meyer, D. (1967). *Educational statistics*. New York: Center for Applied Research in Education.

Meyer, K. A., & Xu, Y. J. (2007). A bayesian analysis of the institutional and individual factors influencing faculty technology use. *The Internet and Higher Education, 10*(3), 184-195. doi:10.1016/j.iheduc.2007.06.001

Miles, J., & Shevlin, M. (2001). *Applying regression & correlation: A guide for students and researchers*. London, UK: Sage Publications.

Miller, G. A., & Chapman, J. P. (2001). Misunderstanding Analysis of Covariance. *Journal of Abnormal Psychology, 110*(1), 40-48.

Miller, C. (2014). *The new landscape of mobile learning: Redesigning education in an app-based world*. New York: Routledge.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017-1054.

Mitchell, A., & Honore, S. (2007). Criteria for successful blended learning. *Industrial and Commercial Training*, *39*(3), 143–149.

Moeller, S., Spitzer, K., & Spreckelsen, C. (2010). How to configure blended problem based learning: Results of a randomized trial. *Medical Teacher*, *32*, 328–346.

Monroe, B. (2004). *Crossing the digital divide: Race, writing, and technology in the classroom*. New

York: Teachers College Press

Montgomery, D. C. (2012). *Design and analysis of experiments* (8th Ed.). :John Wiley & Sons.

Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). E-learning, online learning, and distance learning environments: Are they the same? *The Internet and Higher Education, 14*(2), 129-135. doi:10.1016/j.iheduc.2010.10.001

Moore, N., & Gilmartin, M. (2010). Teaching for better learning: A blended learning pilot project with first-year geography undergraduates. *Journal of Geography in Higher Education*, *34*(3), 327–344.

Moore, J. L., & Marra, R. M. (2005). A comparative analysis of online discussion participation protocols. *Journal of Research on Technology in Education, 38*, 191-212.

Moore, M. (1993). Three types of interaction. In K. Harry, M. Hohn, & D. Keegan (Eds.), *Distance education: New perspectives.* (pp. -). London: Routledge.

Morbey, M. L. (2011). Beyond multimedia literacy: Supporting mastery in virtual environments. *International Journal of Learning and Media, 2*(4), 7-20.

Morbey, M.L., Sabeti, M., & Sengara, M. (in press). Like it: A Facebook e-learning environment for higher education. In D. Fonseca, & E. Redondo (Eds.), *Handbook on research on applied e-learning in engineering and architecture education.* Hershey, PA: Information Science Reference.

Morbey, M. L., Villamor, L., Senoga, M., & Griffith, J. (2012). Participatory architecture: Web 2.0 education in the Uganda National Museum. In H. H. Yang, & S. Wang (Eds.), *Cases on formal and informal e-learning environments: Opportunities and practices* (pp. 261-273). Hershey, PA: Information Science Reference.

Morgan, D. L. (2014). *Integrating qualitative & quantitative methods: A pragmatic approach*. Thousand Oaks, CA: Sage.

Morris, L., & Finnegan, C. (2009). Best practices in predicting and encouraging student persistence and

achievement online. *Journal of College Student Retention: Research, Theory and Practice, 10*(1), 55-64.

Morrison, D. (2014). How to Develop a Sense of Presence in Online and F2F Courses with Social Media. O*nline Learning Insights*. Retrieved March 31, 2015 from http://onlinelearninginsights.wordpress.com/2014/09/29/how-to-develop-a-sense-of-presence-in-online-and-f2f-courses-with-social-media/

Moskal, B. M. & Leydens, J. A. (2000). Scoring rubric development: Validity and reliability. *Practical Assessment, Research & Evaluation*, *7*(10). Retrieved March 31, 2015 from http://PAREonline.net/getvn.asp?v=7&n=10

Moskal, P., Dzuiban, C., & Hartman, J. (2013). Blended learning: A dangerous idea? *Internet and Higher Education*, *18*, 15-23.

Mossberger, K., & Tolbert, C. (2008). *Digital citizenship the internet, society, and participation*. Cambridge, MASS: MIT Press.

Mullen, G., & Tallent-Runnels, M. (2006). Student outcomes and perceptions of instructors' demands, and support in online and traditional classrooms. *Internet and Higher Education, 9*(4), 257–266.

Museus, S. (2012). *Creating campus cultures: Fostering success among racially diverse student populations*. New York: Routledge.

Nagel, L., & Kotzé, T. G. (2010). Supersizing e-learning: What a CoI survey reveals about teaching presence in a large online class. *The Internet and Higher Education, 13*(1-2), 45-51. doi:10.1016/j.iheduc.2009.12.001

National Education Association. (2008). *Access, adequacy, and equity in education technology: Results of a survey of America's teachers and support professionals on technology in public schools and classrooms*. Washington, D.C.: NEA Research.

Negroponte. N. (1995). *Being digital*. New York: Vintage Books

Neter, J., & Wasserman, W. (1983). *Applied linear regression models*. Homewood, ILL: R.D. Irwin.

Neuendorf, K. (2002). *The content analysis guidebook*. Thousand Oaks, Calif.: Sage Publications.

Neumeier, P. (2005). A closer look at blended learning - parameters for designing a blended learning environment for language teaching and learning. *ReCALL, 17*(2), 163-163.

The New London Group. (1996). A pedagogy of multiliteracies: Designing social futures. *Harvard educational review, 66*(1), 60-93.

Neyland, D. (2006). Dismissed content and discontent: An analysis of the strategic aspects of actor-network theory. *Science, Technology & Human Values, 31*(1), 29-52.

Nicol, D. J., & Macfarlane-Dick, D. (2006). Formative assessment and self- regulated learning: A model and seven principles of good feedback practice. *Studies in Higher Education, 31*(2), 199–218.

Nichols, A. L., & Maner, J. K. (2008). The good-subject effect: investigating participant demand characteristics. *Journal of General Psychology 135,* 151-165

Nora, A., & Snyder, B. P. (2008). Technology and higher education: The impact of e-learning approaches on student academic achievement, perceptions and persistence. *Journal of College Student Retention: Research, Theory & Practice*, *10*(1), 3-19.

Norberg, A., Dziuban, C. D., & Moskal, P. D. (2011). A time-based blended learning model. *On the Horizon, 19*(3)*,* 207-216.

Novak, G. M., Patterson, E. T., Gavrin, A. D., & Christian, W. (1999). *Just-in-time teaching: Blending active learning with web technology.* Upper Saddle River, NJ: Prentice Hall.

Oblinger, D. (1999). *Renewing administration: Preparing colleges and universities for the 21st century*. Bolton, MASS: Anker Pub.

Oblinger, D., & Barone, C. (2001). *Distributed education and its challenges: An overview*. Washington, D.C: American Council on Education.

Oblinger, D. (2005). *Educating the net generation*. Boulder, CO: Educause. Retrieved from https://net.educause.edu/ir/library/pdf/pub7101k.pdf

Oblinger, D. (2006). *Learning spaces*. Boulder, CO: Educause.

Oblinger, D. (2012). *Game changers: Education and information technologies*. Washington: Educause.

Oblinger, D. (2014). Designed to Engage. *Educause Review, 49*(5), 23-40.

O'Dowd, R. (2013). Tele collaborative networks in university higher education: Overcoming barriers to integration. *Internet and Higher Education, 18,* 47-53.

OECD. (2000). *Knowledge management in the learning economy.* Paris: OECD Publishing. Retrieved from http://ocw.metu.edu.tr/file.php/118/Week11/oecd1.pdf

OECD. (2013). *First results from: The survey of adult skills: Reader's companion.* Paris: OECD Publishing. Retrieved from http://skills.oecd.org/documents/SkillsOutlook_2013_Chapter1.pdf

O'Flaherty, J., & Phillips, C. (2015). The use of flipped classrooms in higher education: A scoping review. *The Internet and Higher Education, 25*, 85-95. doi:10.1016/j.iheduc.2015.02.002

Oliver, R., Harper, B., Willis, S., Agostinho, J., & Hedberg, G. (2013). Describing ICT-based learning designs that promote quality learning outcomes. In Beetham, H., & Sharpe, R. (2010), *Rethinking pedagogy for a digital age: Designing and delivering e-learning*. London: Routledge.

O'Reilly, T. (2005). *What is web 2.0: Design patterns and business models for the next generation of software.* Retrieved March 12, 2015, from http://oreilly.com/web2/archive/what-is-web-20.html

O'Reilly, T., & Milstein, S. (2009). *The Twitter book*. Beijing: O'Reilly Radar.

Oriogun, P. K., Ravenscroft, A., & Cook, J. (2005). Validating an approach to examining cognitive engagement in online groups. *American Journal of Distance Education, 19*, 197-214.

Otter, R. R., Seipel, S., Graeff, T., Alexander, B., Boraiko, C., Gray, J., & Sadler, K. (2013). Comparing student and faculty perceptions of online and traditional courses. *The Internet and Higher Education, 19*, 27-35. doi:10.1016/j.iheduc.2013.08.001

Ouimet, J. A., & Smallwood, R. A. (2005). CLASSE–the class-level survey of student engagement. *Assessment Update, 17*(6)*,* 13-15.

Overbaugh, R. C., & Nickel, C. E. (2011). A comparison of student satisfaction and value of academic community between blended and online sections of a university-level educational foundations course. *The Internet and Higher Education, 14*(3), 164-174. doi:10.1016/j.iheduc.2010.12.001

Owston, R., Lupshenyuk, D., Wideman, H., & Murphy, J. (2008). Blended professional development: A synthesis of three program evaluations. *The Internet and Higher Education*, *11*, 201-210.

Owston, R., Lupshenyuk, D., & Wideman, H. (2011). Lecture capture in large undergraduate classes: Student perceptions and academic performance. *The Internet and Higher Education, 14*(4), 262-268. doi:10.1016/j.iheduc.2011.05.006

Owston, R. (2009). Digital immersion, teacher learning, and games. *Educational Researcher, 38*(4), 270-3. Retrieved November 15, 2014, from http://journals1.scholarsportal.info.ezproxy.library.yorku.ca/pdf/0013189x/v38i0004/270_ditlag

Owston, R. (2012) Virtual mentoring in pre-service teacher education. *Future Learning*, *2,* 23-28.

Owston, R., & York, D. (2012). *Evaluation of blended learning courses in the faculty of fine arts: Fall/winter session 2011-2012*. (Technical Report No. 2012-4). Institute for Research on Learning Technologies: York University.

Owston, R., York, D., & Finkel, J. (2013). *Evaluation of blended learning courses in the faculty of fine arts: Second evaluation annual report, 2012-2013*. (Technical Report No. 2013-1). Institute for Research on Learning Technologies: York University.

Owston, R., York, D., & Murtha, S. (2013). Student perceptions and achievement in a university blended learning strategic initiative. *Internet and Higher Education, 18*, 38-46.

Oztok, M., Zingaro, D., Makos, A., Brett, C., & Hewitt, J. (2015). Capitalizing on social presence: The relationship between social capital and social presence. *The Internet and Higher Education, 26*, 19-24. doi:10.1016/j.iheduc.2015.04.002

Paechter, M., & Maier, B. (2010). Online or face-to-face? Students' experiences and preferences in e-learning. *The Internet and Higher Education, 13*(4), 292-297. doi:10.1016/j.iheduc.2010.09.004

Paechter, M., Maier, B., & Macher, D. (2010). Students' expectations of, and experiences in e-learning: Their relation to learning achievements and course satisfaction. *Computers in Education*, *54*(1), 222–229.

Palloff, R. M., & Pratt, K. (2011). *The excellent online instructor: Strategies for professional development*. San Francisco, CA: Jossey-Bass.

Papalia R., & Filippucci. C. (2000). *Inference from non-random samples: A maximum entropy approach. Proceedings of the Second International Conference on Establishment Surveys,* 686-1691.

Park, G., Johnson, H., Vath, R., Kubitskey, B., & Fishman, B. (2013). Examining the roles of the facilitator in online and face-to-face professional development contexts. *Journal of Technology and Teacher Education, 21*(2), 225-245. Chesapeake, VA: SITE.

Parker, K., Lenhart, A., & Moore, K. (2011). *The digital revolution and higher education: College presidents, public differ on value of online learning.* Washington, DC: Pew Research Center Social & Demographic Trends.

Parkes, M., Stein, S., & Reading, C. (2015). Student preparedness for university e-learning environments. *The Internet and Higher Education, 25*, 1-10. doi:10.1016/j.iheduc.2014.10.002

Parks, P. (2013). *The digital divide*. San Diego, CA: Reference Point Press.

Parisi, L., & Crosby, B. (2012). *Making connections with blogging: Authentic learning for today's classrooms*. Eugene, OR: International Society for Technology in Education.

Parsons, D. (2012). *Refining current practices in mobile and blended learning: New applications*. Hershey PA: Information Science Reference.

Partnership for 21st Century Skills. (2004). The road to 21st century learning: A policymakers' guide to 21st century skills. Washington, DC. Retrieved December 3, 2014, from http://www.p21.org/component/content/article/30-the-road-to-the-21st-century

Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students*. San Francisco: Jossey-Bass.

Pellegrino, J. (2012). *Education for life and work: Developing transferable knowledge and skills in the 21st century*. Washington, D.C: The National Academic Press.

Pelz, B. (2004). (My) three principles of effective online pedagogy. *Journal of Asynchronous Learning Networks, 8*(3), 33–46.

Percival, J., & Muirhead, B. (2009). Prioritizing the implementation of e-learning tools to enhance the post-secondary learning environment. *Journal of Distance Education*, *23*, 89-106.

Petrides, L. (2000). *Case studies on information technology in higher education implications for policy and practice*. Hershey, PA: Idea Group Pub.

Phillips, R., Gosper, M., McNeill, M., Woo, K., Preston, G., & Green, D. (2007). Staff and student perspectives on web based lecture technologies: Insights into the great divide. Retrieved from http://www.ascilite.org.au/conferences/singapore07/procs/phillips.pdf

Picciano, A. G. (2009). Blended with purpose: The multimodal model. *Journal of Asynchronous Learning Networks, 13*(1), 7-18.

Picciano, A., Dziuban, C., & Graham, C. (2014). *Blended learning research perspectives - Volume 2*. New York: Routledge.

Pintrich, P. R. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research, 31*, 459–470.

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13–39). San Diego, CA: Academic Press.

Podsakoff, P. M., MacKenzie, S. B., Lee, J., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88,* 879-903.

Policy Horizons Canada. (2012). *Maximizing Canada's Engagement in the Global Knowledge-Based Economy: 2017 and Beyond*. Retrieved from

http://www.horizons.gc.ca/eng/content/maximizing-canada's-engagement-global-knowledge-based-economy-2017-and-beyond

Pollock, P., Hamann, K., & Wilson, B. (2011). Learning through discussions: Comparing the benefits of small-group and large-class settings. *Journal of Political Science Education,* 7, 48–64.

Pollard, H., Minor, M., & Swanson, A. (2014). Instructor social presence within the community of inquiry framework and its impact on classroom community and the learning environment. *Online Journal of Distance Learning Administration,* 17(2).

Pond, W. K. (2002). Distributed education in the 21st century: Implications for quality assurance. *Online Journal of Distance Learning Administration,* 5(2). Retrieved September 9, 2014 from http://www.westga.edu/-distance/ojdla/summer52/pond52.html

Poon, J. (2012). Use of blended learning to enhance the student learning experience and engagement in property education. *Property Management, 30*(2), 129–156.

Poon, J. (2013). Blended learning: An institutional approach for enhancing students' learning experiences. *Journal of Online Learning and Teaching, 9*(2), 12-23.

Popper, K. (1978). *Three worlds*. Retrieved from http://www.tannerlectures.utah.edu/lectures/documents/popper80.pdf

Potter, A. (2008). Interactional coherence in asynchronous learning networks: A rhetorical approach. *The Internet and Higher Education, 11*(2), 87-97. doi:10.1016/j.iheduc.2008.05.001

Powell, A. (2011). *A case study of e-learning initiatives in New Zealand's secondary schools*. Retrieved November 26, 2014 from http://pepperdine.contentdm.oclc.org/cdm/singleitem/collection/p15093coll2/id/120/rec/1

Pfaffman, J. (2008). Transforming classrooms with free/open source software. *High School Journal, 91*(3), 25-31

Prensky, M. (2010). *Teaching digital natives: Partners for real learning*. Thousand Oaks, CA: Corwin.

Prensky, M. (2012). *From digital natives to digital wisdom: Hopeful essays for 21st century learning*.

Thousand Oaks, CA: Corwin.

Preston, D. (2004). *Virtual learning and higher education.* Amsterdam: Rodopi.

Putnam, R. D. (2001). *Bowling alone: The collapse and revival of American community.* New York: Simon Schuster.

Quality Online Course Initiative (QOCI) Rubric. An initiative sponsored by Illinois Online Network (ION) University of Illinois. Retrieved from http://www.ion.uillinois.edu/initiatives/qoci/rubric.asp

Quality MattersTMRubric Standards 2011-2013 (2011). Developed by Quality Matters Program, Maryland Online Inc. Retrieved from http://www.qmprogram.org/files/QM_Standards_2011-2013.pdf

R Foundation (2015). *R Project.* Retrieved April 19, 2015 from http://www.rproject.org/foundation/

Raaijmakers, Q. A., Hoof, A. V., Hart, H. T., Verbogt, T. F., & Woolebergh, W. (2000). Adolescents' midpoint response on Likert-type scale items: Neutral or missing values? *International Journal of Public Opinion Research*, *12*(2), 208-216.

Ramsden, P. (2003). *Learning to teach in higher education*. London, UK: Routledge.

Reeves, T., & Oh, E. (2007). Do generational differences matter in instructional design? In Spector, J., Merrill, D., Van Merriënboer, J., & Driscoll, M. (2008). *Handbook of research on educational communications and* technology (pp. 67-99). NY: Lawrence Erlbaum Associates.

Regan, K., Evmenova, A., Baker, P., Jerome, M. K., Spencer, V., Lawson, H., & Werner, T. (2012). Experiences of instructors in online learning environments: Identifying and regulating emotions. *The Internet and Higher Education, 15*(3), 204-212. doi:10.1016/j.iheduc.2011.12.001

Ri, Z. (2013). *Multivariate characteristic and correlation functions*. Berlin: De Gruyter.

Rice, W. (2011). *Moodle 2.0 e-learning course development: A complete guide to successful learning using Moodle.* Birmingham, UK: Packt Pub.

Richardson, J. C., & Ice, P. (2010). Investigating students' level of critical thinking across instructional

strategies in online discussions. *The Internet and Higher Education, 13*(1-2), 52-59. doi:10.1016/j.iheduc.2009.10.009

Richardson, J. T. E. (2011). Eta squared and partial eta squared as measures of effect. *Development of Economy, 16*(2), 305–326.

Ringstaff, C., & Kelley, L. (2002). *The learning return on our educational technology investment: A review of findings from research.* San Francisco, CA: WestEd.

Ritter, C., Polnick, B., Fink, R., & Oescher, J. (2010). Classroom learning communities in educational leadership: A comparison study of three delivery options. *The Internet and Higher Education, 13*(1-2), 96-100. doi:10.1016/j.iheduc.2009.11.005

Rlin, S. (2006). *Knowledge society vs. knowledge economy: Knowledge, power, and politics*. Basingstoke: Palgrave Macmillan.

Roach, A. (2011). Movement in literacy: New directions in multilingual, multicultural, multinational and multimodal literacy studies. *National Council of Teachers of English 88*(4), 45 – 63.

Roberts, C.W. (Ed.). (1997). *Text analysis for the social sciences: Methods for drawing statistical inferences from texts and transcripts*. Mahwah, NJ: Lawrence Erlbaum Associates.

Robinson, K. (2011). *Out of our minds: Learning to be creative*. Oxford: Capstone.

Roblyer, M. D., Freeman, J., Donaldson, M. B., & Maddox, M. (2007). A comparison of outcomes of virtual school courses offered in synchronous and asynchronous formats. *The Internet and Higher Education, 10*(4), 261-268. doi:10.1016/j.iheduc.2007.08.003

Roby, T., Ashe, S., Singh, N., & Clark, C. (2013). Shaping the online experience: How administrators can influence student and instructor perceptions through policy and practice. *The Internet and Higher Education, 17*, 29-37. doi:10.1016/j.iheduc.2012.09.004

Rodriguez, M. (2015). *The relationship between social presence, student satisfaction and academic achievements in fully online asynchronous courses.* (Doctoral dissertation). University of Texas, Brownville.

Rogers, P. C., Graham, C. R., & Mayes, C. T. (2007). Cultural competence and instructional design: Exploration research into the delivery of online instruction cross-culturally. *Educational Technology Research and Development, 55*(2), 197-217.

Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (2000) Methodological issues in the content analysis of computer conference transcripts. *International Journal of Artificial Intelligence in Education, 11*(3), 37-54.

Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (2001). Assessing social presence in asynchronous, text-based computer conferencing. *Journal of Distance Education*, *14*(3), 51-70.

Rosenberg, S. D., Schnurr, P. P., & Oxman, T. E. (1990). Content analysis: A comparison of manual and computerized systems. *Journal of Personality Assessment, 54*(2), 298- 310.

Roskos, K., Jarosewich, T., Lenhart, L., & Collins, L. (2007). Design of online teacher professional development in a statewide reading first professional development system. *The Internet and Higher Education, 10*(3), 173-183. doi:10.1016/j.iheduc.2007.06.004

Ross, K. (1979). An empirical investigation of sampling errors in educational survey research. *Journal of Educational Statistics, 4*(1), 24-40.

Ross, B., & Gage, K. (2006). Global perspectives on blended learning: Insight from WebCT and our customers in higher education. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 155-168). San Francisco, CA: Pfeiffer.

Rovai, A. P. (2002a). Building Sense of Community at a Distance. *The International Review Of Research In Open And Distributed Learning, 3*(1). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/79/152

Rovai, A. P. (2002b). Development of an instrument to measure classroom community. *The Internet and Higher Education, 5*(3), 197−211.

Rovai, A. P. (2002c). Sense of community, perceived cognitive learning, and persistence in asynchronous learning networks. *The Internet and Higher Education, 5*(4), 319−332.

Rovai, A. P. (2007). Facilitating online discussions effectively. *The Internet and Higher Education, 10*(1), 77-88. doi:10.1016/j.iheduc.2006.10.001

Rovai, A. P., & Downey, J. R. (2010). Why some distance education programs fail while others succeed in a global environment. *The Internet and Higher Education, 13*(3), 141-147. doi:10.1016/j.iheduc.2009.07.001

Rovai, A. P., Wighting, M. J., Baker, J. D., & Grooms, L. D. (2009). Development of an instrument to measure perceived cognitive, affective, and psychomotor learning in traditional and virtual classroom higher education settings. *The Internet and Higher Education, 12*(1), 7-13. doi: 10.1016/j.iheduc.2008.10.002

Rubin, B., Fernandes, R., & Avgerinou, M. D. (2013). The effects of technology on the community of inquiry and satisfaction with online courses. *The Internet and Higher Education, 17*, 48-57. doi:10.1016/j.iheduc.2012.09.006

Russell, M., Bebell, D., O'Dwyer, L., & O'Connor, K. (2003). Examining teacher technology use: Implications for preservice and inservice teacher preparation. *Journal of Teacher Education, 54*(4), 297-310.

Sahai, H., & Ageel, M. I. (2000). *The analysis of variance: Fixed, random, and mixed models*. Boston: Birkhäuser.

Samaniego, F. (2010). *A comparison of the bayesian and frequentist approaches to estimation*. New York: Springer.

Samaniego, F. (2014). *Stochastic modeling and mathematical statistics: A text for statisticians and quantitative scientists*. Boca Raton, FL: CRC Press.

Scherer, M. J., Sax, C., VanBiervliet, A., Cushman, L. A., & Scherer, J. V. (2005). Predictors of assistive technology use: The importance of personal and psychosocial factors. *Disability and Rehabilitation*, *27*(21), 1312-1331.

Schiller, F. (2003). (Why) Should We Use SEM? Pros and Cons of Structural Equation Modeling.

Methods of Psychological Research Online, 8(2), 1-22. Retrieved from http://www.dgps.de/fachgruppen/methoden/mpr-online/issue20/art1/mpr127_11.pdf

Schlager, M., & Fusco, J. (2004). Teacher professional development, technology, and communities of practice: Are we putting the cart before the horse? In S. Barab, R. Kling, & J. Gray (Eds.), *Designing for virtual communities in the service of learning* (pp. 265-310). Cambridge, UK: Cambridge University Press.

Schroeder, L., & Sjoquist, D. (1986). *Understanding regression analysis: An introductory guide*. Beverly Hills: Sage.

Schrum, L., Burbank, M. D., & Capps, R. (2007). Preparing future teachers for diverse schools in an online learning community: Perceptions and practice. *The Internet and Higher Education, 10*(3), 204-211. doi:10.1016/j.iheduc.2007.06.002

Schugurensky, D. (2000). *The forms of informal learning: Towards a conceptualization of the field.* WALL Working Paper No.19. Toronto: Centre for the Study of Education and Work.

Seber, G. (1977). *Linear regression analysis*. New York: Wiley.

Servon, L. (2008). *Bridging the digital divide: Technology, community and public policy*. Hoboken, NJ: John Wiley & Sons.

Shattock, M. (2009). *Entrepreneurialism in universities and the knowledge economy diversification and organizational change in European higher education*. Maidenhead, UK: Society for Research into Higher Education & Open University Press.

Shah-Nelson, C. (2013). Synchronous tools in support of teaching and learning. In Kats, Y. (Ed.), *Learning management systems and instructional design best practices in online education.* Hershey, PA: IGI Global.

Shaw, J. (2012). The humanities, digitized. *Harvard Magazine, 114*(5), 40-44.

Shernoff, D. (2013). *Optimal learning environments for student engagement*. New York: Springer.

Shea, P. (2006). A study of students' sense of learning community in online environments. *Journal of*

Asynchronous Learning Networks 10(10). Retrieved November 23, 2014, from http://www.sloan-c.org/publications/jaln/v10n1/v10n1_4shea_member.asp.

Shea, P., Hayes, S., Vickers, J., Gozza-Cohen, M., Uzuner, S., Mehta, R., & Rangan, P. (2010). A re-examination of the community of inquiry framework: Social network and content analysis. *The Internet and Higher Education, 13*(1-2), 10-21. doi:10.1016/j.iheduc.2009.11.002

Shea, P., & Bidjerano, T. (2009). Cognitive presence and online learner engagement: A cluster analysis of the community of inquiry framework. *Computing in Higher Education, 21,* 199-217.

Shea, P., Hayes, S., Smith, S. U., Vickers, J., Bidjerano, T., Pickett, A., Jian, S. (2012). Learning presence: Additional research on a new conceptual element within the community of inquiry (CoI) framework. *The Internet and Higher Education, 15*(2), 89-95. doi:10.1016/j.iheduc.2011.08.002

Shea, P., Li, C. S., Swan, K., & Pickett, A. (2005). Developing learning community in online asynchronous college courses: The role of teaching presence. *The Journal of Asynchronous Learning Networks 9*(4), 59–82.

Sheehy, K., & Bucknall, S. (2008). How is technology seen in young people's vision for future education systems? *Learning, Media and Technology*, *33*(2), 101-114.

Shepherd, C. E., & Bolliger, D. U. (2011). The effects of electronic portfolio tools on online students' perceived support and cognitive load. *The Internet and Higher Education, 14*(3), 142-149. doi:10.1016/j.iheduc.2011.01.002

Sher, A. (2009). Assessing student-instructor and student-student interaction to student learning and satisfaction in web-based online learning environments. *Journal of Interactive Online Learning*, *8*, 102-120. Retrieved from http://www.ncolr.org/jiol/issues/pdf/8.2.1.pdf

Sheridan, K., Kelly, M. (2010). The indicators of instructor presence that are important to student in online courses. *Journal of Online Teaching and Learning, 4*(6), 2-11.

Sheskin, D. (1997). *Handbook of parametric and nonparametric statistical procedures*. Boca Raton,

FL: CRC Press.

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications.* London: John Wiley & Sons, Ltd.

Shor, I. (2009). Critical media literacy for the twenty-first century: Taking our entertainment seriously. In M. Darder (Ed.), *The critical pedagogy reader* (pp. 134-143). New York, Routledge.

Shulman, L. S. (1997). Disciplines of inquiry in education: An overview. In R. M. Jaeger (Ed.). *Complementary methods for researchers in education* (pp. 3-19). Washington, D.C: American Education Research Association.

Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal for Instructional Technology and Distance Learning, 2*(1), 3-11.

Siemens, G., & Tittenberger, P. (2009). *Handbook of emerging technologies for learning.* Winnipeg: University of Manitoba. Retrieved November 12, 2015, from http://www.elearnspace.org/blog /2009/ 03/11/handbook-of-emerging-technologies-for-learning/

Simunich, B. (2014). Designing for presence: QM and the CoI framework as guides. *Conference on Quality Assurance in Online Learning*. Baltimore, MD.

Sitzman, T., Ely, K., Brown, K. G., & Bauer, K. N. (2010). Adding a web-based perspective to the self-assessment of knowledge: Compelling reasons to utilize affective measures of learning. *Academy of Management Learning & Education, 9*(2), 169–191.

Slaughter, S., & Rhoades, G. (2004). *Academic capitalism and the new economy: Markets, state, and higher education.* Baltimore, MD: Johns Hopkins University Press.

Slife, B., & Williams, R. (1995). *What's behind the research? Discovering hidden assumptions in the behavioural sciences*. Thousand Oaks, CA: Sage.

Smith, G. G., Heindel, A. J., & Torres-Ayala, A. T. (2008). E-learning commodity or community: Disciplinary differences between online courses. *The Internet and Higher Education, 11*(3-4), 152-159. doi:10.1016/j.iheduc.2008.06.008

Smith, G. G., Sorensen, C., Gump, A., Heindel, A. J., Caris, M., & Martinez, C. D. (2011). Overcoming student resistance to group work: Online versus face-to-face. *The Internet and Higher Education, 14*(2), 121-128. doi:10.1016/j.iheduc.2010.09.005

Smith, P. (2004). Curricular transformation: Why we need it and how to support it. *Change: The Magazine of Higher Learning, 36*(1), 28-35.

Smith, P. J. (2005). Learning preferences and readiness for online learning. *Educational Psychology, 25*(1), 3–12.

Smith, P. J., Murphy, K. L., & Mahoney, S. E. (2003). Towards identifying factors underlying readiness for online learning: An exploratory study. *Distance Education, 24*(1), 57–67.

Smith, S. D., & Caruso, J. B. (2010). *The ECAR study of undergraduate students and information technology.* Boulder, CO: Center for Applied Research.

Smith, S., Salaway, G., & Borreson Caruso, J. (2009). *The ECAR study of undergraduate students and information technology: Key findings.* Boulder, CO: Center for Applied Research.

Smith, T. (1983). On the validity of inferences from non-random samples. *Journal for the Royal Society for Statistics (Series A), 146*(4), 394-403.

Smithson, M. (2003). *Confidence intervals*. Thousand Oaks, CA: Sage.

Smyth, S., Houghton, C., Cooney, A., & Casey, D. (2012). Students' experiences of blended learning across a range of postgraduate programmes. *Nurse Education Today, 32*, 464–468.

Snart, J. A. (2010). *Hybrid learning: The perils and promise of blending online and face-to-face instruction in higher education*. Santa Barbara, CA: Praeger.

So, H. J., & Bonk, C. J. (2010). Examining the roles of blended learning approaches in computer-supported collaborative learning (CSCL) environments: A Delphi study. *Educational Technology & Society*, *13*(3), 189–200.

Spanjers, I. A., Könings, K. D., Leppink, J., Verstegen, D. M., Jong, N. D., Czabanowska, K., & Merriënboer, J. J. (2015). The promised land of blended learning: Quizzes as a moderator. *Educational Research Review, 15*, 59-74. doi:10.1016/j.edurev.2015.05.001

Spector, J., Merrill, D., Van Merriënboer, J., & Driscoll, M. (2008). *Handbook of research on educational communications and technology*. New York: Lawrence Erlbaum Assoc.

Spector, P. (1981). *Research designs*. Beverly Hills, CA: Sage.

Speed, T. P. (1985). Teaching statistics at the university level: How computers can help us find realistic models for real data and reasonably assess their reliability. In L. Ride and T. P. Speed (Eds.), *Teaching of Statistics in the Computer* Age (pp. 111-131). London, UK: Chartwell Bratt Ltd.

St. John, W., & Johnson, P. (2000). The pros and cons of data analysis software for qualitative research. *Journal of nursing scholarship, 32*(4), 393–7.

Stacey, E. (2009). *Effective blended learning practices: Evidence-based perspectives in ICT-facilitated education*. Hershey, PA: Information Science Reference.

Stein, D. S., & Wanstreet, C. E. (2003). *Role of social presence, choice of online or face-to-face group format, and sat with perceived knowledge gained in a distance learning environment.* Paper presented at the Midwest Research to Practice Conference in Adult, Continuing, and Community Education.

Steeples, C. (2002). *Networked learning: Perspectives and issues*. London, UK: Springer.

Stein, D. S., Wanstreet, C. E., Slagle, P., Trinko, L. A., & Lutz, M. (2013). From 'hello' to higher-order thinking: The effect of coaching and feedback on online chats. *The Internet and Higher Education, 16*, 78-84. doi:10.1016/j.iheduc.2012.03.001

Stemler, Steve (2001). An overview of content analysis. *Practical Assessment, Research & Evaluation*, *7*(17). Retrieved December 1, 2014 from http://PAREonline.net/getvn.asp?v=7&n=17 .

Sterba, S. (2009). Alternative Model-Based and Design-Based Frameworks for Inference From Samples to Populations: From polarization to integration. *Multivariate Behavioural Research, 44*(6), 711-740.

Stevens, J. P. (2002). Applied multivariate statistics for the social sciences. Mahwah, NJ: Lawrence Erblaum.

Straubhaar, J. (2012). *Inequity in the technopolis: Race, class, gender, and the digital divide in Austin*. Austin, TX: University of Texas Press.

Stigler, S. M. (1986). The history of statistics: the measurement of uncertainty before 1900. Cambridge, Mass: Belknap Press of Harvard University Press.

Sturgis, P., Roberts, C., & Smith, P. (2014). Middle alternatives revisited: How neither/nor acts as a way of saying "I don't know?". *Sociological Methods & Research*, *43*(1), 15-38.

Svanum, S., & Aigner, C. (2011). The influences of course effort, mastery and performance goals, grade expectancies, and earned course grades on student ratings of course satisfaction. *British Journal of Educational Psychology, 81*, 667–679.

Swan, K., Day, S. L., Bogle, L. R., & Matthews, D. B. (2014). A collaborative, design-based approach to improving an online program. *The Internet and Higher Education, 21*, 74-81. doi:10.1016/j.iheduc.2013.10.006

Swan, K., & Ice, P. (2010). The community of inquiry framework ten years later: Introduction to the special issue. *The Internet and Higher Education, 13*(1-2), 1-4. doi:10.1016/j.iheduc.2009.11.003

Swan, K., Matthews, D., Bogle, L., Boles, E., & Day, S. (2012). Linking online course design and implementation to learning outcomes: A design experiment. *The Internet and Higher Education, 15*(2), 81-88. doi:10.1016/j.iheduc.2011.07.002

Swan, K., Shea, P., Richardson, J., Ice, P., Garrison, D. R., Cleveland-Innes, M., & Arbaugh, J. B. (2008). Validating a measurement tool of presence in online communities of inquiry. *E-Mentor*, *2*(24), 1-12.

Sweetman, D., Badiee, M., & Creswell, J. (2010). Use of the transformative framework in mixed methods studies. *Qualitative Inquiry, 16*(6), 441-454.

Tabachnick, B., & Fidell, L. (2007). M*ultivariate statistics*. Boston, MA: Pearson/Allyn & Bacon.

Tabor, S. W. (2007). Narrowing the distance: Implementing a hybrid learning model for information

security education. *The Quarterly Review of Distance Education*, *8*(1), 47–57.

Tang, E., & Lam, C. (2014). Building an effective online learning community (OLC) in blog-based teaching portfolios. *The Internet and Higher Education, 20*, 79-85. doi:10.1016/j.iheduc.2012.12.002

Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C., & Schmid, R. F. (2011). What Forty Years of Research Says About the Impact of Technology on Learning: A Second-Order Meta-Analysis and Validation Study. *Review of Educational Research, 81*(1), 4-28.

Tapanes, M. A., Smith, G. G., & White, J. A. (2009). Cultural diversity in online learning: A study of the perceived effects of dissonance in levels of individualism/collectivism and tolerance of ambiguity. *The Internet and Higher Education, 12*(1), 26-34. doi:10.1016/j.iheduc.2008.12.001

Taplin, R. H., Kerr, R., & Brown, A. M. (2013). Who pays for blended learning? A cost–benefit analysis. *The Internet and Higher Education, 18*, 61-68. doi:10.1016/j.iheduc.2012.09.002

Tapscott, D. (1998). *Growing up digital: The rise of the net generation*. New York: McGraw-Hill.

Taradi, S. K. (2005). Blending problem-based learning with Web technology positively impacts student learning outcomes in acid-base physiology. *AJP: Advances in Physiology Education, 29*(1), 35-39.

Tashakkori, A. (2003). *Handbook of mixed methods in social & behavioural research*. Thousand Oaks, CA: Sage.

Tatnall, A. (2010). *Actor-Network theory and technology innovation: Advancements and new concepts.* Hershey, PA: IGI Global.

Taylor, J. A., & Newton, D. (2013). Beyond blended learning: A case study of institutional change at an Australian regional university. *The Internet and Higher Education, 18*, 54-60. doi:10.1016/j.iheduc.2012.10.003

Teaching, Learning, and Technology (TLT) Group. (2011). *Rubrics: Definition, tools, examples, references.* Retrieved July 30, 2014 from

http://www.tltgroup.org/resources/flashlight/rubrics.htm

Team-Based Learning Collaborative. (2011). *Getting started with TBL.* Retrieved October 10, 2014 from http://www.teambasedlearning.org/

Tempelaar, D. T., Niculescu, A., Rienties, B., Gijselaers, W. H., & Giesbers, B. (2012). How achievement emotions impact students' decisions for online learning, and what precedes those emotions. *The Internet and Higher Education, 15*(3), 161-169. doi:10.1016/j.iheduc.2011.10.003

Thieman, G. (2008). Using technology as a tool for learning and developing 21st century skills: An examination of technology use by pre-service teachers with their K-12 students. *Contemporary Issues in Technology and Teacher Education, 8*(4), 342- 366.

Thistlethwaite, J. (2006). More thoughts on 'assessment drives learning'. *Medical Education, 40(*11), 1149-1150.

Thomas, D., & Brown, J. (2011). *A new culture of learning: Cultivating the imagination for a world of constant change*. Lexington, KY: CreateSpace.

Thomas, L. (2011). *Institutional transformation to engage a diverse student body*. Bingley, UK: Emerald.

Thorne, S. (2013). Digital literacies. In M. Hawkins (Ed.), *Framing language and literacies (*pp. 192-218). New York: Routledge.

Thornton, K., & Yoong, P. (2011). The role of the blended action learning facilitator: An enabler of learning and a trusted inquisitor. *Action Learning: Research and Practice, 8*(2), 129-146.

Ting, Y. (2015). Tapping into students' digital literacy and designing negotiated learning to promote learner autonomy. *The Internet and Higher Education, 26*, 25-32. doi:10.1016/j.iheduc.2015.04.004

Tinney, J. (2013). A senior administrator's view of technology and learning. *Education Canada, 53*(4), 21-36. Retrieved January 12, 2015, from http://www.cea-ace.ca

Tollman, J. (2003). Classroom teaching in Botswana and online teaching from Georgia: Hard knocks and earned successes. *Journal of Education for Library and Information Science, 44*(1), 39-57.

Top, E. (2012). Blogging as a social medium in undergraduate courses: Sense of community best predictor of perceived learning. *The Internet and Higher Education, 15*(1), 24-28. doi:10.1016/j.iheduc.2011.02.001

Traphagan, T., Kucsera, J. V., & Kyoko, K. (2010). Impact of class lecture webcasting on attendance and learning. *Educational Technology Research and Development, 58,* 19–37.

Traver, A. E., Volchok, E., Bidjerano, T., & Shea, P. (2014). Correlating community college students' perceptions of community of inquiry presences with their completion of blended courses. *The Internet and Higher Education, 20*, 1-9. doi:10.1016/j.iheduc.2013.09.001

Trilling, B., & Fadel, C. (2012). *21st century skills: Learning for life in our times*. NY: Jossey-Bass.

Tsai, P., Tsai, C., & Hwang, G. (2011). The correlates of Taiwan teachers' epistemological beliefs concerning internet environments, online search strategies, and search outcomes. *The Internet and Higher Education, 14*(1), 54-63. doi:10.1016/j.iheduc.2010.03.003

Tsang, K. (2012). The use of midpoint on Likert scale: The implications for educational research. *Hong Kong Teachers' Centre Journal, 11*, 121-130.

Tselios, N. K., Daskalakis, S., & Papadopoulou, M. (2011). Assessing the Acceptance of a Blended Learning University Course. *Educational Technology & Society*, *14*(2), 224-235.

Tseng, S., & Tsai, C. (2010). Taiwan college students' self-efficacy and motivation of learning in online peer assessment environments. *The Internet and Higher Education, 13*(3), 164-169. doi:10.1016/j.iheduc.2010.01.001

Tu, C. H. (2002). The measurement of social presence in an online learning environment. *International Journal on E-Learning, 1*(2), 34–45.

Tu, C., & McIsaac, M. (2002). The relationship of social presence and interaction in online classes. *American Journal of Distance Education, 16*(3), 131–150.

Turkle, S. (2012). *Alone together: Why we expect more from technology and less from each other.* NewYork: Basic Books.

Twigg, C.A. (1999). Improving learning & reducing costs: Redesigning large-enrollment courses. National Centre for Academic Transformation. Retrieved from http://thencat.org/Monographs/mono1.pdf

Twigg, C.A. (2003a). Improving learning and reducing costs: New models for online learning. *Educause Review*, *38*(5), 29-38.

Twigg, C.A. (2003b). *Program in course redesign.* National Centre for Academic Transformation. Retrieved October 3, 2014, from http://thencat.org/PCR.htm

Ulrich, J., & Karvonen, M. (2011). Faculty instructional attitudes, interest, and intention: Predictors of web 2.0 use in online courses. *The Internet and Higher Education, 14*(4), 207-216. doi:10.1016/j.iheduc.2011.07.001

United Nations Economic Commission for Europe. (2002). Towards a knowledge-based economy country readiness assessment report. New York. Retrieved February 9, 2015, 2015, from http://www.unece.org/fileadmin/DAM/ie/enterp/documents/coverpagarmenia.pdf

U.S. Department of Education. (2010). Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies. Washington, D.C.: U.S. *Department of Education, Office of Planning, Evaluation, and Policy Development.* Retrieved from http://www2.ed.gov/rschstat/eval/tech/evidence- based-practices/finalreport.pdf

Uzun, A., & Senturk, A. (2010). Blending makes the difference: Comparison of blended and traditional instruction on students' performance and attitudes in computer literacy. *Contemporary Educational Technology*, *1*(3), 196-207.

Van Dusen, G. (2014). The virtual campus: Technology and reform in higher education. *ASHE-ERIC Higher Education Report, 25*(5), 6-22.

Van House, N. (2004). Science and technology studies and information studies. *ARIST*, *38*(1), 74-89.

Vance, A. (2009, January 7). Data analysts captivated by R's power. *New York Times,* pp. B6.

Vance, R., & Crawford, B. (2013). Challenges of LMS implementation in a multi-cultural context. In Kats, Y. (Ed.), *Learning management systems and instructional design best practices in online education.* Hershey, PA: IGI Global.

Vaughan, N., Cleveland-Innes, & Garrison, D. (2013). *Teaching in blended learning environments creating and sustaining communities of inquiry*. Edmonton: AU Press.

Vaughan, N. (2010a). A blended community of inquiry approach: Linking student engagement to course redesign. *Internet and Higher Education, 13*(1-2), 60-65.

Vaughan, N. (2010b). *How can students improve their academic course work through the use of interactive learning technologies?* Paper presented at the Canadian Society for Studies in Education (CSSE) Conference, Toronto.

Vaughan, N. (2004). *Investigating how a blended learning approach can support an inquiry process within a faculty learning community*. Calgary: Graduate Division of Educational Research.

Vaughan, N. (2007). Perspectives on blended learning in higher education. *International Journal on E-Learning, 6*(1), 81-94. Chesapeake, VA: AACE.

Viale, R. & Etzkowitz, H. (2010). *The capitalization of knowledge: A triple helix of university-industry-government*. Cheltenham, UK: Edward Elgar.

Vockley, M. (2008). *Maximizing the impact: The pivotal role of technology in a 21st century education system.* Partnership for 21st Century Skills. Retrieved from http://www.p21.org/storage/documents/p21setdaistepaper.pdf

Vladimirschi , V. (2012). An exploratory study of cross-cultural engagement in the community of inquiry: Instructor perspectives and challenges. In Z. Akyol & R. Garrison (Eds.), *Educational Communities of Inquiry: Theoretical Framework, Research and Practice.* (pp. 21-31). Hershey, PA: IGI Global.

Vrasidas, C., & Zembylas, M. (2004). Online professional development lessons from the field.

Education and Training, 46(6–7), 326−334.

Waldman, J., & Smith, C. E. (2013). *Learning in a Canadian college environment*. Toronto: Higher Education Quality Council of Ontario.

Wang, L. (2010). Integrating communities of practice in e-portfolio assessment: Effects and experiences of mutual assessment in an online course. *The Internet and Higher Education, 13*(4), 267-271. doi:10.1016/j.iheduc.2010.07.002

Wang, Y.**,** Bonk, C., Delandshere, J. & Brush, T. (2008, March). *Mixed methods for research on blended learning in teacher education.* Paper presented at The Society for Information Technology and Teacher Education International Conference, Las Vegas, NV.

Wanstreet, C. E., & Stein, D. S. (2011). Presence over time in synchronous communities of inquiry. *American Journal of Distance Education, 25*(3), 162–177. doi:10.1080/ 08923647.2011.590062

Warne, R. T. (2014). A primer on multivariate analysis of variance (MANOVA) for behavioural scientists. *Practical Assessment, Research & Evaluation 19*(17): 1-10.

Warschauer, M. (2008). Laptops and literacy: A multi-site case study. *Pedagogies: An International Journal, 3*, 52-67.

Wasilik, O., & Bolliger, D. U. (2009). Faculty satisfaction in the online environment: An institutional study. *The Internet and Higher Education, 12*(3-4), 173-178. doi:10.1016/j.iheduc.2009.05.001

Wasson, B., & Vold, V. (2012). Leveraging new media skills in a peer feedback tool. *The Internet and Higher Education, 15*(4), 255-264. doi:10.1016/j.iheduc.2011.10.002

Waxman, H. C., Connell, M. L., & Gray, J. (2002). *A quantitative synthesis of recent research on the effects of teaching and learning with technology on student outcomes.* Naperville, IL: North Central Regional Education Laboratory.

Weber, S., & Dixon, S. (2007). *Growing up online: Young people and digital technologies*. New York: Palgrave Macmillan.

Weber, R. P. (1990). *Basic Content Analysis*. Newbury Park, CA: Sage.

Weiss, P. (2012). *Hyper thinking: Creating a new mindset for the age of networks*. Farnham, UK: Gower.

Wenger, E. (1998). *Communities of practice: learning, meaning, and identity*. Cambridge, UK: Cambridge University Press.

Westland, J. C. (2015). Structural Equation Modeling: From Paths to Networks. New York: Springer.

Whale, D. (2006). Technology skills as a criterion in teacher evaluation. *Journal of Technology and Teacher Education, 14*(1), 61-74.

Wiley, J., & Schooler, J. W. (2001). The mental web: Pedagogical and cognitive implications of the net. In C.R. Wolfe (Ed.), *Learning and teaching on the world wide web* (pp. 243-257). San diego, CA: Academic Press.

Williams, J. & Fardon, M. (2007). *Lecture recordings: extending access for students with disabilities.* In Research paper for ALT-C: Beyond Control 2007, University of Nottingham. Nottingham.

Williams, M. K., Foulger, T. S., & Wetzel, K. (2009). Preparing preservice teachers for 21st century classrooms: Transforming attitudes and behaviours about innovative technology. *Journal of Technology and Teacher Education, 17*(3), 393-418.

Willems, B. (2013). *Outlooks and opportunities in blended and distance learning*. Hershey, PA: Information Science Reference.

World Health Organization (WHO) (2014). International classification of functioning, disability and health: ICF. Geneva: WHO. Retrieved January 3, 2015, from http://www.who.int/mediacentre/factsheets/fs352/en/

Woltering, V., Herrler, A., Spitzer, K., & Spreckelsen, C. (2009). Blended learning positively affects students' satisfaction and the role of the tutor in the problem-based learning process: Results of a mixed-method evaluation. *Advances in Health Sciences Education*, *14*, 725–738.

Woo, Y., & Reeves, T. C. (2007). Meaningful interaction in web-based learning: A social constructivist interpretation. *The Internet and Higher Education, 10*(1), 15-25.

doi:10.1016/j.iheduc.2006.10.005

Wood, S. (2010). Technology for teaching and learning: Moodle as a tool for higher education. *International Journal for Teaching and Learning in Higher Education*, *3*, 299-307.

Wickham, H. (2014). *Advanced R*. London, UK: Chapman and Hall.

Wicks, D. A., Craft, B. B., Mason, G. N., Gritter, K., & Bolding, K. (2015). An investigation into the community of inquiry of blended classrooms by a faculty learning community. *The Internet and Higher Education, 25*, 53-62. doi:10.1016/j.iheduc.2014.12.001

Wild, I. (2008). *Moodle course conversion beginner's guide*. Birmingham, UK: Packt Pub.

Wild, I. (2011). *Moodle 2.0 course conversion beginner's guide: A complete guide to successful learning using Moodle 2.0*. Birmingham, UK: Packt Publishing.

Woods, R. H., & Baker, J. D. (2004). Interaction and immediacy in online learning. *The International Review of Research in Open and Distance Learning, 5*(2), 1–13.

Xiao, Y., & Lucking, R. (2008). The impact of two types of peer assessment on students' performance and satisfaction within a wiki environment. *The Internet and Higher Education, 11*(3-4), 186-193. doi:10.1016/j.iheduc.2008.06.005

Xie, Y., Ke, F., & Sharma, P. (2008). The effect of peer feedback for blogging on college students' reflective learning processes. *The Internet and Higher Education, 11*(1), 18-25. doi:10.1016/j.iheduc.2007.11.001

Xu, Y., & Meyer, K. A. (2007). Factors explaining faculty technology use and productivity. *The Internet and Higher Education, 10*(1), 41-52. doi:10.1016/j.iheduc.2006.10.004

Yeh, S. S. (2009). The cost-effectiveness of raising teacher quality. *Educational Research Review, 4*(3), 220–232.

Yang, C. C., Tsai, I. C., Kim, B., Cho, M. H., & Laffey, J. M. (2006). Exploring the relationships between students' academic motivation and social ability in online learning environments. *The Internet and Higher Education, 9,* 277–286.

Young, A., & Fry, J. D. (2008). Metacognitive awareness and academic achievement in college students. *Journal of the Scholarship of Teaching and Learning*, *8*(2), 1-10.

York University (2010). *University academic plan 2010–2015: Enhancing academic quality in a globalized world.* Toronto, ON: York University Senate. Retrieved from http://www.yorku.ca/secretariat/senate/committees/apprc/documents/ UAP2010-2015.pdf

Yu, T., & Richardson, J. C. (2015). Examining reliability and validity of a Korean version of the community of inquiry instrument using exploratory and confirmatory factor analysis. *The Internet and Higher Education, 25*, 45-52. doi:10.1016/j.iheduc.2014.12.004

Zhou, M., & Winne, P. H. (2012). Modeling academic achievement by self-reported versus traced goal orientation. *Learning and Instruction, 22*(6), 413–419.

Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13–39). San Diego, CA: Academic Press.

Zuckerman, E. (2013). *Rewire: digital cosmopolitans in the age of connection*. New York: W. W. Norton & Company.

Zumel, N., & Mount, J. (2014). *Practical data science with R*. Greenwich, CT: Manning Publications.

APPENDIX A: Definitions of Key Terms

Blended Learning

As Driscoll (2002) points out, blended (or hybrid) learning has many different definitions, which may speak to the potentiality of its wider application. Verbs most commonly used to describe the concept are "to combine" or "to mix," both of which can refer to the combination of instructional or web-based technologies, pedagogical methods, or learning theories that target technology enhanced learning outcomes (Bonk & Graham, 2006). Twigg (2003) outlines a number of possible blended models in her work, but for the purpose of this research, the five models that will be considered are those that were present in the courses where data was collected: 1) fully online, with content and resources online, but the availability of face-to-face (F2F) Teaching Assistant (TA) office hours; 2) online lecture, in-class tutorials, where F2F tutorials were paired with purely online content and preparation; 3) in-class lectures, online tutorials, with instructor time F2F, but TA contact online; 4) in-class lectures, blended tutorials , where instructors lectured F2F, but tutorials alternated between in-person and online; 5) web enhancement model , with no reduction of F2F instruction, but the inclusion of Moodle (an online learning management system) as a supplement to class work (York, Owston, Murtha & Finkel, 2014).

Community of Inquiry (CoI)

The CoI model emerged through the pioneering work of Randy Garrison (2001). In an educational context, a community of inquiry is a group of individuals working together to engage in purposeful action, discussion, and reflection in order to create a deep and meaningful learning experience (Garrison, Anderson, & Archer, 2001). There is an emphasis within this model on the construction of personal meaning as well as confirmed mutual understanding (collaborative-constructivist). This personal meaning and mutual understanding is constructed through the development of three interdependent variables: social, cognitive, and teaching presence.

Cognitive Presence

As defined by Garrison, and Anderson (2001), cognitive presence is the extent to which participants within a community of inquiry are able to construct meaning through sustained communication. The CoI survey measures cognitive presence along the categories of: triggering event, exploration, integration, and resolution. An example of learner-content interaction that supports cognitive presence is the ability to apply new knowledge.

Social Presence

As defined by Rourke, Anderson, Garrison, and Archer (2001), social presence is the ability of learners to project their personal characteristics into a community of inquiry, thereby presenting themselves as real people. The CoI survey measures social presence along the categories of: affective expression, open communication, and group cohesion. An example of learner-peer interaction that supports social presence is the ability to respectfully disagree with a peer's opinion within a group discussion forum.

Teacher Presence

As defined by Rourke et. al (2001), teaching presence is the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile outcomes. Measures of teacher presence include: design and organization, facilitation, and direct instruction. An example of learner-instructor interaction that supports teacher presence is a clearly accessible course syllabus that allows learners to easily navigate course topics and goals.

Networked Learning

Connectivism or networked learning (Bouchard, 2013; Brooks, 2012; Jenkins, 2006a; Siemens, & Tittenberger, 2009) is a notion that emphasizes the power of interpersonal connections, either online or in person. Stephen Downes (2015) argues that the student remains at the centre of this network, where connectivism concerns itself with the quality of access a learner has to a system of distributed knowledge, as opposed to describing the nature of how that learner learns.

Learning Management System (LMS)

As Ryann (2009) outlines, a LMS is "a software application that automates the administration, tracking, delivery, and reporting of (e-learning) training events" (p. 1). Moodle is one example of a learning management system, while others include Blackboard and Edmodo. A CMS (Content Management System), on the other hand, speaks more specifically to content organization, but not an overall learning environment. A LCMS (Learning Content Management System) is typically designed for students to navigate content with the purpose of learning, much like an LMS, but a LCMS affords more collaborative content development, publishing options and the archiving for future reference (Kerschenbaum, 2009).

21st Century Skills

The Partnership for 21st Century Skills (2011) describes this term as the set of skills and knowledge students need to succeed in work, life, and citizenship, as well as the support systems necessary to achieve 21st century learning outcomes. Their definition includes skills such as: core subjects (traditional disciplines – the 3 Rs of reading, writing, and arithmetic); life and career skills; information, media, technology; and innovation (the 4 Cs – creativity, collaboration, communication, and critical thinking).

APPENDIX B: Outline of Blend Formats

FORMAT 1 = Web-enhanced
(0% online replacement, but supplemented with online resources/activities);
THEATER: **n = 248** *(courses 1, 42 & 47)*
40% of grade based on work done online (discussion-based, but F2F lectures + tutorials)
0% of assessment tasks handed in through online channels

FORMAT 2 = (in-class lectures with blended tutorials),
FILM: **n = 383** *(courses 16 & 44)*
45% of graded content completed through blended tutorial work
100% of assessment tasks submitted through online channels

FORMAT 3 = (in-class lectures with online tutorials)
DANCE: **n = 158** *(courses 2 & 40 & 45)*
50% of grade based on work completed
50% of assessment tasks submitted online (short-answer tasks and participation in discussion groups)

FORMAT 4 = (online lectures with in-class tutorials)
MUSIC: **n = 558** *(courses 3, 41 & 46)*
100% of graded content prepared online and discussed through F2F tutorial work
50% of assessment tasks handed in online (50% in F2F tutorial work)

FORMAT 5 = Fully online (100% of the students grade is through work done online)
VISUAL ARTS: **n = 438** *(courses 17 & 43)*
100% of resources and graded content prepared online. TA office hours only
100% of work submitted online

APPENDIX C: Student Surveys

THE STUDENT SURVEY (Year 1)

Blended Learning Survey for Students

Please indicate your response by darkening the appropriate bubble on the answer sheet. Your frank opinions will help us improve the design of courses at York in future. Your answers will not be seen by your course instructor.

How much you agree or disagree with the following statements:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A
1. Overall, I am satisfied with this course.	A	B	C	D	E	F
2. Given the opportunity I would take another course in the future that has both online and face-to-face components.	A	B	C	D	E	F
3. This course experience has improved my opportunity to access and use the class content.	A	B	C	D	E	F
4. The online and face-to-face course components of this course enhanced each other.	A	B	C	D	E	F
5. The course Moodle site is well organized and easy to navigate.	A	B	C	D	E	F
6. The web resources in this course are helpful.	A	B	C	D	E	F
7. When I encounter a problem with the use of the technologies in this course, the York technical support service helped me with my problem in a timely and effective manner.	A	B	C	D	E	F
Compared to typical face-to-face courses I have taken…	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**N/A**
8. …this course offered the convenience of not having to come to campus as often.	A	B	C	D	E	F
9. …this course allowed me to reduce my total travel time each week and related expenses.	A	B	C	D	E	F
10. …I am more engaged in this course.	A	B	C	D	E	F
11. …I am likely to ask questions in this course.	A	B	C	D	E	F
12. …I feel that the *amount* of my interaction with *other students* in this course increased.	A	B	C	D	E	F
13. …I feel that the *quality* of my interaction with *other students* in this course was better.	A	B	C	D	E	F
14. …I feel connected with other students in this course.	A	B	C	D	E	F
15. ...I feel isolated during this course.	A	B	C	D	E	F
16. ...I feel that the *amount* of my interaction with *the instructor* in this course increased.	A	B	C	D	E	F
17. ...I feel that the *quality* of my interaction with *the instructor* in this course was better.	A	B	C	D	E	F
18. ...I am overwhelmed with information and resources in this course.	A	B	C	D	E	F
19. ...I have trouble using the technologies in this course.	A	B	C	D	E	F
20. ...I feel more anxious in this course.	A	B	C	D	E	F
21. ...this course required more time and effort.	A	B	C	D	E	F
22. ...this course has improved my understanding of key concepts.	A	B	C	D	E	F

Course Format Preferences

23. If the same course is being offered in different formats, which course format would you prefer?

    A. Entirely face-to-face course format
    B. Blended course format (meaning some face-to-face activities are replaced with online activities)
    C. Entirely online course format (with no face-to-face class time)

24. If you had a choice between attending lectures face-to-face or accessing lectures online which would you choose?
    A. Attending lectures face-to-face
    B. Accessing online downloadable videos of lectures
    C. A combination of both

25. If you had a choice between attending tutorials face-to-face or participating in tutorials online which would you choose?
    A. Attending tutorials face-to-face
    B. Participating in tutorials online
    C. A combination of both

26. If you had a choice between participation in classroom discussion or online discussion which would you choose?
    A. Class discussion
    B. Online discussion
    C. A combination of both

How much you agree or disagree with the following statements:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A
27. Video recordings of the course lectures that I could download for my personal use would be worth an extra $15 course fee to me.	A	B	C	D	E	F
28. I have strong time management skills.	A	B	C	D	E	F
29. I am motivated to succeed.	A	B	C	D	E	F

Additional Information

30. How many hours a week on average are you employed?
    A. I'm not working
    B. 1-9 hours
    C. 10-19
    D. 20-29
    E. 30-39
    F. 40+

31. What is your current overall GPA?
    A. A/A+ (8.0-9.0)
    B. B/B+ (6.0-7.9)
    C. C/C+ (4.0-5.9)
    D. D+ and less (less than 3.9)

Please share any additional comments or suggestions about this course.

_____

_____

_____

_____

_____

Thank You!

THE STUDENT SURVEY (Year 2/3)

Blended Learning Survey for Students

Please indicate your response by darkening the appropriate bubble on the answer sheet. Your frank opinions will help us improve the design of courses at York in future. Your answers will not be seen by your course instructor.

How much you agree or disagree with the following statements:	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Not Applicable**
1. Overall, I am satisfied with this course.	**A**	**B**	**C**	**D**	**E**	**F**
2. Taking this course increased my interest in the material.	**A**	**B**	**C**	**D**	**E**	**F**
3. Given the opportunity I would take another course in the future that has both online and face-to-face components.	**A**	**B**	**C**	**D**	**E**	**F**
4. The online and face-to-face course components of this course enhanced each other.	**A**	**B**	**C**	**D**	**E**	**F**
5. I was able to find course information easily at the Moodle site.	**A**	**B**	**C**	**D**	**E**	**F**
6. The resources at the Moodle site were useful.	**A**	**B**	**C**	**D**	**E**	**F**
7. The course expectations were clearly communicated.	**A**	**B**	**C**	**D**	**E**	**F**
8. The technology used for online portions of this course was reliable.	**A**	**B**	**C**	**D**	**E**	**F**
Compared to typical face-to-face courses I have taken…	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Not Applicable**
9. …this course allowed me to have more flexibility in my personal schedule.	**A**	**B**	**C**	**D**	**E**	**F**
10. …this course allowed me to reduce my total travel time to campus each week.	**A**	**B**	**C**	**D**	**E**	**F**
11. …I was more engaged in this course.	**A**	**B**	**C**	**D**	**E**	**F**
12. …I was more likely to ask questions in this course.	**A**	**B**	**C**	**D**	**E**	**F**
13. …the amount of my interaction with other students in this course increased.	**A**	**B**	**C**	**D**	**E**	**F**

14. …the quality of my interaction with other students in this course was better.	**A**	**B**	**C**	**D**	**E**	**F**
15. …I felt connected to other students in this course.	**A**	**B**	**C**	**D**	**E**	**F**
16. ...the amount of my interaction with the instructor in this course increased.	**A**	**B**	**C**	**D**	**E**	**F**
17. ...the quality of my interaction with the instructor in this course was better.	**A**	**B**	**C**	**D**	**E**	**F**
18. ...I was overwhelmed with information in this course.	**A**	**B**	**C**	**D**	**E**	**F**
19. …this course required extra effort.	**A**	**B**	**C**	**D**	**E**	**F**
20. ...this course improved my understanding of key concepts.	**A**	**B**	**C**	**D**	**E**	**F**
21. …this course helped me develop better communication skills.	**A**	**B**	**C**	**D**	**E**	**F**
22. …I had more opportunities in this course to reflect on what I have learned.	**A**	**B**	**C**	**D**	**E**	**F**
23. …the technology used in this course interfered with my learning.	**A**	**B**	**C**	**D**	**E**	**F**

Course Format Preferences

24. If the same course is being offered in different formats, which course format would you prefer?

- **A.** Entirely face-to-face course format
- **B.** Blended course format (meaning some face-to-face activities are replaced with online activities)
- **C.** Entirely online course format (with no face-to-face class time)

25. If you had a choice between attending lectures face-to-face or accessing lectures online which would you choose?

- **A.** Attending lectures face-to-face
- **B.** Accessing online downloadable videos of lectures
- **C.** A combination of both

26. If you had a choice between attending tutorials face-to-face or participating in tutorials online which would you choose?

- **A.** Attending tutorials face-to-face
- **B.** Participating in tutorials online
- **C.** A combination of both

27. If you had a choice between participation in classroom discussion or online discussion which would you choose?

- **A.** Class discussion
- **B.** Online discussion
- **C.** A combination of both

Additional Information

28. Please indicate which of the following best describes your situation:

- **A.** I live on campus.
- **B.** I commute to campus.

29. How many hours a week on average are you employed?

- **A.** I'm not working
- **B.** 1-9 hours
- **C.** 10-19
- **D.** 20-29
- **E.** 30-39

APPENDIX D: The CoI Survey

Community of Inquiry Survey Instrument (draft v14)

Teaching Presence

Design & Organization

1. The instructor clearly communicated important course topics.

2. The instructor clearly communicated important course goals.

3. The instructor provided clear instructions on how to participate in course learning activities.

4. The instructor clearly communicated important due dates/time frames for learning activities.

Facilitation

5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.

6. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.

7. The instructor helped to keep course participants engaged and participating in productive dialogue.

8. The instructor helped keep the course participants on task in a way that helped me to learn.

9. The instructor encouraged course participants to explore new concepts in this course.

10. Instructor actions reinforced the development of a sense of community among course participants.

Direct Instruction

11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.

12. The instructor provided feedback that helped me understand my strengths and weaknesses.

13. The instructor provided feedback in a timely fashion.

Social Presence

Affective expression

14. Getting to know other course participants gave me a sense of belonging in the course.

15. I was able to form distinct impressions of some course participants.

16. Online or web-based communication is an excellent medium for social interaction.

Open communication

17. I felt comfortable conversing through the online medium.

18. I felt comfortable participating in the course discussions.

19. I felt comfortable interacting with other course participants.

Group cohesion

20. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.

21. I felt that my point of view was acknowledged by other course participants.

22. Online discussions help me to develop a sense of collaboration.

Cognitive Presence

Triggering event

23. Problems posed increased my interest in course issues.

24. Course activities piqued my curiosity.

25. I felt motivated to explore content related questions.

Exploration

26. I utilized a variety of information sources to explore problems posed in this course.

27. Brainstorming and finding relevant information helped me resolve content related questions.

28. Online discussions were valuable in helping me appreciate different perspectives.

Integration

29. Combining new information helped me answer questions raised in course activities.

30. Learning activities helped me construct explanations/solutions.

31. Reflection on course content and discussions helped me understand fundamental concepts in this class.

Resolution

32. I can describe ways to test and apply the knowledge created in this course.

33. I have developed solutions to course problems that can be applied in practice.

34. I can apply the knowledge created in this course to my work or other non-class related activities.

5 point Likert-type scale

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

APPENDIX E: The Moodle Rubric

MOODLE COURSE WEBSITE EVALUATION RUBRIC

The framework employed was an adaptation of three existing evaluation rubrics frequently used to assess the design and delivery of online courses in higher education. These rubrics include: the *Quality Online Course Initiative (QOCI) Rubric*[1], the *Quality Matters Rubric*[2], and the *Rubric for Online Instruction*[3].

INSTRUCTIONS

The criteria are grouped into four areas of evaluation: (a) Moodle organization and layout design; (b) instructional design and delivery; (c) student engagement; and (d) student support and resources. The criteria provided in this evaluation rubric represent some of the most important issues instructors face when designing Moodle for their blended learning courses.

Here's how to use the rubric:

- Respond to each criterion along the 3-point scale (1 to 3) provided. The scale is provided along with each criterion. Please select "0," if evidence of the criterion is not present, but should be, based on design of a blended course and content; or present, but not appropriate for this course. Also, select "0," if the criterion is not applicable based on design of a blended course.
- There are three interpretive statements for each criterion that will assist the evaluator in selecting the right score.
- From a drop-down menu select the score that best represents your viewpoint regarding the Moodle course site. Be honest and realistic in your assessment.
- Although criteria ask the evaluator to rate the Moodle site in a quantitative way, the evaluator can respond from his/her own perspective in the "observation" field below each evaluation category.
- At the end of each evaluation category, the evaluator is provided with information on how to interpret the total score in a particular category. At the end of evaluation, interpretation for the final score is also provided to determine the overall state of the Moodle course design and implementation.

Rating Scale:

1 **"Developing"** (i.e., does not meet the criterion) means that little evidence of this criterion present, but it *needs improvement* (to be presented more clearly or better developed).
2 **"Appropriate"** (i.e., meets the criterion) means that evidence of this criterion is clear and is *appropriate* for this blended course. More could possibly be added.
3 **"Outstanding"** (i.e., exceeds the criterion) means that evidence of this criterion is clear, appropriate for this blended course, *exceeds the expectations of the "appropriate" criterion*, and *demonstrates best practices* in a manner that models its use.

[1] Quality Online Course Initiative (QOCI) Rubric. An initiative sponsored by Illinois Online Network (ION) University of Illinois. Retrieved February 09, 2012, from http://www.ion.uillinois.edu/initiatives/qoci/rubric.asp
[2] Quality Matters™Rubric Standards 2011-2013 (2011) developed by Quality Matters Program, Maryland Online Inc. Retrieved February 09, 2012, from http://www.qmprogram.org/files/QM_Standards_2011-2013.pdf
[3] Rubric for Online Instruction (2009). An initiative sponsored by California State University, Chico. Retrieved February 09, 2012, from http://www.csuchico.edu/tlp/resources/rubric/rubric.pdf

MOODLE ORGANIZATION AND LAYOUT DESIGN

Evaluation criteria	Criteria interpretation			Rating Score
	Developing (1)	**Appropriate (2)**	**Outstanding (3)**	
Ease and clarity of navigation of Moodle course website [1, 3]	Much of Moodle is under construction, with some key components identified such as the syllabus.	Moodle is organized and navigable. Students can understand the key components and structure of the course.	Moodle is well-organized and easy to navigate. Scrolling is minimized and facilitated with anchors. Hyperlinks are based on visual cues such as color, underlining, and text directives (e.g., Start here).	0
Consistent navigation from page to page throughout Moodle [1] *(i.e. use of frames)*	Windows open in inappropriate frames that might confuse students. Alien (third-party, other than those within Moodle) frames (widgets, applications) are used.	Most windows/hyperlinks open in appropriate frames that do not confuse students. The use of non- Moodle frames (applications) is avoided.	All windows/hyperlinks open in appropriate frames. The use of additional frames, other than those within the Moodle is avoided.	0
Visual consistency of a Moodle course website [1, 3] *(i.e., fonts, colours, layout, formatting, positioning of visual elements, etc.)*	The visual design elements (e.g., sizes and colours of heading and body text styles) are used inconsistently, and do not present course information clearly (long activity/resources names, cluttered with images or other dynamic visuals).	Most Moodle pages are visually consistent. Short activity/resources names are used. The use of images and other dynamic visual objects (animation, videos) is limited to only those that contribute to the learning experience	All Moodle pages are readable and visually consistent. Use of short names, images, and other dynamic visuals enhances the course and streamlines delivery of the content.	0
Functional consistency of a Moodle course website [1, 3] *(i.e., consistent use of language and terms, labels, blocks, content and resources, links)*	Moodle pages are functionally inconsistent and do not communicate course information clearly.	Most Moodle pages are functionally consistent, and communicate course information clearly and in sequential order.	All Moodle pages are functionally consistent, and communicate course information clearly and in sequential order throughout Moodle.	0
Use of multimedia [1, 2] *(i.e., audio, video)*	Multimedia files do not meet minimum standards, e.g., blurry (quality), too large size, or inadequate length of audio/video files – that restrict users' ability to view/download the file. Audio/video player required is not compatible with multiple operating systems and requires additional plug-ins.	Multimedia files meet minimum standards: clear (quality), adequate (size/length). Audio/video player required is compatible with multiple operating systems and requires only a free, standard, and easily downloadable plug-in.	Multimedia files exceed minimum standards and are optimized for efficient loading on computers with lower bandwidths. A written transcript is provided with all audio/video files.	0
Total score (in this category):				0

INSTRUCTIONAL DESIGN & DELIVERY

Evaluation criteria	Criteria interpretation			Rating score
	Developing (1)	**Appropriate (2)**	**Outstanding (3)**	
Organization of a blended course [2, 3]	Moodle provides fragmentary information about the blended course and its structure. It is unclear about what is expected of students in the course.	Moodle provides adequate information about the blended course, its structure. Specifically, it identifies and delineates the role the online component will play in the blended course.	Moodle provides extensive information about the blended course, the structure of learning; clearly delineates the role the online component will play in the course; and clarifies the relationship between the face-to-face and online components.	0
Building learning paths [1, 2] *(i.e., a logical way of structuring the course content – resources and activities)*	The structure of the course (e.g., modules and activities) is unclear on Moodle.	The course content on Moodle is logically sequenced *OR* grouped. Navigational instructions make clear how to get started and where to find various course components.	The course content on Moodle is logically sequenced *AND* integrated to help students engage with it. Instructions to students on how to meet the learning objectives are adequate.	0
Meeting the diverse learning needs of students [1, 3]	Moodle provides limited visual, textual, kinesthetic and/or auditory activities/multimedia resources to enhance student learning and accommodate different learning preferences.	Moodle provides adequate visual, textual, kinesthetic and/or auditory activities/multimedia resources to enhance student learning and accommodate different learning preferences.	Moodle provides multiple visual, textual, kinesthetic and/or auditory activities and multimedia resources to enhance student learning and accommodate different learning preferences.	0
Use of Moodle technology [1, 2]	Course uses limited Moodle tools to facilitate communication and learning.	Course uses adequate Moodle tools to facilitate communication and learning.	Course uses a variety of Moodle tools to appropriately facilitate communication and learning. The course design also takes advantage of other technologies and media to support the learning objectives.	0
Use of a variety of learning activities [1, 2, 3]	Moodle provides limited activities to help students master the content, develop critical thinking and/or problem-solving skills.	Moodle provides adequate activities to help students master the content, develop critical thinking and/or problem-solving skills.	Moodle provides multiple activities that help students master the content, develop critical thinking and problem-solving skills.	0
Total score in this category:				0

STUDENT ENGAGEMENT

Evaluation criteria	Criteria interpretation			Rating score
	Developing (1)	Appropriate (2)	Outstanding (3)	
Student-to-student interaction [1, 2, 3]	Moodle offers limited opportunity for student-to-student interaction and communication.	Moodle offers adequate opportunity for student-to-student interaction and communication. The requirements for interaction are clearly articulated.	Moodle offers ample opportunities and activities to foster student-to-student interaction and communication. Students are asked to introduce themselves to the class.	0
Student-to-instructor interaction [1, 2, 3]	Moodle offers limited opportunity for student-to-instructor interaction and communication.	Moodle offers adequate opportunity for student-to-instructor interaction and communication. Clear standards are set for instructor response and availability (turn-around time for email, grade posting).	Moodle offers ample opportunities for student-to-instructor interaction and communication. The course design prompts the instructor to be active and engaged with the students.	0
Student-to-content interaction [1, 2, 3]	Moodle offers limited opportunity for student-to-content interaction.	Moodle offers adequate opportunity for student-to-content interaction.	Moodle offers ample opportunities and activities to foster student-to-content interaction. Communication tools guide the student to become more engaged with the course content.	0
Organization and management of discussion forums [1]	Course engages students in Moodle discussions in a very limited way. Discussions are unstructured, inconsistent, and lack regulation.	Course takes the full advantage of Moodle forums and effectively engages students in online discussions. Discussions are organized in clearly defined forums and/or threads.	Moodle effectively engages students in Moodle discussions in a variety of ways and offers separate forums for community-related issues, course Q&A, content discussions, etc.	0
Organization and facilitation of group work [1]	Moodle offers limited opportunity for students to work in groups.	Moodle offers adequate opportunities for students to work in groups. Instructions on how to form groups and carry out the group's overall task are adequate.	Moodle offers ample opportunities for students to work in groups. The expectations of group participation and instructions on how to form groups and carry out the group's overall task are clearly stated.	0
Total score in this category				0

STUDENT SUPPORT & RESOURCES

Evaluation criteria	Criteria interpretation			Rating score
	Developing (1)	**Appropriate (2)**	**Outstanding (3)**	
Information about being a successful learner in a blended course [2, 3]	Moodle contains limited information about being a blended learner and offers limited resources for students to succeed in a blended course.	Moodle contains adequate information about being a blended learner and provides adequate resources for students to succeed in a blended course.	Moodle contains extensive information about being a blended learner and provides links to a wide range of tutorials and resources for students to succeed in a blended course.	0
Course-related information [1, 2, 3] *(See Note below for more details)*	Moodle provides limited course-specific resources, limited instructor information (e.g., contact information).	Moodle provides adequate course-specific resources, appropriate instructor information (e.g., contact or biographical information).	Moodle provides a variety of course-specific resources, extensive instructor information (contact, biographical, office and virtual availability information, and picture).	0
Technical support and resources [1, 2, 3] *(e.g., links to Moodle and other technology tutorials, contact information for technical assistance)*	Moodle offers limited information about technical support for Moodle and other course-related technologies that can assist students in effectively using the technologies in a blended course.	Moodle offers adequate information about technical support for Moodle and other course-related technologies in order to assist students in effectively using the technologies in a blended course.	Moodle offers access to a wide range of resources related to technical support for Moodle and other course-related technologies in order to assist students in effectively using the technologies in a blended course.	0
Academic support and resources [1, 2] *(i.e., links to library, academic advising, learning skills, ESL, counseling services, writing centre, etc.)*	Moodle provides limited information about (or links to) York's academic support that can assist students in improving their strategies for academic success and achieving their academic goals.	Moodle offers access to adequate resources related to York's academic support in order to assist students in improving their strategies for academic success and achieving their academic goals.	Moodle offers access to a wide range of resources related to York's academic support in order to assist students in improving their strategies for academic success and achieving their academic goals.	0
Institutional/program support and resources [1] *(i.e., academic integrity expectations, grading and attending policies, emergencies, etc.)*	Moodle provides limited information about university and program policies, procedures, and regulations, and limited contact information for department and program.	Moodle offers access to adequate resources related to university and program policies, procedures, and regulations, and provides some contact information for department and program.	Moodle offers access to a comprehensive list of resources related to university and program policies, procedures, and regulations, and provides full contact information for department and program.	0
Total score in this category				0

Note: Components of course-related information include (but not limited to) articulation or link to: course description, **syllabus**, **navigational instructions** (i.e., how to get started and where to find various course components), **course resources** (i.e., a list of textbooks and other instructional materials needed for the course), instructions on how to access resources at a distance, **grading scale and weights**, **calendar of due dates** and other events, **a code of online conduct** (i.e., netiquette expectations with regard to Moodle discussions, email, and other forms of communication), **the requirements for course interaction**, a list of technical competencies and minimum learning skills (if applicable, prerequisite knowledge in the discipline) necessary for course completion, a list of technical requirements, and any other instructions to students on how to meet the course objectives. **In bold** – essential elements the blended course must have present on Moodle as part of the "appropriate" criterion.

Interpretation of the total score in this category

13-15 (90-100%) Moodle exceeds the expectations of the "appropriate" criteria for student support and resources. Overall, the Moodle site demonstrates best practices in a manner that models its use.

10-12 (67-89%) Moodle meets the minimum criteria for adequate student support and resources, and appropriate for a blended course.

5-9 (33-66%) Moodle shows little evidence of the criteria for adequate student support and resources. Some resources need to be presented more clearly and/or better developed.

4 > (32% and less) Moodle does not meet the minimum criteria for adequate student support and resources, and may prevent students from access to available resources to improve their strategies for academic success in the blended course. Major improvements are needed in articulating an explanation of how available support systems can assist students and/or in providing links to available resources that answer students' questions for the duration of the blended course.

Observation notes

[Comments]

Final decision

Total rating score:

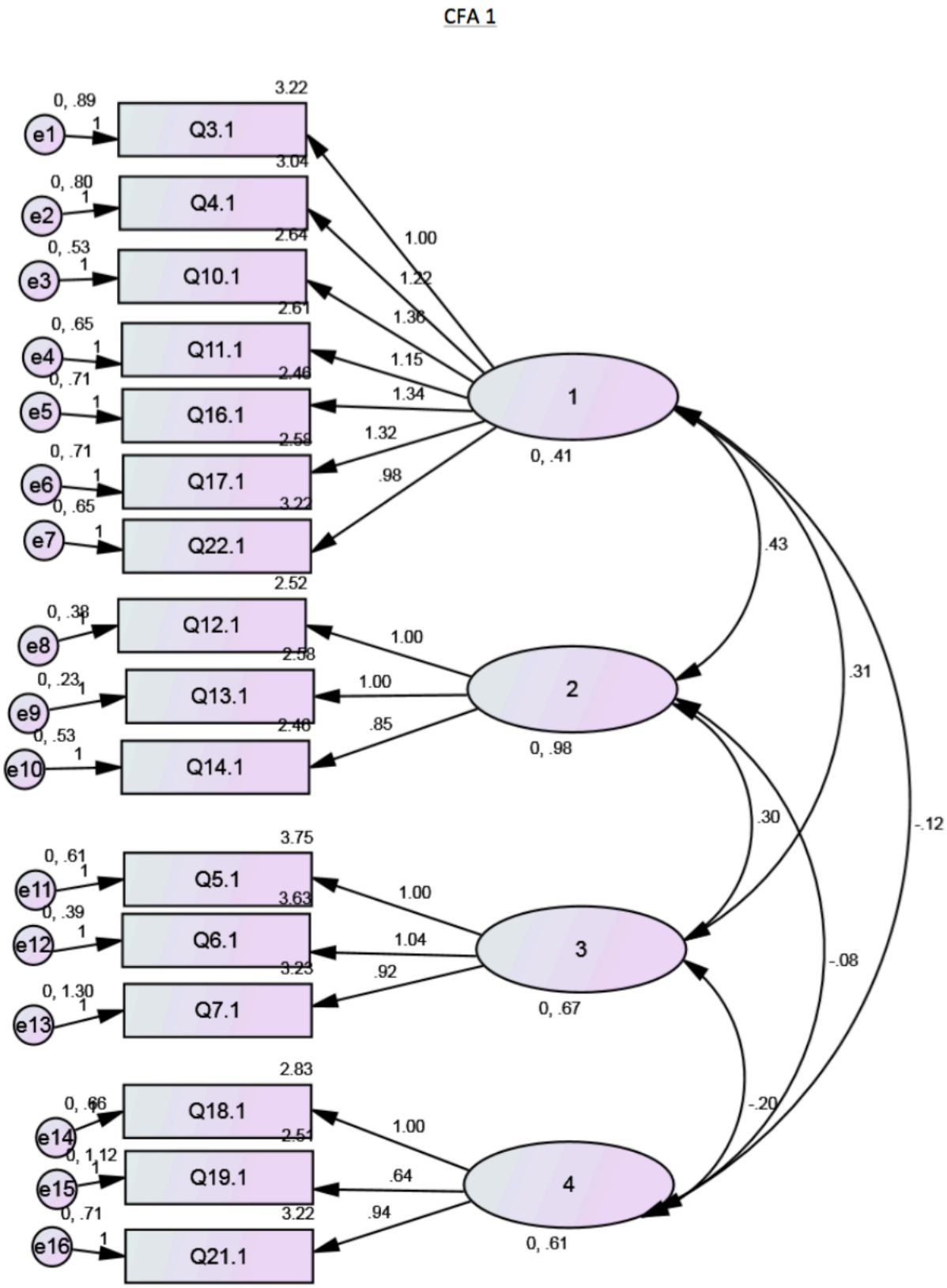
54-60 (90-100%) The Moodle site exceeds the expectations of the "appropriate" criteria a blended course must meet. It thus demonstrates best practices in a manner that models its use.

40-53 (67-89%) The Moodle site meets the expectations appropriate for a blended course. More could possibly be added.

20-39 (33-66%) The Moodle site is under development, little evidence of the expectations appropriate for a blended course present. Therefore, Moodle needs to be presented more clearly or better developed.

> 19 (32% and less) Moodle does not meet the minimum criteria appropriate for a blended course, but there are potential improvement opportunities.

APPENDIX F: Presence Variables: Confirmatory Factor Analysis



Number of distinct sample moments:	152
Number of distinct parameters to be estimated:	54
Degrees of freedom (152 - 54):	98

Result (Default model)

Minimum was achieved
Chi-square = 1841.319
Degrees of freedom = 98
Probability level = .000

Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Q3.1	<---	1	1.000				
Q4.1	<---	1	1.218	.057	21.505	***	
Q10.1	<---	1	1.355	.058	23.566	***	
Q11.1	<---	1	1.153	.053	21.913	***	
Q16.1	<---	1	1.338	.059	22.596	***	
Q17.1	<---	1	1.325	.059	22.532	***	
Q22.1	<---	1	.981	.048	20.612	***	
Q12.1	<---	2	1.000				
Q13.1	<---	2	1.004	.023	44.572	***	
Q14.1	<---	2	.847	.023	36.891	***	
Q5.1	<---	3	1.000				
Q6.1	<---	3	1.035	.041	24.971	***	
Q7.1	<---	3	.924	.045	20.415	***	
Q18.1	<---	4	1.000				
Q19.1	<---	4	.637	.050	12.659	***	
Q21.1	<---	4	.942	.069	13.723	***	

APPENDIX G: Results

SEM RESULTS – SYNTAX

```
Structural equation model                       Number of obs     =      1,926
Estimation method  = adf
Discrepancy        =  .02383839

------------------------------------------------------------------------------
Standardized |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Structural   |
  socia~e <- |
  teacher_~e |   .2344256   .0827762     2.83   0.005     .0721872     .396664
    Presence |   .1116141   .2804773     0.40   0.691    -.4381112    .6613394
       _cons |   1.833308    .446919     4.10   0.000     .9573631    2.709253
  -----------+----------------------------------------------------------------
  cogni~e <- |
  social_p~e |   .4452636   .0363134    12.26   0.000     .3740907    .5164366
    Presence |   .4904086   .1385946     3.54   0.000     .2187682     .762049
       _cons |   2.845321   .1615258    17.62   0.000     2.528737    3.161906
  -----------+----------------------------------------------------------------
  teach~e <- |
    Presence |    .709497    .036433    19.47   0.000     .6380897    .7809043
       _cons |   4.812141   .154271     31.19   0.000     4.509775    5.114506
  -----------+----------------------------------------------------------------
  stude~e <- |
     Quality |  -.0510157   .023278     -2.19   0.028    -.0966399   -.0053916
       _cons |   3.703392   .1229843    30.11   0.000     3.462347    3.944437
  -----------+----------------------------------------------------------------
  Prese~e <- |
  student_~e |  -.4103465   .0327078   -12.55   0.000    -.4744526   -.3462403
     Quality |    .092089   .028464     3.24   0.001     .0363006    .1478774
-------------+----------------------------------------------------------------
Measurement  |
  Grade <-   |
    Presence |   .1614238   .0349533     4.62   0.000     .0929165     .229931
       _cons |   3.730991   .1059938    35.20   0.000     3.523247    3.938735
-------------+----------------------------------------------------------------
var(e.soci~e)|   .8954587   .0197279                      .8576157    .9349715
var(e.cogn~e)|   .4398579   .0310113                      .3830894    .5050386
var(e.teac~e)|    .496614   .0516982                      .4049559     .609018
var(e.stud~e)|   .9973974   .0023751                      .9927531    1.002063
 var(e.Grade)|   .9739424   .0112846                      .9520742    .9963128
var(e.Pres~e)|   .8192798    .026754                      .7684858    .8734311
------------------------------------------------------------------------------
Discr. test of model vs. saturated: chi2(6)   =    38.64, Prob > chi2 = 0.0000
```

BLEND FORMAT & GRADE – POST-HOC COMPARISONS

Dependent Variable: Grade

Tamhane

(I) Course format	(J) Course format	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
F1: Web Enhanced	F2: In-Class Lectures + Blended Tutorials	-.77840*	.16181	.000	-1.2343	-.3225
	F3: In-Class Lectures + Online Tutorials	-.49301	.24142	.348	-1.1732	.1872
	F4: Online Lectures + F2F Tutorials	.28277	.16622	.609	-.1852	.7508
	F5: Fully Online + F2F Tutorial Option	-.67633*	.16811	.001	-1.1496	-.2031
F2: In-Class Lectures + Blended Tutorials	F1: Web Enhanced	.77840*	.16181	.000	.3225	1.2343
	F3: In-Class Lectures + Online Tutorials	.28539	.19896	.810	-.2778	.8486
	F4: Online Lectures + F2F Tutorials	1.06118*	.09448	.000	.7961	1.3263
	F5: Fully Online + F2F Tutorial Option	.10207	.09778	.970	-.1724	.3765
F3: In-Class Lectures + Online Tutorials	F1: Web Enhanced	.49301	.24142	.348	-.1872	1.1732
	F2: In-Class Lectures + Blended Tutorials	-.28539	.19896	.810	-.8486	.2778
	F4: Online Lectures + F2F Tutorials	.77578*	.20256	.002	.2028	1.3488
	F5: Fully Online + F2F Tutorial Option	-.18332	.20412	.990	-.7605	.3939

	Tutorial Option					
F4: Online Lectures + F2F Tutorials	F1: Web Enhanced	-.28277	.16622	.609	-.7508	.1852
	F2: In-Class Lectures + Blended Tutorials	-1.06118*	.09448	.000	-1.3263	-.7961
	F3: In-Class Lectures + Online Tutorials	-.77578*	.20256	.002	-1.3488	-.2028
	F5: Fully Online + F2F Tutorial Option	-.95911*	.10491	.000	-1.2534	-.6648
F5: Fully Online + F2F Tutorial Option	F1: Web Enhanced	.67633*	.16811	.001	.2031	1.1496
	F2: In-Class Lectures + Blended Tutorials	-.10207	.09778	.970	-.3765	.1724
	F3: In-Class Lectures + Online Tutorials	.18332	.20412	.990	-.3939	.7605
	F4: Online Lectures + F2F Tutorials	.95911*	.10491	.000	.6648	1.2534

BLEND FORMAT & STUDENT ADOPTION ATTITUDES – POST-HOC COMPARISONS

Dependent Variable: Student Adoption Attitude

Tamhane

(I) Course format	(J) Course format	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
F1: Web Enhanced	F2: In-Class Lectures + Blended Tutorials	.22086*	.06475	.007	.0388	.4029
	F3: In-Class Lectures + Online Tutorials	.21871	.08110	.071	-.0097	.4471
	F4: Online Lectures + F2F Tutorials	-.02107	.06415	1.000	-.2014	.1593
	F5: Fully Online + F2F Tutorial Option	.10818	.06394	.616	-.0716	.2880
F2: In-Class Lectures + Blended Tutorials	F1: Web Enhanced	-.22086*	.06475	.007	-.4029	-.0388
	F3: In-Class Lectures + Online Tutorials	-.00215	.07281	1.000	-.2075	.2032
	F4: Online Lectures + F2F Tutorials	-.24193*	.05329	.000	-.3914	-.0924
	F5: Fully Online + F2F Tutorial Option	-.11268	.05303	.292	-.2615	.0362
F3: In-Class Lectures + Online Tutorials	F1: Web Enhanced	-.21871	.08110	.071	-.4471	.0097
	F2: In-Class Lectures + Blended Tutorials	.00215	.07281	1.000	-.2032	.2075
	F4: Online Lectures + F2F Tutorials	-.23978*	.07228	.010	-.4437	-.0359
	F5: Fully Online + F2F Tutorial Option	-.11053	.07209	.741	-.3139	.0928

F4: Online Lectures + F2F Tutorials	F1: Web Enhanced	.02107	.06415	1.000	-.1593	.2014
	F2: In-Class Lectures + Blended Tutorials	.24193*	.05329	.000	.0924	.3914
	F3: In-Class Lectures + Online Tutorials	.23978*	.07228	.010	.0359	.4437
	F5: Fully Online + F2F Tutorial Option	.12925	.05229	.128	-.0175	.2759
F5: Fully Online + F2F Tutorial Option	F1: Web Enhanced	-.10818	.06394	.616	-.2880	.0716
	F2: In-Class Lectures + Blended Tutorials	.11268	.05303	.292	-.0362	.2615
	F3: In-Class Lectures + Online Tutorials	.11053	.07209	.741	-.0928	.3139
	F4: Online Lectures + F2F Tutorials	-.12925	.05229	.128	-.2759	.0175

*. The mean difference is significant at the 0.05 level.

BLEND FORMAT & PRESENCE – POST-HOC COMPARISONS

Tamhane

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Cognitive Presence	F1: Web Enhanced	F2: In-Class Lectures + Blended Tutorials	.0678	.07081	.984	-.1314	.2669
		F3: In-Class Lectures + Online Tutorials	-.1560	.08617	.521	-.3986	.0867
		F4: Online Lectures + F2F Tutorials	-.0869	.06775	.893	-.2775	.1038
		F5: Fully Online + F2F Tutorial Option	-.2758*	.06803	.001	-.4673	-.0844
	F2: In-Class Lectures + Blended Tutorials	F1: Web Enhanced	-.0678	.07081	.984	-.2669	.1314
		F3: In-Class Lectures + Online Tutorials	-.2237*	.07409	.027	-.4327	-.0148
		F4: Online Lectures + F2F Tutorials	-.1546*	.05153	.027	-.2992	-.0100
		F5: Fully Online + F2F	-.3436*	.05188	.000	-.4892	-.1979

F3: In-Class Lectures + Online Tutorials	F1: Web Enhanced	.1560	.08617	.521	-.0867	.3986
	F2: In-Class Lectures + Blended Tutorials	.2237*	.07409	.027	.0148	.4327
	F4: Online Lectures + F2F Tutorials	.0691	.07117	.982	-.1318	.2701
	F5: Fully Online + F2F Tutorial Option	-.1198	.07143	.630	-.3215	.0818
F4: Online Lectures + F2F Tutorials	F1: Web Enhanced	.0869	.06775	.893	-.1038	.2775
	F2: In-Class Lectures + Blended Tutorials	.1546*	.05153	.027	.0100	.2992
	F3: In-Class Lectures + Online Tutorials	-.0691	.07117	.982	-.2701	.1318
	F5: Fully Online + F2F Tutorial Option	-.1889*	.04762	.001	-.3226	-.0553

		Option					
	F5: Fully Online + F2F Tutorial Option	F1: Web Enhanced	.2758*	.06803	.001	.0844	.4673
		F2: In-Class Lectures + Blended Tutorials	.3436*	.05188	.000	.1979	.4892
		F3: In-Class Lectures + Online Tutorials	.1198	.07143	.630	-.0818	.3215
		F4: Online Lectures + F2F Tutorials	.1889*	.04762	.001	.0553	.3226
Social Presence	F1: Web Enhanced	F2: In-Class Lectures + Blended Tutorials	-.0802	.08300	.983	-.3136	.1532
		F3: In-Class Lectures + Online Tutorials	.1833	.10072	.514	-.1004	.4669
		F4: Online Lectures + F2F	-.0507	.07839	.999	-.2713	.1699

	F5: Fully Online + F2F Tutorial Option	-.0070	.07950	1.000	-.2307	.2167
F2: In-Class Lectures + Blended Tutorials	F1: Web Enhanced	.0802	.08300	.983	-.1532	.3136
	F3: In-Class Lectures + Online Tutorials	.2635*	.08916	.033	.0120	.5149
	F4: Online Lectures + F2F Tutorials	.0295	.06283	1.000	-.1469	.2058
	F5: Fully Online + F2F Tutorial Option	.0732	.06422	.947	-.1071	.2534
F3: In-Class Lectures + Online Tutorials	F1: Web Enhanced	-.1833	.10072	.514	-.4669	.1004
	F2: In-Class Lectures + Blended Tutorials	-.2635*	.08916	.033	-.5149	-.0120
	F4: Online Lectures + F2F Tutorials	-.2340	.08488	.061	-.4736	.0057
	F5: Fully Online + F2F Tutorial Option	-.1903	.08591	.244	-.4328	.0522

F4: Online Lectures + F2F Tutorials	F1: Web Enhanced	.0507	.07839	.999	-.1699	.2713
	F2: In-Class Lectures + Blended Tutorials	-.0295	.06283	1.000	-.2058	.1469
	F3: In-Class Lectures + Online Tutorials	.2340	.08488	.061	-.0057	.4736
	F5: Fully Online + F2F Tutorial Option	.0437	.05814	.998	-.1194	.2068
F5: Fully Online + F2F Tutorial Option	F1: Web Enhanced	.0070	.07950	1.000	-.2167	.2307
	F2: In-Class Lectures + Blended Tutorials	-.0732	.06422	.947	-.2534	.1071
	F3: In-Class Lectures + Online Tutorials	.1903	.08591	.244	-.0522	.4328
	F4: Online Lectures + F2F Tutorials	-.0437	.05814	.998	-.2068	.1194

Teacher Presence	F1: Web Enhanced	F2: In-Class Lectures + Blended Tutorials	-.2529*	.08326	.025	-.4872	-.0186
		F3: In-Class Lectures + Online Tutorials	-.2692*	.09223	.036	-.5288	-.0096
		F4: Online Lectures + F2F Tutorials	-.2115	.08017	.083	-.4373	.0142
		F5: Fully Online + F2F Tutorial Option	-.4684*	.08035	.000	-.6946	-.2421
	F2: In-Class Lectures + Blended Tutorials	F1: Web Enhanced	.2529*	.08326	.025	.0186	.4872
		F3: In-Class Lectures + Online Tutorials	-.0163	.07246	1.000	-.2204	.1879
		F4: Online Lectures + F2F Tutorials	.0414	.05632	.998	-.1167	.1994
		F5: Fully Online + F2F Tutorial Option	-.2155*	.05658	.001	-.3743	-.0567

F3: In-Class Lectures + Online Tutorials	F1: Web Enhanced	.2692*	.09223	.036	.0096	.5288
	F2: In-Class Lectures + Blended Tutorials	.0163	.07246	1.000	-.1879	.2204
	F4: Online Lectures + F2F Tutorials	.0577	.06889	.994	-.1366	.2519
	F5: Fully Online + F2F Tutorial Option	-.1992*	.06910	.041	-.3941	-.0043
F4: Online Lectures + F2F Tutorials	F1: Web Enhanced	.2115	.08017	.083	-.0142	.4373
	F2: In-Class Lectures + Blended Tutorials	-.0414	.05632	.998	-.1994	.1167
	F3: In-Class Lectures + Online Tutorials	-.0577	.06889	.994	-.2519	.1366
	F5: Fully Online + F2F Tutorial Option	-.2568*	.05193	.000	-.4025	-.1112
F5: Fully Online + F2F Tutorial Option	F1: Web Enhanced	.4684*	.08035	.000	.2421	.6946
	F2: In-Class Lectures + Blended Tutorials	.2155*	.05658	.001	.0567	.3743
	F3: In-Class Lectures + Online Tutorials	.1992*	.06910	.041	.0043	.3941
	F4: Online Lectures + F2F Tutorials	.2568*	.05193	.000	.1112	.4025

Based on observed means.
The error term is Mean Square(Error) = .794.
*. The mean difference is significant at the .05 level.