2017

Beauty in online learning environments: A quantitative study of the impact of expressive aesthetics on student engagement in blended courses

Shane Alexander Kelley
Bethel University

Beauty in online learning environments: A quantitative study of the impact of expressive aesthetics on student engagement in blended courses

by
Shane A. Kelley

A dissertation submitted to the faculty of Bethel University
in partial fulfillment of the requirements for the degree of
Doctor of Education

Saint Paul, MN
2016

Approved by:

Advisor: Joel Frederickson

Reader: Amy Hutchison

Reader: Matthew Putz

Abstract

With the growing proportion of blended and online courses in higher education, it is increasingly important to understand how the online learning environments of these courses can impact student engagement. One important element of these online learning environments that is not yet understood is the role of expressive aesthetics. In this study, thirty graduate students participated in two different online environments of approximately equal usability – except for expressive aesthetics – to determine how this difference might affect student engagement in a blended learning course. Using a quantitative experimental repeated measures design, students encountered both a high expressive aesthetics and a low expressive aesthetics environment and their level of engagement in each environment was compared. The results of this study showed that there was no significant difference in student engagement between these two environments. These findings suggest that the usability of an online learning environment is more important than the "look" of that environment. The outcomes of this study can help educational leaders consider the role of instructional designers and online instructors in course development, the impact of the online environment on blended learning, and the optimal level of aesthetic emphasis in the design of learning management systems that will encourage student engagement.

Acknowledgements

This work is dedicated to my family and friends.

Mom and Dad – thank you for investing so much in me over the years and for always encouraging me to grow in knowledge.

Samantha -thank you for taking on so much in stewarding our family and our home in order to give me space for this dissertation journey. You are my greatest treasure on this earth, and my next advanced degree is assuredly going to be a Ph.D. in how to love and serve you more!

Jeff – thank you for seeing potential in me to serve God's Kingdom through graduate education and for getting our church family behind my pursuit of a doctoral degree. You have shown me what it means to be a godly leader.

Dr. Frederickson, Dr. Putz, and Dr. Hutchison – thank you for walking me through the foreign (to me) world of dissertation research and for helping me put an exclamation mark on my educational journey.

Table of Contents

List of Tables

Chapter I: Introduction

Introduction to the Problem

As a "thoughtful fusion of face-to-face and online learning experiences" (Garrison & Kanuka, 2004), blended learning can take many forms. Instructors delivering courses through blended learning environments typically seek to employ the best aspects of online delivery and the best aspects of face-to-face delivery in order to meet the course objectives. However, while blended environments attempt to capture the best of both approaches, this delivery format also invites additional variables into the learning experience. There is no need to consider the dynamics of a face-to-face learning experience in a fully online course. Likewise, there is no need to consider the complexity of online learning in a course that is fully taught face-to-face. When teaching in blended learning environments, instructors must account for the contributions of both approaches to the student experience.

Adding to this complexity is the notion that each course "blends" differently (Osguthorpe & Graham, 2003). There is a need for further study as educational researchers seek to identify the consequential changes that can affect the delivery of a blended learning course. One vein of blended learning research is the study of course design elements that will elicit strong student engagement (Bliuc, Goodyear, & Ellis, 2007; Delialioğlu, 2012; Owston, York, & Murtha, 2013). The present study will contribute to this body of research by identifying the role of aesthetics of the online environment on student engagement within a blended learning course.

Blended learning courses emerged around the year 2000 as a method of mixing face-to-face and online delivery systems with the goal of improving upon the delivery of fully online or fully face-to-face courses (Osguthorpe & Graham, 2003). Also referred to as "hybrid" courses, blended courses can include varying proportions of online and face-to-face elements, leading to

difficulty in strictly defining the concept (Bliuc et al., 2007). Thus, researchers have attempted to categorize blended courses as follows: web-facilitated courses (less than 20% of content delivered through the online medium), blended courses (30-79% of content delivered online) and online courses (80+% delivered online; Allen & Seaman, 2015). However, these definitions are still not universally accepted throughout the e-learning community (Mayadas, Miller, & Sener, 2015). Lin and Overbaugh (2009) referred to blended instruction as "a blend of both traditional classroom instruction and online learning activities…including synchronous and asynchronous communication modes" (p. 999). This definition is broad enough to include varying levels of blending and still captures the distinctive nature of this mode of course delivery. Therefore, Lin and Overbaugh's (2009) definition will be applied to the current study.

Due to the combining of face-to-face and online elements in a blended learning course, the blended format also introduces a level of complexity in determining which elements of the course particularly elicit student understanding (Bliuc et al., 2007), student achievement (Owston et al., 2013) and student engagement (Delialioğlu, 2012). In their foundational research on blended learning, Osguthorpe and Graham (2003) called for online and face-to-face content not be perceived as separate entities but instead as an integrated whole. Further research suggests that the face-to-face learning environment should not be merely mediated by technology (or vice versa). Instead, the blended course should be designed from a holistic approach that is able to accommodate various learning styles (Bauk, Scepanovic, & Kopp, 2014) and geared toward common outcomes (Bliuc et al., 2007). The instructor – beyond grading and managing the face-to-face classroom – must also be an expert facilitator of the online environment (Hung & Chou, 2015) and ensure that the interdependence of the online and face-to-face environment does not lead to an overwhelming load of work for students (Gedik, Kiraz, & Ozden, 2012). The design of

online environment, then, holds great consequences for students, instructors, and the overall efficacy of the blended learning course.

Factors contributing to the success of online learning environments.

As researchers continue to demonstrate the importance of the design of the online learning environment, some are developing comprehensive e-learning evaluations that are intended to guide course designers and instructors. These models function as a checklist for designing and evaluating the design of the online environment within blended courses. A basic understanding of these models is necessary to understand the relative role of each factor of the online environment, including the factors that will become the focus of this study.

Models of evaluation.

In their model for Measuring E-Learning Success (MELSS), Hassanzadeh, Kanaani, and Elahi (2012) labeled technical system quality, content and information quality, system quality, user satisfaction, intention to use, use of system, loyalty to system, benefits of use, and goals achievement as the components of the online environment necessary for determining e-learning success. Ozkan and Koseler (2009) developed the Hexagonal e-learning Assessment Model (HELAM), which evaluates the online environment on social issues such as supportive factors, learner perspectives, and instructor attitudes along with technical issues such as system quality, information quality, and service quality. In their survey of a multitude of comprehensive e-learning evaluations, Daskalakis and Tselios (2011) noted that the common factors contributing to success of online learning environments include self-efficacy, computer anxiety, perceived enjoyment, satisfaction, cognitive absorption, and usability. Within these comprehensive studies exists a common focus on the importance of the system used to deliver the online aspects of a course and the interactions of the user with that system. A helpful umbrella term that captures

these issues is "usability."

Introduction to Usability.

The concept of usability in the online environment has its roots in human-computer interaction (HCI) research - focusing on criteria such as time to learn, error rate, and performance factors (Tractinsky, 2000). Since the term is a carryover from a different area of research, sometimes the term "usability" is not seen in educational research, but is instead implied by terms such as ease of use (David & Glore, 2010), organization and navigation (Precel et al., 2009), and system or service quality (Ozkan & Koseler, 2009; Chiu, Hsu, Sun, Lin & Sun, 2005). Zaharias (2009) built the clearest bridge between HCI and educational research by outlining a complete framework for understanding usability in the online learning environment – including five sub-factors of usability: navigation, learnability, accessibility, consistency, and visual design.

Introduction to Aesthetics.

In carrying over Zaharias' (2009) breakdown of usability, it is apparent that visual design has some impact on the user experience with an online course. However, visual design – or, "aesthetics" – is currently relegated to the level of a sub-concept of usability, and the role of aesthetics in the online learning environment is an undeveloped area of educational research (David & Glore, 2010). Research on aesthetics in the digital realm also has its foundations in HCI research, and is largely focused on discovering the best balance between usability and aesthetics in the user's digital experience (Lavie & Tractinsky, 2004a).

As might be expected, the term "aesthetics" can have a variety of definitions. However, Lavie & Tractinsky (2004a) helpfully separated the concept into the "classical" and "expressive" aesthetic, with the classical dimension placing emphasis on orderliness and clarity and the

expressive aesthetic prioritizing creativity and originality. Since the classical aesthetic displays much overlap with the concept of usability, the expressive aesthetic will be the fulcrum concept in the present study.

So far, HCI research has elicited mixed results in demonstrating causal links between aesthetics and user satisfaction (Tractinsky, 2000; Tuch et al., 2012). HCI aesthetics research has been treated only briefly in educational research (Pomales-Garcia & Liu, 2006; Miller, 2011; Heidig, Müller, & Reichelt, 2015), so further understanding is needed to understand how the aesthetics of the online environment impacts students involved in higher education.

Evaluating Student Engagement.

One method of studying the impact of online environment design on students is by evaluating their engagement relative to different course designs. Student Engagement can be broadly understood – at a program level or institution level – as student participation in activities that are academic in nature and assumed to be significant to learning (Kuh, 2001). At this broader level, The National Survey on Student Engagement (NSSE) lists five benchmarks in assessing student engagement – level of academic challenge, active and collaborative learning, student interactions with faculty members, enriching educational experiences, and supportive campus environment

Student engagement can also be understood at the course-level as "the extent to which students actively engage by thinking, talking, and interacting with the content of a course, the other students in the course, and the instructor" (Dixson, 2015, p. 2). At this level, the construct of Student Engagement has been shown to have four factors - skills engagement, emotional engagement, participation/interaction engagement, and performance engagement (Handelsman, Briggs, Sullivan, & Towler, 2005; Dixson, 2015). Skills engagement deals with the elements of

interaction with the course that have to do with study skills. Emotional engagement relates to the affective elements of interaction with the course. Participation/interaction engagement refers to the elements of the course that demonstrate active participation. Performance engagement relates to the elements of the course that are graded and demonstrate achievement of course outcomes (Dixson, 2015).

A survey of research demonstrates that student engagement is strongly related to learning outcomes (Carini, Kuh, & Klein, 2006); use of course technology (Chen, Lambert, & Guidry, 2010), higher-order thinking (Pike, Smart, & Ethington, 2012), and persistence (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008). Student engagement is a robust topic of study in higher education and researchers have developed a variety of tools for studying this concept both at the program level and the course level (Mandernach, 2015). Student Engagement measures provide useful mechanisms for comparing practices in higher education, including comparison of course delivery models and aspects of those models. In the current study, online environments of differing levels of expressive aesthetics will be compared to one another using Student Engagement as the dependent variable.

Background of the Study

Blended (or hybrid) learning is a growing trend in higher education, with 79% of students in U.S. based institutions having now participated in at least one blended learning course (Dahlstrom, Walker, & Dziuban, 2013). Even amidst the difficulty of defining the standards of what constitutes "blended" learning, this course delivery method continues to show promise. In their nationwide survey of chief academic officers, Allen & Seaman (2015) found that most academic leaders found blended learning outcomes to be the same as (56.6%) or superior to (32.8%) face-to-face learning outcomes. In a study of a university's initiative to transition a

major proportion of course offerings to a blended format, Owston et al. (2013) found that students showed greater satisfaction with blended courses than those in the lecture format and that high-achieving students connected this delivery format to greater convenience, flexibility, engagement, and improved understanding of course concepts. Further, blended learning is linked to reduction of dropout rates and higher student grades (Lopez-Perez, Perez-Lopez, & Rodriguez-Ariza, 2011).

Despite the perceived benefit and usefulness of blended learning, blended course instructors take on a demanding and multi-faceted role in teaching their courses. (Chang, Shen & Liu, 2014; Hung & Chou, 2015). Much is demanded of students as well, particularly with relation to self-regulatory behavior. The ability of students to engage with online and blended courses is linked to this self-regulatory behavior, with research indicating that self-regulation is significantly related to student satisfaction, usefulness, and self-efficacy (Liaw & Huang, 2013). Perceived effectiveness, usefulness and information quality in the online environment are also correlated with student self-regulation in the online environment (Lee & Lee, 2008). It is clear from this body of research that both the instructor's pedagogical approach *and* his or her ability to facilitate an online environment are important factors for engaging students.

One tactic that is often undertaken to address these and other issues of design in online and blended courses is to have course developers (also known as instructional designers or educational technologists) design the online environment in place of the instructor (Precel, Eshet-Alkalai, & Alberton, 2009). This is a common practice that has gained acceptance in education, with the Bureau of Labor Statistics reporting 147,700 such positions nationwide (U.S. Department of Labor, 2015). In most cases, instructional designers are "teacher educators" who can bear the burden of design – allowing instructors to focus on content (Beabout et al., 2006).

However, Precel, Eshet-Alkalai, and Alberton (2009) cautioned that this separation of design and content is a critical paradox in online learning. In fact, the strategy of limiting the role of the instructor in course design may highlight an underlying assumption that the design of the online learning environment needs to be sufficiently complicated or time-consuming that the instructors of the courses should not undertake the design process themselves.

Researchers present conflicting evidence on the importance of preserving the instructor's role as teacher *and* designer. On one hand, instructors that do attempt to teach and design a course report a higher workload for online course preparation than what they experience in traditional classroom preparation (Seaman, 2009). Further barriers to adopting the role of designer and facilitator of a blended learning course include the challenge of planning and designing the course, the difficulty of communicating with students on these multiple levels, and lack of familiarity with technology (Ocak, 2011).

However, research also indicates that students and faculty alike place a high value on instructors who can both design and facilitate a course. Chang, Shen and Liu (2014) reported that university faculty perceived the roles of instructional designer and content expert to be more important than other course roles such as assessor, facilitator, and researcher. Hung and Chou (2015) found that students perceived the roles of designer, organizer, and technology facilitator to be the most important for online instructors.

Further research is needed to determine the ideal role of the instructional designer and the instructor in the construction of the online environment of a course. Depending on the educational context, this deeper understanding could either encourage faculty to take on more design influence on their courses or assist instructional designers in training instructors. In either case, more common language must be developed between designers and instructors. While

faculty report a willingness to adopt blended learning, technologists continue to attribute low motivation and enthusiasm to faculty members, even citing this as the biggest challenge for universities to offer blended learning courses (Oh & Park, 2009). A better understanding of the role of aesthetics within the online environment could bridge this divide. If expressive aesthetic emphasis does not facilitate greater student engagement, then attention can be directed toward other design elements. If aesthetic emphasis does facilitate greater student engagement - instructional designers and instructors alike can incorporate this knowledge into training faculty to construct blended learning courses. Research demonstrates that faculty would receive this training well and would also be more willing to put the extra effort into designing and facilitating online aspects of the course (Bailey & Card, 2009; Roby, Ashe, Singh, & Clark, 2013).

Understanding the instructor-technology interactions can contribute to better online environment design, but this understanding must also be supplemented with a greater understanding of student-technology interactions. Online education has penetrated the landscape of higher education to such a degree that "computer anxiety" has emerged as a major topic of research (Celik & Yesilyurt, 2013). While nationwide surveys indicate that most students in U.S. higher education believe that technology helps achieve academic outcomes, these students also are less interested in using innovative tools than they are in clearly understanding the expectations of technology use within a course (Dahlstrom et al., 2013).

If students only want to know the "basics," then perhaps the new tools, features, and aesthetics of online environments can be prioritized less. Most academic leaders believe that discipline, not technological innovation, is important for online students (Allen & Seaman, 2015) and research supports the importance of this "computer self-efficacy" (Celik & Yesilyurt, 2013). If ensuring disciplined progress through online courses is important to academic leaders, then it

may be that course organization, coherence, and usability should be prioritized more than originality. Thus, students, faculty, and academic leaders will benefit from gaining understanding on the role of usability and aesthetics in the transmission of knowledge through technology.

Consideration of the current state of the learning management system (LMS) in higher education provides another helpful lens through which to consider the significance of understanding the role of expressive aesthetics in the online learning environment. The LMS is the primary means of delivering content in an online or blended course. Popular LMSs in American higher education include Blackboard, Desire2Learn, Instructure Canvas, Moodle, Pearson LearningStudio, and Sakai. LMS software enables faculty and administration to use a common tool to pull together course content resources, student activities, and assessment in a secure online environment (Wright et al., 2014).

Given these commonalities, one method of competing against other LMSs involves introducing new updates and features that could set their system apart. Yet, faculty members report that these new tools are only lightly used (Brown, Dehoney, & Millichap, 2015) and students continue to highlight the importance of organization (Hannon & D'Netto, 2007; Hung & Chou, 2015) even as tools are added. It is no surprise, then, that a climate of dissatisfaction surrounds the state of LMSs, with a recent survey showing that 15% of institutions planned to change their LMS within three years (Dahlstrom et al., 2013) and another survey reporting that 78% of chief academic officers list the additional effort of delivering an online course as a barrier to distance delivery formats (Allen & Seaman, 2015). Reducing the complexity of these systems could be a powerful mechanism of ensuring student engagement, gaining faculty trust, and stabilizing institutional change.

Statement of the Problem

As the blended delivery format continues to grow in prevalence, it is important for educational leaders to understand which elements of the blended course specifically contribute to keeping students engaged in their studies. With 99% of U.S. universities using a learning management system (Brown, Dehoney, & Millichap, 2015), one way to gain this understanding is to understand the role of expressive aesthetics in the online environments of blended courses. While HCI research demonstrates that user experience is affected by the aesthetics (Moshagen & Thielsch, 2010) and usability (Lee, Hsieh, & Chen, 2013) of the online environment of websites, mobile phone interfaces, and other areas, little understanding exists regarding the impact of expressive aesthetics on the online *learning* environment (Heidig, Müller, & Reichelt, 2015). Participants in this experiment were presented with two different online environments that were of approximately equal usability – except for expressive aesthetics – to determine how this difference might affect student engagement in a blended learning course. Using a quantitative experimental repeated measures design, students in a blended course encountered both a high expressive aesthetics and a low expressive aesthetics environment and their level of engagement in each environment was compared.

Purpose of the Study

This purpose of this quantitative experimental study was to explore the relationship between online environment aesthetics and student engagement in blended learning courses. The results of this study will help educational leaders consider the role of instructional designers and online instructors in course development, the impact of the online environment on blended learning, and the optimal level of aesthetic emphasis in the design of learning management systems that will encourage student engagement.

Rationale

Experts expect the LMS of the future to be more student-centric and personalizable, acting as a hub to connect different content and functions rather than a separate classroom management space (Brown, Dehoney, & Millichap, 2015). As these systems are designed, it will be important to understand the role of aesthetics. If students are equally engaged in a low expressive aesthetic online environment, and the perception of organization and usability in this environment can be preserved, then options to reduce extraneous aesthetic emphasis can be considered. This reduction could lower the barrier for faculty involvement in online courses, reduce student computer anxiety, and become an important design consideration for instructional designers and LMS developers. Discovering the relative impact of aesthetic emphasis in online learning environments was the primary goal of this study.

Research Questions

1. What differences, if any, exist in student engagement between an online environment with high expressive aesthetics and an online environment with low expressive aesthetics within the same blended learning course?
2. What differences, if any, exist between the four factors of student engagement based on the expressive aesthetics of the learning environment?

Significance of the Study

With a litany of factors affecting blended learning, educational researchers are piecing together an understanding of student engagement in blended learning. Factors such as pedagogy, instructor roles and skills, student factors, and the online environment each impact student engagement in different ways, but further research is necessary in order to determine the impact of the specific blended course attributes within these broader factors (Delialioğlu, 2012;

Mayadas, Miller, & Sener, 2015; Owston, York, & Murtha, 2013).

The online environment of a blended learning course is important to the delivery of those courses. Instructors should be able to create learning communities through the design of the online environment (Hung & Chou, 2015) because this environment is the means of ensuring social presence (So & Brush, 2008; Rourke, Anderson, Garrison, & Archer, 1999). The influence of design on the online learning environment also becomes more pronounced as students interact with this environment more often (McNaught, Lam, & Cheng, 2012).

While the above studies are valuable for understanding the online environment, there remains a need to study the particular role of the online environment in promoting student engagement (Chen, Lambert, & Guidry, 2010; Delialioğlu, 2012, McNaught, Lam, & Cheng, 2012).

In existing research, Chen, Lambert, and Guidry (2010) found a positive relationship between online technology and student engagement, demonstrating that there are factors within the online environment that have potential for enhancing engagement. McNaught, Lam, and Cheng (2012) found a mild correlation between web environment design and perceived learning outcomes in blended learning environments and suggest the goal of designing high-quality online tools that are clear, relevant, and stimulate active learning and interactions. In their study of the engagement patterns of students in blended geography courses, Stewart, Stott, and Nuttall (2011) found that students focused their engagement in the online environment around the due dates of course assessments rather than being engaged in this environment throughout the term.

While all of this research provides evidence of some impact of online design, it is also difficult to determine causal relationships. For instance, with the finding of Chen, Lambert, and Guidry (2010) that there is a positive relationship between technology and student engagement, it

is possible that engaged students simply tend to pursue technology. By gaining understanding and enhancing existing course technology, the causal relationships within online environment design can become clearer.

One vein of research that can provide opportunities to explore these causal relationships is the impact of "usability" (Zaharias, 2009) on the online learning environment. The broader concept of usability has been shown to be important to students (Lee & Lee, 2008; Lim, Morris, & Kupritz, 2007) but the role of visual attractiveness or "aesthetics" within this concept of usability is undefined in educational research (David & Glore, 2010). Stated simply: for students to be engaged in a course, the tools used to facilitate their education must be attractive in some way (David & Glore, 2010), but it remains unclear which qualities of these tools are behind this attraction. As it pertains to the online learning environment, it remains to be determined if students are engaged more due to the aesthetics of the environment or the usability of that environment, and further understanding is necessary to determine how these concepts interrelate.

Unfortunately, there is little research dealing with the role of aesthetics in the online learning environment (David & Glore, 2010; Glore & David, 2012). Research focuses more on developing comprehensive evaluations of e-learning systems (Ozkan & Koseler, 2009) that study visual design as only one factor. Many of these broader evaluations include criteria to assess "perceived ease of use," "perceived usefulness," "attitude toward use," and other terms that suggest a role of aesthetics without studying the concept directly (Daskalakis & Tselios, 2011). These concepts have been examined more deeply in HCI research (Schmidt, Liu, & Sridharan, 2009), but are only recently focusing on implications that are relevant to the field of education (Heidig, Müller, & Reichelt, 2015). The present study contributes to understanding within this underdeveloped area of educational research.

Definition of Terms

Aesthetics: An appraised quality of an environment or an object that relates to the pleasing or appealing nature of its appearance (Moshagen & Thielsch, 2010; Schmidt, Liu, & Sridharan, 2009).

Blended (or Hybrid) Learning: a "a blend of both traditional classroom instruction and online learning activities…including synchronous and asynchronous communication modes" (Lin & Overbaugh, 2009, p. 999).

Classical Aesthetics: "The classical aesthetics dimension pertains to aesthetic notions that presided from antiquity until the 18th century. These notions emphasize orderly and clear design" (Lavie & Tractinsky, 2004a, p. 292).

Expressive Aesthetics: "The expressive aesthetics dimension is reflected by the designers' creativity and originality and by the ability to break design conventions" (Lavie & Tractinsky, 2004a, p. 292).

Human Computer Interaction (HCI): "Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them" (Hewett & Hefley, 1996).

Learning Management System (LMS): Online software that facilitates e-learning by enabling processing of academic materials, communication, and course administration features (McGill & Klobas, 2009).

Student Engagement (course level): "The extent to which students actively engage by thinking, talking, and interacting with the content of a course, the other students in the course, and the instructor" (Dixson, 2015, p. 2).

Student Engagement (institutional level): Student participation in activities that are

academic in nature and assumed to be significant to learning (Kuh, 2001)

Usability: The "extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO, 2010, Section 11.2.1).

Assumptions and Limitations

In this study, the researcher assumed that students had at least some experience with online learning technology and that they understood the survey questions and responded honestly. It was also assumed that the survey instruments were valid and reliable and that the variables were measured accurately.

This study was limited by the use of a convenience sample in one section of a Master's level course in systematic theology. Although it is hoped that the methodology will be replicable, caution is encouraged in assuming the generalizability of the results to a larger population. While conducting a semester-long study of a blended course added complexity, it is believed that the repeated measures design mitigated some concern on these limitations and that this methodology was warranted given the exploratory nature of the present study.

Nature of the Study

A quantitative experimental repeated measures design was used to investigate the research question, and a quantitative survey – presented to all participants in all conditions of the experiment – was the means of gathering data. Two groups of students in the same course received two levels of treatment and their survey responses were compared.

Organization of the Remainder of the Study

Deeper consideration is needed in order to identify the impact of expressive aesthetic emphasis of the online environment on student course engagement. The forthcoming review of

literature first addresses the theoretical foundations of student engagement before moving onto web environment design in blended learning, usability, aesthetics, and the integration of usability, aesthetics, and student engagement. Following the literature review, Chapter 3 outlines the methodology of the experimental study. Chapter 4 details the results of the experiment and Chapter 5 discusses these results along with presenting potential implications based upon the experimental findings.

Chapter II: Review of Literature

Student Engagement

In higher education, student engagement can be broadly understood as student participation in activities that are academic in nature and assumed to be significant to learning (Kuh, 2001). George Kuh catalyzed the proliferation of this construct (Kuh et al., 1991) and is instrumental to the continuing development of the National Student Engagement Survey (NSSE), which has helped establish the importance of the student engagement in the landscape of higher education. However, this construct was not a new one, but represented an evolution and combination of earlier educational theories (Kuh, 2009).

The earliest foundations of student engagement stem from Tyler's work on "time on task," where Tyler demonstrated the positive educational effects of devoting time to a task in the learning process (Merwin, 1969, as cited in Kuh, 2009). Pace built upon this research through development of the College Student Experiences Questionnaire (CSEQ) in the 1970s. Pace's research demonstrated that students benefit from learning activities both inside and outside the classroom (Pace, 1990). This shift of perspective to studying activities outside of the classroom led to further research support for the pronounced impact of the student environment on student learning. Within this vein of research, Tinto (1987, 1993) demonstrated the connection between social and academic factors and student attrition and Pascarella (1985) found that the most direct effects of educational aspirations during college stemmed from the student environment.

Chickering's research into student development provides another foundation for the concept of student engagement (Chickering, 1981). Chickering promoted an individualized approach to education that focused on creating a flexible learning environment that could encourage student development regardless of the content matter (Chickering, 1981). Chickering

and Gamson (1987) suggested 7 principles that should guide educators in creating such an environment in higher education: (1) increased contact between student and faculty, (2) increased opportunities for students to collaborate, (3) active learning, (4) timely grading and feedback by instructors, (5) emphasis on students spending quality time on academic tasks (6) high standards for academic tasks, and (7) emphasis on different styles of learning.

Astin's (1993) model of student involvement showcases much overlap with Chickering and Gamson's (1987) principles. Astin defined student involvement as "the amount of physical and psychological energy that the student devotes to the academic experience" (Astin, 1999, p. 528). Astin's model promoted the importance of three factors of student success in higher education: (1) student-faculty interaction, (2) student-student interaction, and (3) student time-on-task. In contrast to the content learning theory that relegated the learner into a passive role and developmental theories that emphasize developmental stages and outcomes, Astin's model of student involvement emphasized the active role of the student and how students develop – namely through active, motivated learning.

While these threads of educational research carried on, there remained a desire among educational leaders to develop a reliable measure to measure the student experience (Kuh, 2009). The initial versions of the NSSE were derived largely from the CSEQ and the survey was administered nationally for the first time in the year 2000 (Kuh, 2001). The widespread use of NSSE – and the comprehensive scope of this measure – established the concept of student engagement as a useful construct for understanding the student environment. In the NSSE, student engagement is composed of five categories: Level of Academic Challenge, Active and Collaborative Learning, Student Faculty Interaction, Enriching Educational Experiences, and Supportive Campus Environment. The fundamental premise of these five categories, and the

NSSE as a whole, is that the more a student is participating in these different elements of the academic setting, the more engaged he or she is in the educational environment.

This theoretical foundation and the prevalence of the NSSE provided opportunities for robust research into particular educational elements affecting student engagement. In one such study, Carini, Kuh, and Klein (2006) explored the relationship between student engagement and academic performance in order to ascertain the extent of this relationship and the forms of engagement that are most impactful in this relationship. The authors gathered data from 1352 students at 14 universities. Measures included cognitive tests, performance tests, SAT scores, GRE scores, college GPA, and student engagement reports. The authors found that there is a significant positive relationship between student engagement and learning outcomes. Student engagement was also more strongly related to academic performance than critical thinking skills, with each of 15 student engagement scales being positively correlated to GPA.

Along with the connection to academic performance, student engagement is also related to college achievement and persistence. Using data from the 6,193 respondents in the NSSE, Kuh et al. (2008) found that student engagement was positively related to academic outcomes and persistence from the first year of college to the second year – and that these effects existed for students of diverse demographic backgrounds.

Student engagement has also been linked to technology use. Chen, Lambert, and Guidry (2010) used items from the NSSE to gather data from 17,819 students at 45 U.S. institutions. The authors explored (1) the relationship between different types of courses and the use of internet technologies for those courses, (2) the characteristics of an individual and an institution affecting online course participation and (3) potential effects of the amount of technology on student engagement, learning approaches, and learning outcomes. The authors found that there is a

positive relationship between online technology use and both student engagement and learning outcomes along with a positive relationship between students who engage with technology and other deep learning approaches.

While the construct of student engagement promotes the presence of impactful activities both inside and outside the classroom, most studies focus on student engagement at the institutional or program-level. Handelsman et al. (2005) translated this research foundation into a tool for studying student engagement at the course level. Using an inductive approach that leaned upon previous engagement research, the researchers determined twenty-seven behaviors and attitudes related to student engagement. After conducting a pilot test with 266 undergraduate students, Handelsman et al. (2005) found that these behaviors and attitudes loaded on four different factors: skills engagement, emotional engagement, participation/interaction engagement, and performance engagement. A second study by the researchers corroborated the presence of these four factors. Employing this information, the researchers developed a final measure consisting of 23 items. This research provides valuable insight into the different components of student engagement at the course level and offers a validated measure that was used in the present study. Dixson (2015) later translated this scale into the Online Student Engagement scale (OSE), which created the opportunity to study student engagement in distance learning courses as well.

The body of research on student engagement provides strong evidence that student engagement is positively related to major areas of focus in the field of higher education – academic performance, achievement, persistence, and more. Identification of strategies for improving student engagement is thus a major focus for academic leaders, with execution of these tactics potentially affecting learning in courses, programs, and institutions as a whole.

Blended Learning Design Elements

One strategy for promoting student engagement is the implementation of blended learning. Research demonstrates linkages between blended learning, student engagement and achievement (Owston et al., 2013) along with positive relationships between blended learning and perceived utility, motivation, and satisfaction (Lopez-Perez et al., 2011). Within this broader scope of blended learning, however, there remains a need to understand the course design factors at play. Since blended learning courses can have vastly different designs, it is important to identify the elements of these courses that are engaging students (Osguthorpe & Graham, 2003).

Ginns and Ellis (2007) highlighted the importance of the relationship between online and in-person activities as a blended course is designed. In their study, Ginns and Ellis explored which online activities specifically complemented the face-to-face aspects of a blended course. They found that student perceptions of teacher quality and student interaction were strongly related to student achievement and that student interaction correlated to a deeper approach to learning. Although these results came from a small sample of students, the findings highlight that the role of the online environment is less about drawing students into tasks and more about clarifying standards and facilitating interaction.

Stewart et al. (2011) explored the effects of student attendance, access to online resources, and LMS usage on student performance and student engagement in a blended learning course. Gathering data from 151 students in blended geography courses, the authors found a positive association between attendance and performance and discovered that students accessed the LMS in a "targeted" manner rather than treating it as a true complement to the classroom. The authors note that their course design, which did not require continual online interaction, enabled students to use the LMS in this way. These findings demonstrate the interplay between

the online and in-person environment in a blended course. Design decisions in the online environment lead to changes in that environment but also have ramifications for the in-person environment and the flow of the course as a whole.

Further amplifying the importance of web environment design in blended courses is the value that both faculty *and* students place on this design. Roby, Ashe, Singh, and Clark (2013) studied 1139 students and 49 instructors who recently participated in online or blended courses to determine factors of distance education that could be best addressed by administrators. Having "a manageable amount of required assignments" was rated by students as the most important course element of the online environment design, with "interesting presentation of the online content" and having a "self-paced format" rated closely behind. Instructors rated the most important elements of online environment design as "technical support," "instructional design support," "electronic or web-based material development support," and "reassigned time." Clearly, the online learning environment plays an integral role in the execution of a course design through technological means.

In their study on a myriad of design elements in a blended learning course, Precel, Eshet-Alkalai, and Alberton (2009) collected data from 58 students in blended learning courses during a period of three semesters in order to explore their perceptions about the pedagogy, instructional tools and materials, and the effect of the design of the online environment on learning. The authors found that students preferred the blended learning model, printed textbooks, and design elements such as distinct text organization, ease of navigation, and integration of course tasks directly into the online environment. Students also reported an exceptionally high level of satisfaction with the online environment, which the authors attribute to early and intentional course design. However, some features of this environment were given low usability ratings and

this research did not attempt to discover an explanation for the disconnect between satisfaction and usability. This study also only assessed student perceptions of the elements of the course (digital textbook, video lectures, discussion boards, etc.) rather than studying why students might be attracted to some elements versus others. Still, this study provides evidence for the importance of clarity in the online environment.

Similar to Precel et al. (2009), Lim, Morris, and Kupritz (2007) also demonstrated linkages between course design and student satisfaction. The authors collected quantitative and qualitative data from 125 undergraduate students in order to compare instructional outcomes and learner satisfaction between online and blended course delivery and found that both deliveries contributed to significant increases in perceived and actual learning with regards to the instructional outcomes. Interestingly, students reported a higher difficulty level, a higher workload, and lower felt support in the online delivery format. Students reported a pronounced desire for more instructional clarity, with students in blended courses reporting that course content was more clear and concise. While this study addresses only the student perception of the different elements of these courses, the results are intriguing, and more research is needed to identify the broader issues of why students may be more satisfied with certain elements more than others.

One potential explanation for this difference in satisfaction is the perceived functionality of the web environment. McNaught, Lam, and Cheng (2012) collected perception and performance data from students in 21 online courses in order to explore potential links between different online learning designs and student outcomes. The authors created a matrix to study 15 online functions under three areas of design – communication, assessment, and content resources. The authors found positive correlations between perceptions of the different elements

of the online environment with students' perceived learning outcomes. They also found a mild correlation between "richness" of learning resources and learning motivation while there was no relationship found between richness and actual performance. The authors identify clarity and quality as particular contributors to students' motivation to learn. This study demonstrates the importance of students' perceptions of the online environment as a whole and directly links this perception to their motivation to learn. While motivation to learn is different than "student engagement" proper, the concepts are very similar and this study thus establishes a link between web environment design and the dependent variable of the present study.

These studies paint a broad picture of the importance of the different elements of web environment design in blended learning courses and introduce the potential impact of this environment on student engagement. However, more precision is needed in order to begin identifying very specific changes that could affect engagement. This clarity can be promoted by gaining understanding regarding the constructs of "usability" and "aesthetics" in online design research.

Usability of the Web Environment

The concept of usability in the online environment has its roots in human-computer interaction (HCI) research. In the HCI field, usability includes two streams of study – formative usability and summative usability. Formative usability focuses on the product meeting its intended purpose and delivering efficiency and satisfaction. Summative usability focuses on eliminating usability problems (Lewis, 2014). Usability is only recently being treated in detail in educational research (Chiu et al., 2005; So-Yeon, Laffey, & Hyunjoo, 2008; Zaharias, 2009), so usability in the educational field is often only hinted at by terms such as ease of use (David & Glore, 2010), organization and navigation (Precel et al., 2009), and system quality (Ozkan &

Koseler, 2009). Due to the potential ambiguity of the concept, the present study will employ the international standard of usability as the operational definition of the concept. The International Standards Organization defines usability as the "extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO, 2010, Section 11.2.1).

The crossover of usability research from HCI into the field of education has elicited useful information regarding the design of web learning environments. Lee and Lee (2008) connected the learning theory of self-regulatory efficacy to user perceptions of quality and satisfaction in the online learning environment. Using responses from 225 participants, the researchers found that satisfaction was strongly related to assessment of interaction quality, information quality, and system quality. Their study also demonstrated group differences in perceived satisfaction, with students displaying higher self-regulatory efficacy being more sensitive to effectiveness, usefulness, and contextual information quality in the online environment and students displaying lower self-regulatory efficacy being more sensitive to ease of use, representational information. Liaw and Huang (2013) provided further evidence regarding the impact of the online learning environment on self-regulation. The researchers found that interactive learning environments were significantly related to student satisfaction, usefulness, and self-regulation and found that perceived satisfaction with online learning was significantly related to self-efficacy, anxiety, usefulness, and self-regulation. The major takeaway from these studies is that online environments designed to encourage self-regulation educe high user satisfaction ratings.

Beyond promoting self-regulation, high usability in the online environment also has ramifications on the user's decision to continue participating in an online environment. Chiu et

al. (2005) applied expectancy disconfirmation theory (EDT) to the evaluation of e-learning systems. EDT is a behavior theory associating consumer satisfaction and continuance of use with disconfirmation or confirmation of expectations. Essentially, this theory assumes that users develop expectations based on their interaction with an environment. If optimistic expectations are confirmed, they will more readily continue to engage with the environment. In studying the responses of 183 participants, Chiu et al. (2005) found that the effects of perceived usability, quality, and value on satisfaction were indeed significant and that this satisfaction was a predictor of continued use of the e-learning system.

A similar mechanism of studying the user's intention to use technology is the Technology Acceptance Model (TAM). The basic summarization of the TAM is that Perceived Ease of Use (PEU) and Perceived Usefulness (PU) are central to the attitude of the technology user. If PEU and PU are rated highly, then the user's attitude toward the technology (AT) will be positive and his or her Behavioral Intention (BI) to use the technology increases. Lee, Hsieh, & Chen (2013) employed the TAM in order to investigate attitudes toward e-learning systems. Gathering responses from 332 users of online courses, they found that PU is significantly related to BI, PEU is significantly related to PU, PEU is significantly related to AT, and AT is significantly related to The researchers conclude that Perceived Ease of Use is the most significant factor in the Behavior Intention to use e-learning systems.

This selection of research demonstrates the importance of usability considerations in the online learning environment. Broadly stated, *if the online environment facilitates self-regulation and is perceived as useful, users will be satisfied and continue to use that system*. While the above studies validate this connection, it is important to note that these studies evaluate usability very broadly and solely through the lens of the user's perception of the online environment. To

further understand the impact of usability, attention must be turned toward controlling the design of the online learning environment in order to determine which design elements particularly contribute to high usability.

One mechanism of gaining this understanding is the creation of usability evaluations. Oztekin, Kong, and Uysal (2010) synthesized work from a few exploratory e-learning usability evaluations and developed a comprehensive checklist for evaluating e-learning systems. Based on their research, the authors proposed the existence of an inextricable link between e-learning quality and e-learning usability. Reflecting this connection in a 36-item checklist, the authors labeled dimensions such as visibility, memorability, flexibility, reduced redundancy and error prevention as "pure usability dimensions," concepts such as aesthetics, accessibility, and consistency as "common dimensions," and the presence of a clear syllabus, defined learning outcomes, and critical thinking opportunities as "pure quality dimensions." Oztekin et al. (2010) concluded that their UseLearn method is "the foremost quantitative method among usability evaluation methods because…this method successfully reveals the significant usability problems in order to improve the usability index" (p. 468).

While the UseLearn method is helpful in designing online learning environments, there is some reason for caution. First, the authors leaned on previous e-learning evaluations that were presented through professional conferences rather than built upon research findings. Second, the tactic of combining e-learning quality and e-learning usability into one checklist is helpful for direct application for instructional designers and instructors, but it causes difficulty for research use. By combining these threads together into "common dimensions," it is difficult to determine the direct impact of different course design elements on "usability" proper.

In contrast, Zaharias (2009) focused his e-learning evaluation method directly upon the

concept of usability emerging from past HCI and educational research. Zaharias proposed that usability in e-learning has been too concerned with addressing the user rather than the "user as learner" and – in his own usability evaluation – adds to this focus on functional usability the additional dimension of the user's "motivation to learn."

In two studies, Zaharias and Poylymenakou (2009) found support for the above method of evaluating online learning environments. In their first pilot test, they gathered responses from 113 participants and found high internal consistency for their final 51-item questionnaire. Research in a second pilot study refined their questionnaire to 49 items. This final version was found to have high consistency, content validity, and criterion validity and the authors note the presence of a strong association between motivation to learn and e-learning usability.

Zaharias and Poylymenakou's (2009) treatment of usability from the functional and the motivation perspectives aptly corresponds to the user perception research described above. Those studies revealed the importance of functional usability topics such as perceived ease of use and learner-centered topics such as self-regulation, as well as the impact of each of these on user satisfaction. For this reason, this framework will be used in the pilot study in assessing the usability of different online learning environments.

However, it is interesting to note that the above usability evaluations of Zaharias and Poylymenakou (2009) and Oztekin et al. (2010) each placed relatively little emphasis on the role of aesthetics in usability. The UseLearn evaluation includes only two aesthetics-related items listed as, "Is there proper use of color or graphics that enhance navigation?" and "Are the screens pleasing to look at?" (Oztekin et al., 2010). Zaharias and Poylymenakou (2009) used the term "visual design" and include only four items within this subcategory. Other comprehensive e-learning evaluations display a similar lack of attention to aesthetic detail (Hassanzadeh,

Kanaani, & Elahi, 2012; Ozkan & Koseler, 2009; Daskalakis & Tselios, 2011). This limited treatment of aesthetics is noteworthy given the widespread research on the aesthetics-usability dynamic in the HCI field (Schmidt, Liu, & Sridharan, 2009; Tuch et al., 2012). Additional attention to the background of the construct of aesthetics is warranted in order to understand the role of aesthetics in the online learning environment.

Aesthetics of the Web Environment

The significance of aesthetics is exhibited broadly by mankind's persisting appreciation of beauty. The connections between beauty and nature, art, and love are engrained into the human experience, but aesthetic concerns are considered in other realms as well. Early Greek architects labeled aesthetics as a core foundation of design (Kruft, 1994, as cited in Lavie & Tractinsky, 2004a) and this foundation even carried over to ancient philosophy (Liu, 2003). Many post-Enlightenment philosophers offered analysis on the concept of beauty, with the major discussion revolving around whether beauty should be attributed to the object or the perception of the observer (Frohlich, 2004).

This debate has only continued as aesthetic emphasis has broadened into the fields of engineering (Liu, 2003), human-computer interaction (Tractinsky et al., 2000), and even instructional design (Parrish, 2009). This has led to much difficulty in defining the construct (Lindgaard et al., 2006). However, some steps can be taken to understand the role of aesthetics – especially as it relates to human-computer interaction. In practice, aesthetics "bridge the gap between a product and the user's emotion and/or feeling" (Glore & David, 2012, p. 384). In HCI research, a user is commonly asked to give aesthetic appraisals (Moshagen & Thielsch, 2010) based on what he or she "feels and reports pleasing or appealing in appearance" (Schmidt, Liu, & Sridharan, 2009, p. 631).

The particular role of aesthetics in the web environment has proven to be an exciting branch of HCI research. In a review of this research, Moshagen and Thielsch (2010) found aesthetics to be related to trustworthiness, positive affect, satisfaction, preference, customer loyalty, intention to revisit, and fun, joy, and pleasure. Robins and Holmes (2008) found that website content presented with higher aesthetic quality was judged by users to have higher credibility and Lindgaard et al. (2006) found that users made very quick judgments regarding the credibility of websites – making such judgments after encountering the site for only 50 milliseconds. The established importance of the visual appeal of a web interface necessitates further understanding of the particular design considerations that lead to this aesthetic appeal.

In perhaps the most detailed study on this subject, Schmidt, Liu, and Sridharan (2009) determined 57 variables in website design from previous research and used three studies to explore the relationship between aesthetic judgments, performance, and usability. Using participant rankings and cluster analysis, the authors determined 10 clusters: page progression/targeting strategy, basic visual structure, navigation, clarification/simplification, relevance/speed, trust/flexibility, marketing, appeal/diversion, multimedia, and accessibility. In the first study, the authors then conducted an experiment to study loading speed and aesthetic content. The researchers found that user preference increased as aesthetic content increased and also as loading speed increased. They also found that there was no significant difference between webpages consisting of low aesthetic content plus fast loading speeds and webpages with high aesthetic content plus slow loading speeds. In the second study, the authors used 20 conditions – two levels of image size and ten levels of font size – to present webpages to participants. The authors found that aesthetic preference and ease of interaction increased as font size increased, and aesthetic preference increased as graphic size increased. In a third study, the authors used 10

conditions – two levels of column width and five levels of font style – to study user preferences and found that users preferred a wider column width and links being blue with underline.

The results of this series of studies are compelling. First, the ten clusters highlight very useful design considerations that are evidently linked to aesthetics ratings. Second, user performance was not related to aesthetics, ease-of-use ratings, or interaction time. Third, users were willing to endure longer loading times (i.e. lower performance) for high aesthetics content. However, it should be noted that this study measures aesthetics based on a singe-item preference rating rather than an accepted aesthetics measure and measures usability as simply "ease of use" rather than more a more comprehensive mechanism.

In fact, in order to fully grasp the complexity of the role of aesthetics in the web environment, it is also important to understand the concept in relation to its partner concept: usability. A seminal study conducted by Tractinsky et al. (2000) catalyzed research on the relationship between aesthetics and perceived usability. In this study, the authors claimed that prominence has been placed on usability over aesthetics. The researchers studied 132 students and their responses to nine ATM layouts rated at differing levels of aesthetic quality. Results showed support for a strong correlation between aesthetics and perceived usability and showed this association to be apart from evaluation method bias. User perceptions of usability after the experiment were also affected by aesthetics regardless of the total usability level of the system, giving further evidence to the aesthetics-usability association. Based on these results, Tractinsky et al. (2000) proposed a "halo effect" where the aesthetic impression of the system could be so affecting the user that it influences evaluation of all components of the system.

These claims ignited a new area of HCI research, with many further studies testing the claim that "what is beautiful is usable" (Tractinsky et al., 2000). In their review of this research,

Hassenzahl and Monk (2010) reported that HCI studies generally demonstrate a positive correlation between aesthetics and usability but do showcase high variability and notable exceptions (Hassenzahl, 2004; van Schaik & Ling, 2009). The chief criticism for this area of research is the lack of studies involving experimental manipulation. So, while research demonstrates that aesthetics are important as a starting point (Robins and Holmes, 2008; Lindgaard et al., 2006), there is not conclusive evidence of a direct relationship between aesthetics and usability (Hassenzahl & Monk, 2010).

The most direct challenge to the idea that "what is beautiful is usable" (Tractinsky et al., 2000) comes from the research of Tuch et al. (2012). In their review of research, the authors found that the aesthetics-usability correlation dissipated in in the studies that controlled for hedonic quality (a product's potential to benefit the user). Noting this gap – and the lack of experimental research on the subject – the authors independently manipulated interface-aesthetics and interface-usability in their own study while controlling for quality. The authors manipulated usability by creating an environment with a good information architecture (high usability) and an environment with a bad information architecture. They manipulated aesthetics by using expert ratings to create a beautiful and an ugly online shop. In the study, 178 participants gave pre-task ratings of (1) perceived aesthetics, (2) usability, and (3) emotional valence. They then completed four shopping tasks while being assessed for performance factors (task completion time, clicks, and success rate). Finally, they rated post-task usability, perceived orientation, pragmatic quality, subjective usability, and then rated beauty, classical aesthetics, expressive aesthetics, hedonic quality, and emotional valence. The researchers found no effect of interface aesthetics or interface usability on pre-use perceived usability, *meaning that perceived usability at the end of the experiment was only affected by the actual usability*. In short,

aesthetics did not affect perceived usability, but a low perception of usability significantly lowered classical aesthetics and hedonic quality. Through analyzing path coefficients, the researchers also found that the effect of usability on classical aesthetics is mediated through the user's affective response. They theorize that the frustration of a poor usability experience led to a negative affective response, which led to poor perceived aesthetic ratings.

Further research corroborates the mediating role of hedonic quality in the usability-aesthetics dynamic (van Schaik & Ling, 2008; Hassenzahl, Diefenbach, & Göritz, 2010). Hamborg, Hülsmann, and Kaspar (2014) manipulated usability and aesthetics on a mobile phone interface and found that there was an effect of usability on perceived aesthetics but no such effect of aesthetics on perceived usability. Further, both usability and aesthetics showed a main effect on hedonic quality. Hamborg et al. (2014) concluded that "there is neither a direct nor an indirect link between aesthetics and perceived usability, or in other words: people judge the usability of a system independently of whether it is ugly or beautiful" (p. 11).

However, some hesitation is warranted regarding this conclusion. Even apart from consideration of hedonic quality, and using an experimental method, Moshagen, Musch, and Göritz (2009) found that visual aesthetics enhanced performance in conditions of poor usability without negatively affecting performance in conditions of high usability. In another experimental study employing mobile phone interfaces, Sauer and Sonderegger (2011) found that users gave higher usability ratings to high aesthetic interfaces. Indeed, it is best to surmise that further research is needed to bring more clarity to the usability-aesthetics dynamic.

In summary, aesthetics is indeed an important factor in any online web environment (Moshagen & Thielsch, 2010; Robins and Holmes, 2008; Lindgaard et al., 2006), and the design details of a web environment contribute in some way to users' perception of aesthetics (Schmidt,

Liu, and Sridharan, 2009). However, aesthetics becomes a difficult construct to measure due to its close linkage with the concept of usability, with some concluding that, "what is beautiful is usable" (Tractinsky et al., 2000) and others concluding that "what is usable is beautiful" (Tuch et al., 2012). The present study will still seek to translate these gleanings from HCI research into the online learning environment and draw meaningful conclusions.

Table 1

Aesthetics and Usability Research Summary

Study	IV	DV	Summary of Finding
Tractinsky et al. (2000)	Aesthetics	Usability	Effect of aesthetic quality on perceived usability
Tuch et al. (2012)	Aesthetics Usability	Usability Aesthetics	Effect of usability on perceived aesthetics. No effect of aesthetic quality on perceived usability.
Hamborg et al. (2014)	Aesthetics Usability	Usability Aesthetics	Effect of usability on perceived aesthetics. No effect of aesthetic quality on perceived usability.
Moshagen et al. (2009)	Aesthetics	Usability	Effect of aesthetic quality on perceived usability
Sauer and Sonderegger (2011)	Aesthetics	Usability	Effect of aesthetic quality on perceived usability

One way to navigate the usability-aesthetics debate is to use a well-established aesthetics evaluation. Lavie and Tractinsky (2004a) constructed the first widely accepted evaluation tool for users to rate the perceived visual aesthetics of a web site. Beginning with a list of 41 items derived from previous research and expert input, they passed their measure through four studies and found that aesthetics loaded on to two dimensions - classical and expressive. The classical dimension prioritizes orderliness and clarity while the expressive aesthetic prioritizes creativity and originality. This measure is especially pertinent to educational research because it is specific enough to study aesthetics apart from usability (Moshagen et al., 2009; Robins & Holmes, 2010) yet broad enough to study aesthetics beyond the most prominent expression of aesthetics

research – website design (Moshagen & Thielsch, 2010).

While these dimensions do not conclusively define aesthetics (Lindgaard et al., 2006), the separation of classical and expressive aesthetics provides a useful comparison point for research. This is due in large part to the overlap of the classical aesthetic with the concept of usability. Lavie and Tractinsky (2004a) found that usability showed substantially higher correlation with the classical aesthetic ($r = 0.78$) than the expressive aesthetic ($r = 0.40$). Likewise, Tuch et al. (2012) found that a low perception of usability significantly lowered classical aesthetics.

Aesthetics, Usability, and Student Engagement

As research continues to support the importance of student engagement in higher education (Carini et al., 2006; Chen et al., 2010), it follows that the online environment should be designed with the intent to increase engagement. However, the bulk of research on blended learning design, exemplified by the studies described above, has proceeded with a focus on the specific elements of a course or more general evaluations of e-learning systems as a whole (Ozkan & Koseler, 2009) rather than considering how aesthetics may directly affect student engagement. In fact, the very precise exploration of aesthetic implications in the online environment – though common in HCI research – is not imitated in research regarding the online educational environment. Research on the aesthetics of the online learning environment has tended to focus broadly on more subjective themes such as instructional design languages (Parrish, 2009; Derntl, Parrish, & Botturi, 2010) or on the usability parameters of the environments rather than particular aesthetics considerations (David & Glore, 2010; Glore & David, 2012). A few studies that have explored the impact of aesthetics in the online learning environment are presented below.

Pomales-Garcia and Liu (2006) compared twelve web modules of different time lengths

and formats to determine the effects of design differences in an online learning environment. Participants spent three hours working through learning activities on nine different web modules. For each module, participants first gave a pre-use aesthetic appeal rating and then participated in the learning activities. Following the module, participants completed a recall activity, shared their perceived module length, divulged their likelihood to continue using that module voluntarily, and rated content difficulty and post-use aesthetic appeal. The authors determined that (1) participants gave significantly lower aesthetics ratings to longer modules, (2) longer modules elicited lower persistence ratings, (3) modules with video were perceived to be less difficult and more attractive, and (4) modules with text were perceived to be of shorter length. This study aligns with the findings of Schmidt et al. (2009) regarding the importance of minor design decisions in aesthetic appraisals of the online environment. However, this study used a very small sample size (n=20) and involved the manipulation of many variables at the same time – making it difficult to ascertain direct relationships between variables. Further, aesthetics was evaluated through single-item aesthetics scales not supported by previous research.

A study by Miller (2011) represents one attempt to evaluate aesthetics and usability in the context of assessing the impact of aesthetics on learner cognitive load. In this study, participants encountered a series of performance tasks as part of a short module for an online American Sign Language (ASL) course. Following completion of the tasks, students participated in an assessment delivered at two levels of aesthetic quality – low and high – where the low aesthetic environment was simply functional while the high aesthetic environment included different color schemes, shadows, and transitions. Using Lavie and Tractinsky's (2004a) evaluation tool for aesthetic appraisals, Miller (2011) found that aesthetic design had a significant effect on cognitive load, with participants reporting less mental effort and stress in the high aesthetics

condition. Participants also reported significantly higher satisfaction and willingness to continue use in the high aesthetics condition. However, perceived usability and perceived aesthetics were not significantly correlated. Even though this study did not manipulate or control for usability and only presented environments to participants for 20 minutes, Miller presented a compelling alternative explanation for potential differences in the effect of aesthetics – cognitive load. Studies in HCI research are beginning to establish hedonic quality as one such explanation (Hamborg et al., 2014; Tuch et al., 2012) so it is interesting – albeit not surprising – to find educational researchers suggesting a mediating role of cognition.

Heidig, Müller, and Reichelt (2015) conducted the research in the educational field that most directly attempts to separate aesthetics from usability. The authors studied learners' emotional responses to the design features of multimedia learning environments that differed in aesthetic quality and usability. During a class period, 334 students participated in one of nine learning environments that were a combination of high/low classical aesthetics, high/low expressive aesthetics, and high/low usability. The authors found that there was no significant difference between the conditions on perceived usability and that the constructed differences in usability did not impact learners' emotional states. Yet, results did indicate that the condition of high expressive aesthetics, high classical aesthetics, and high usability did positively impact users' emotional states. However, in this study, the authors designed their treatments of differing levels of aesthetics-usability based on ratings from students rather than ratings from experts. Upon statistical analysis, they found that their manipulations of the classical aesthetics, expressive aesthetics, and usability conditions were unsuccessful – the differences between the conditions were not significant. Further, usability was manipulated only by creating longer loading times for the low usability condition. This represents a less-comprehensive

understanding of the usability construct and may have contributed to the lack of significant difference between the high/low usability conditions. As a result of the difficulty in establishing significant differences, the authors advised future researchers to separate the usability-aesthetics research objective from the aesthetics-emotional states research objective.

Hancock (2004) conducted the study in the educational field that most closely connects aesthetics to student engagement. He developed aesthetics criteria for designing online courses implemented these designs across three separate online courses. Courses were delivered with two different sections: one composed of the control group and the other composed of the experimental group, with all other differences aside from aesthetic manipulation managed to the fullest possible extent. Students participated in the courses and then completed an optional survey regarding their learning experience. From these surveys, Hancock (2004) found a mild correlation between the modules designed with higher aesthetic criteria and higher student engagement. Hancock supported this link by analyzing the time-related data collected by the LMS. Students generated the same amount of clicks between conditions, but – in two of the courses – spent 20% more time in the higher aesthetics environment. However, while this study provides some support for the aesthetics-engagement link, there is much to be improved upon. First, this study employs aesthetics criteria that were designed by the author rather than being rooted in past research or even emerging from factor analysis. Second – Hancock uses the term "student engagement" synonymously with "student motivation" rather than the broadly accepted understanding of the term and, consequently, does not use an already-validated measure to evaluate student engagement. Third, mean responses to surveys were compared without using quantitative statistical analysis.

Based on the above survey of research, it is apparent that further study is needed to

understand the impact of expressive aesthetics in the evaluation of the online learning environment and to determine if changes to the aesthetic qualities of the online environment impact student engagement.

While the present study does not seek to solve the emerging usability-aesthetics issue, it is hoped that this study will add to this body of research by exploring aesthetics from a new perspective. Research into the usability-aesthetics relationship has for the most part focused on ascertaining correlations with hedonic quality (Hamborg et al., 2014; Tuch et al., 2012), cognitive load (Miller, 2011) and, in education - emotional valence (Heidig et al., 2015; Platt et al., 2014). The present study focused not on the reasons for aesthetic differences but rather the consequences of these differences, particularly with respect to students in an online learning environment.

Manipulation of the online environment of a blended learning course was an apt method of determining these consequences, as it is established that design changes have consequences for student satisfaction (Precel et al., 2009; Lim et al., 2007), student performance (Stewart et al., 2011; Roby et al., 2013), and student learning outcomes (McNaught et al., 2012) and that there is initial evidence that usability (Liaw & Huang, 2013; Lee et al., 2013; Zaharias & Poylymenakou, 2009) and/or aesthetics (Pomades-Garcia & Liu, 2006; Miller, 2011; Heidig et al., 2015) may play a role in student perceptions of online environment design. Student engagement was a suitable dependent variable for determining the consequences of aesthetics manipulation because of its significance to the field of higher education, (Carini et al., 2006; Chen, Lambert, & Guidry, 2010), the existence of verified, objective measures for this construct (Handelsman et al., 2005; Dixson, 2015), and the narrowness in scope of this construct as compared to the broader dimensions recently used in aesthetics research in the field of education – such as emotion

(Heidig et al., 2015) and cognition (Miller, 2011). Further, the research design of the present study answers two of the major weaknesses stemming from aesthetics research in HCI and higher education – the lack of experimental studies (Tuch et al., 2012; Hassenzahl & Monk, 2010) and the dearth of studies involving repeated interactions with interfaces of different aesthetic quality (Miller, 2011).

Chapter III: Methodology

Philosophy and Justification

A quantitative experimental repeated measures design was used to investigate the research question, and a quantitative survey – presented to all participants in all conditions of the experiment – was the means of gathering data. Two groups of students in the same course, entitled Theology I, received two levels of treatment and their survey responses were compared.

The experimental approach was preferred in this case because of the level of involvement necessary to structure the Theology I course in accordance with a repeated measures design. In this research, a naturally formed group – students registering for the Theology I course – were the sample for the study (Creswell, 2014, p. 168). Within this context, the researcher had the ability to design the course with the research in mind and work with the course instructor to deliver the course while also following the data collection procedures listed below.

Research Question(s)

1. What differences, if any, exist in student engagement between an online environment with high expressive aesthetics and an online environment with low expressive aesthetics within the same blended learning course?
2. What differences, if any, exist between the four factors of student engagement based on the expressive aesthetics of the learning environment?

Theoretical Framework

At the course level, research on student engagement enables students to attribute significance to their learning through different elements of a given course (Dixson, 2015). The comprehensive scope of this theory invites study on a variety of course instruction strategies because students may find significance in any of these areas. In blended learning design, for

instance, student perception of the online environment is one such locus of significance (McNaught, Lam, & Cheng, 2012; Lim, Morris, & Kupritz, 2007). However, it is not yet clear how the usability or the aesthetics of this environment contribute to student perception of the online environment (Heidig et al., 2015). While there is still overlap in the definitions of usability and aesthetics (Tuch et al., 2012), it is possible to begin parsing these apart through research and to also begin connecting these concepts to student engagement. An experimental approach to studying these connections over the course of a whole semester was especially apt for this level of exploratory research, since students in real-world settings would derive judgments about the online environment through consistent interactions rather than a lone exposure (Miller, 2011).

Variables

The variables for the present study are presented in Table 2.

Table 2

Variables

Variable Name	Research Question	Number of Survey Items
Independent Variable 1: Expressive Aesthetics	Field Test	5
Control Variable 1: Usability	Field Test	None
Control Variable 2: Background Knowledge	1 & 2	1
Dependent Variable 1: Student Engagement	1	1
Dependent Variable 2: Skills Engagement	2	11
Dependent Variable 3: Emotional Engagement	2	5
Dependent Variable 4: Participation Engagement	2	11
Dependent Variable 5: Performance Engagement	2	3

Alternate Hypotheses

1. H_1: Students will be more engaged in the high expressive aesthetics online environment than in the low expressive aesthetics online environment.
2. H_2: Students will give significantly higher ratings on skills engagement in the high expressive aesthetics online environment than the low expressive aesthetics online environment.
3. H_3: Students will give significantly higher ratings on emotional engagement in the high expressive aesthetics online environment than the low expressive aesthetics online environment.
4. H_4: Students will give significantly higher ratings on participation engagement in the high expressive aesthetics online environment than the low expressive aesthetics online environment.
5. H_5: Students will give significantly higher ratings on performance engagement in the high expressive aesthetics online environment than the low expressive aesthetics online environment.

Research Design Strategy

In this study a counterbalanced within-subjects (repeated measures) design was utilized. Participants were presented with two different online environments that were approximately equal in usability – except for expressive aesthetics – to determine how this difference affected student engagement in a blended learning course. Half of the students were presented with the high expressive aesthetics environment first, then the low expressive aesthetics environment. The opposite occurred for the other half of students, thus counterbalancing the design. In comparing students "to themselves," the potential effects of other factors influencing student engagement

were reduced, leading to a greater possibility that differences in student engagement ratings were due to manipulation of online environment aesthetics.

Measures

Lavie and Tractinsky (2004a) constructed an evaluation tool for measuring perceived visual aesthetics of a web site (Lavie & Tractinsky, 2004b). After passing their measure through four studies, they arrived at a measure with 10 items loading on two factors - the classical aesthetic (prioritizing orderliness and clarity) and the expressive aesthetic (prioritizing creativity and originality). The Cronbach's Alpha values for the classical and expressive aesthetics factors were each 0.86. The authors demonstrated concurrent validity by showing positive correlations between classical aesthetics, expressive aesthetics, and other measures that assess usability, service quality, and pleasure. The authors demonstrated discriminant validity by revealing insignificant correlations when both classical and expressive aesthetics were compared to age and gender. This measure was deployed during the field test in order to determine if the two online learning environments used for the experiment were significantly different on the variable of expressive aesthetics.

Noting the prevalence of measures designed to study student engagement at the "macro level," Handelsman et al. (2005) designed the Student Course Experience Questionnaire (SCEQ), a measure that would instead explore student engagement within a particular classroom-based course. They found further evidence supporting the presence of four distinct factors of student course engagement, with final coefficient alphas of 0.82 for skills engagement, 0.82 for emotional engagement, 0.79 for participation/interaction engagement, and 0.76 for performance engagement. The highest correlation between each factor was only $r = .44$, giving evidence to the discriminant validity of each factor. Convergent validity was demonstrated by comparing each of

the four factors of the SCEQ to other measures of student learning. The presence of four factors within the concept of student engagement allowed for study of the particular effect of aesthetics on the different factors of student course engagement.

The online student engagement scale (OSE) adapted items from the SCEQ as appropriate to the online environment and consists of 19 items that load onto the same factors as the SCEQ (Dixson, 2010). The Cronbach's alpha for the 19 items of the OSE is 0.91. Concurrent validity is demonstrated by strong correlations with global items of engagement and through the adaptation of the OSE measure from the SCEQ. Dixson (2015) validated the OSE further by finding a strong correlation between observed application behaviors and student engagement (r = .48) as measured by the OSE. This finding especially showcases the strength of the OSE measure by providing construct validity and supplementing the use of a self-report scale with actual observed behavior.

There are not already-validated questionnaires for studying student engagement in a blended learning course, so the student engagement survey used in this study was derived from items on the student course engagement questionnaire (SCEQ) for in-person courses and the online student engagement scale (OSE). In many cases, items were the exact same on both measures, so this item was delivered only once in the modified questionnaire. For instance, the item "Making sure to study on a regular basis" was on both the OSE and SCEQ and was thus presented just once on the survey. The rest of the survey is comprised of items that were different between the two existing questionnaires. For instance, the SCEQ item "Participating actively in small-group discussions" was included in the modified questionnaire along with the OSE item "Participating actively in small-group discussion forums" since both of these items are relevant to a blended learning course. On the first delivery of this modified student engagement scale

during the present study, the Cronbach's alpha for the 30 items on this combined scale was .90. On the second delivery, the Cronbach's alpha for the 30 items on this combined scale was .91. These values affirmed the reliability of the modified student engagement scale.

Field Test

The present study depended on the development of two different online environments that differed only on expressive aesthetic emphasis. For this reason, a field test was conducted to ensure that the environments met these criteria. First, the initial online environment was designed on the Blackboard LMS using Zaharias' (2009) usability evaluation as a guide. Then, a copy of this environment was created and manipulated in order to enhance the expressive aesthetic. To avoid confounding usability, the manipulations did not affect the actual navigation of the online environment. In other words, both the high expressive aesthetic environment and the low expressive aesthetic environment had the *same learning content and the same navigation*. The only manipulations to the environment were derived from past aesthetics research.

Table 3

Expressive Aesthetic Design Aspects

Aspect	Source(s)
Diversity – Slight Aesthetic Differences Between Pages	Moshagen & Thielsch (2010)
Hyperlinks with Blue Color & Underline	Schmidt, Liu, & Sridharan (2009)
Increased Font Size	Schmidt, Liu, & Sridharan (2009)
Increased Graphic Use	Schmidt, Liu, & Sridharan (2009), Tuch et al. (2012)
Use of Background Colors	Heidig, Müller, & Reichelt (2015), Moshagen & Thielsch (2010), Tuch et al. (2012)
Use of Background Texture	Moshagen & Thielsch (2010), Tuch et al. (2012)
Use of Color Accents	Heidig, Müller, & Reichelt (2015), Miller (2011), Moshagen & Thielsch (2010)

Use of Color Contrast	Heidig, Müller, & Reichelt (2015), Moshagen & Thielsch (2010)
Use of Complementary Colors	Heidig, Müller, & Reichelt (2015), Moshagen & Thielsch (2010)
Use of Gradients and Shadows	Miller (2011)

Following these initial manipulations, the researcher collaborated with two website design experts to modify both environments. At the conclusion of the design process, the initial online environment became the low expressive aesthetics environment and could be compared to the new high expressive aesthetics environment with confidence that usability had remained consistent between the two interfaces. Example screenshots of the two environments can be found in Appendix F and Appendix G.

In the field test, 18 volunteers with experience participating in online or blended courses were provided with a list of tasks to complete within each online environment. To control for order effects, participants were presented with the low expressive aesthetics or the high expressive aesthetics environment in random order. Following interaction with the first environment, they completed Lavie and Tractinsky's (2004b) aesthetics evaluation. Participants were then directed to interact with the second online environment and complete the aesthetics evaluation again based on that experience. Each participant completed the field test in about 30 minutes.

Following completion of the field test, mean expressive aesthetics ratings were compared to each other using a paired *t*-test. Participants reported significantly higher expressive aesthetic scores in the high expressive aesthetic environment, $M = 16.72$, $SD = 4.56$, than in the low expressive aesthetic environment, $M = 12.78$, $SD = 3.86$, $t(17) = 5.41$, $p < .001$, $d = 0.94$. The results of this manipulation check indicate that the two online learning environments were

significantly different from one another in expressive aesthetics.

Sampling Design

The population for this study was students involved in blended learning courses in higher education. The sample for this study consisted of graduate students enrolled in a blended Systematic Theology course at the Ames, IA extension campus of Midwestern Baptist Theological Seminary. The Theology I course is a required course for the Master's in Theological Studies degree, so all of the participants were graduate students. The author had access to this sample by virtue of his staff position at the extension site. A description of the roles of the instructor and the researcher in this study is detailed below.

The content of the Theology I course could be described as an introduction to the foundations of Christian theology. The nature of theology, its methods, and its sources were discussed and assessed with special attention given to the doctrines of revelation, Scripture, and God. Following an introductory all-day seminar, this course was delivered in two modules, with each module holding to the same rhythm. In the first phase of each module, students completed a reading assignment, an online writing assignment, and then held a small group Socratic discussion. In the second phase of each module, students completed a reading assignment, wrote a position paper, and then held a small group meeting to defend their papers. An all-day large group meeting that included all of the students in the course acted as the capstone to each module.

Data Collection Procedures

Following the field test – where the two online environments studied in the experiment were decided upon – the researcher designed the Theology I course. In order to control for potential order effects, different cohorts of students were randomly assigned to one of two

groups upon registration for the course. Group A encountered the high expressive aesthetics environment first and then the low expressive aesthetics environment. Group B encountered these treatments in reverse order.

At the beginning of the course, the researcher prepared the course instructor to distribute informed consent forms to students. The instructor also distributed FERPA release forms to students as requested by Midwestern Baptist Theological Seminary. Any students declining to participate were given the option to continue as a student in the course without completing the student engagement questionnaires or to drop the course and take the equivalent online Theology I course through MBTS. Students were also assigned to cohorts by the course instructor at this initial meeting and given direction on the two different online environments. Following the distribution of this initial information, participants simply participated in the course as normal.

At the halfway point in the Theology I course, students were randomly assigned an ID number and student engagement surveys were collected. Surveys included items from the modified student engagement survey along with demographic items. The survey that participants completed is included in Appendix A. All surveys were administered online through Qualtrics.

Following the first survey, students were directed to continue completing the course as normal, but this time by completing the next course module on the other online environment. At the end of the course, students completed the same survey using their assigned ID number.

Limitations of Methodology

Blended learning courses are complex, so uncontrolled variables such as course content, instructor role, student groups, and others could have affected the results. The repeated measures within-groups experimental design was helpful in addressing these issues, since this design allowed comparison of participant responses in the low expressive aesthetics condition to their

own responses in the high expressive aesthetics condition.

This study was also limited by the need to use a convenience sample, so one should exercise caution in claiming generalizability of results. However, the convenience sample did afford a level of depth and control that would not be accessible in a larger setting. The researcher's ability to partner with the instructor was enhanced by the utilization of this sample, and this partnership helped ensure that ethical considerations were emphasized and the student experience of the course was in no way hampered by the ongoing presence of the study. Further, the data extracted by this study is unique in an area of research that usually deals with much shorter online environment interactions (Heidig, Müller, & Reichelt, 2015).

A final limitation of this study was the added dimension of switching between online environments in the middle of the course. The researcher attempted to assuage concerns regarding this switch first by ensuring that the same LMS was used between conditions – with the only change being the different "look" of the online environments. Further, the researcher selected a course instructor who had experience facilitating multiple sections of the same LMS and helped the instructor (1) prepare students in all conditions to transition as seamlessly as possible, (2) establish for students the educational purposes for the switch, and (3) clearly articulate any necessary elements of the switch from the outset of the course (through the course syllabus). Further, many of the students at the institution already had experience using different learning management systems, so it is likely that the change did little to hamper course delivery.

Ethical Considerations

In order to protect the privacy of participants, all survey responses were submitted anonymously through Qualtrics. Qualtrics uses transport layer security encryption, ensuring that the online responses were kept confidential (Qualtrics, 2015). Students were randomly assigned

their ID numbers through the use of a random number generator and a pen-and-paper list. The course instructor, not the researcher, had access to this list and the researcher was not able to match responses back to individual students. Concurrently, the course instructor did not see the results of the student responses on Qualtrics. The physical copy of the list was stored safely at the extension campus location and was destroyed by the instructor upon completion of the study.

In order to settle concerns on disclosing personal information, the demographic information collected in the final course student engagement questionnaire was optional, and the student's option to participate in these questions was clearly articulated.

Finally, participants were aware that the researcher is on staff at the school they attend. For this reason, the researcher and the instructor adhered to the following boundaries and communicated these boundaries to participants in the informed consent process. The researcher sent links for the student engagement questionnaire and was present for set-up and delivery of in-person elements of the blended course, in accordance with his job responsibilities. The researcher was not be able to match participants to their ID numbers, was not involved in grading coursework, and was not involved with any aspect of the student's interaction with the online learning environment. The instructor conducted the course as normal – welcoming registered students, distributing the syllabus, communicating with cohorts/students regarding the online learning environment, among other details. In the first class meeting, the instructor distributed informed consent forms and gave a brief description of the study while making it clear that students were not required to participate. At the second class meeting, the instructor notified students that the link for the first student engagement questionnaire was in their inboxes and provided time to complete the survey. At this class meeting, the instructor also described how students would switch to the LMS that they would interact with for the second half of the

experiment. At the third class meeting, the instructor notified students that the link for the second student engagement questionnaire was in their inboxes and gave them time to complete the survey. The instructor never had access to the results of the student engagement questionnaire.

Chapter IV: Results

Sample

The sample for this study consisted of 30 graduate students enrolled in a blended Systematic Theology course at the Ames, IA extension campus of Midwestern Baptist Theological Seminary. A total of 30 students were invited to participate in the study. The following results are based on 28 completed surveys. Two participants did not respond to one item in the survey so a total score could not be calculated for the scale including that item.

Table 4

Demographics of Sample

Demographic Variable	Number	Percentage
Gender (n=30)		
Female	8	26.7
Male	22	73.3
Age (n=30)		
20 to 24	15	50.0
25 to 34	11	36.7
35 to 44	3	10.0
45 to 54	1	3.3
Race/Ethnicity (n=30)		
White	28	93.3
Other	2	6.7
Blended Courses Taken Before Theology I (n=30)		
None	4	13.3
1-2 courses	7	23.3
3-4 courses	7	23.3
5+	12	40.0

Data Analysis

All statistical analyses for this study were conducted using SPSS and an alpha level of $p = .05$ was used for all tests. Following the completion of the experiment, mean scores on the engagement scales completed at the halfway point of the course were compared to mean scores

from the end of the course to determine if order effects were present. The results of these *t*-tests are presented in Table 5. Student Engagement was found to be significantly higher for students of both conditions following the second half of the course, $M = 84.71$, $SD = 15.03$, than after the first half of the course, $M = 81.46$, $SD = 14.05$, $t(27) = 2.844$, $p = .008$. Of the four factors of student engagement, there was only a significant difference on the factor of participation engagement, with scores following the second half of the course, $M = 26.83$, $SD = 7.05$, found to be significantly higher than scores following the first half of the course, $M = 25.07$, $SD = 6.37$, $t(29) = 2.189$, $p = .038$.

Table 5

Summary of Order Effects Data

Dependent Variable	Survey Delivery	*n*	*M*	*SD*	*t*	*p*
Student Engagement	Midterm	28	81.46	14.05	2.844	.008
	Final		84.71	15.03		
Skills Engagement	Midterm	30	32.23	6.22	1.713	.097
	Final		33.20	5.65		
Emotional Engagement	Midterm	30	15.33	2.97	.705	.487
	Final		15.56	3.05		
Participation Engagement	Midterm	30	25.07	6.37	2.189	.038
	Final		26.83	7.05		
Performance Engagement	Midterm	28	8.89	1.66	.000	1.000
	Final		8.89	1.85		

For the experimental data, student ratings on each item of the student engagement scale were added together to create a total engagement score. The mean scores from the total student engagement score on each treatment were compared to one another using a paired *t*-test in order to determine if there were significant differences in student engagement between an online environment with high expressive aesthetics and an online environment with low expressive

aesthetics within the same blended learning course. Essentially, data from groups A and B were separated in order to compare participants' mean engagement scores from the high expressive aesthetics environment to their mean scores from the low expressive aesthetics environment.

Student ratings on each item were also added together within each of the four student engagement factors in order to tabulate a mean score for each of these factors. These mean scores were evaluated through paired *t*-tests to determine if there was a significant difference in the effect of expressive aesthetics of the online environment of a blended learning course when the four factors of student course engagement (skills, emotional, participation, and performance) were compared.

Hypotheses with Findings

Hypothesis H_1 deals with this research question: What differences, if any, exist in student engagement between an online environment with high expressive aesthetics and an online environment with low expressive aesthetics within the same blended learning course? Hypotheses H_2, H_3, H_4, and H_5 deal with this research question: What differences, if any, exist between the four factors of student engagement based on the expressive aesthetics of the learning environment?

For each question, the null hypothesis was that no difference would be found in engagement when the high expressive aesthetics and low expressive aesthetics online environments were compared. The alternative hypotheses are presented below along with the results of the data analysis related to each hypothesis.

H_1: Students will be more engaged in the high expressive aesthetics online environment than in the low expressive aesthetics online environment.

When mean total scores from the modified student engagement scale were compared to

one another, participants were not found to have significantly different mean scores in the high expressive aesthetics environment, $M = 84.66$, $SD = 14.76$, than in the low expressive aesthetics environment, $M = 83.48$, $SD = 14.19$, $t(28) = 1.873$, $p = .072$.

This finding corresponds with students' self-rating of how engaged they were in the class. The mean self-rating of engagement for participants in the high expressive aesthetics environment, $M = 4.30$, $SD = .651$, was not found to be significantly different than the mean self-rating of engagement in the low expressive aesthetics environment, $M = 4.37$, $SD = .669$, $t(29) = .701$, $p = .489$.

H_2: Students will give significantly higher ratings on skills engagement in the high expressive aesthetics online environment than the low expressive aesthetics online environment.

For the factor of skills engagement, mean scores in the high expressive aesthetics environment, $M = 32.37$, $SD = 6.37$, were not found to be significantly different from mean scores in the low expressive environment, $M = 33.07$, $SD = 5.51$, $t(29) = 1.212$, $p = .235$.

H_3: Students will give significantly higher ratings on emotional engagement in the high expressive aesthetics online environment than the low expressive aesthetics online environment.

For emotional engagement, mean scores in the high expressive aesthetics environment, $M = 15.57$, SD = 2.60, were not found to be significantly different from mean scores in the low expressive aesthetics environment, $M = 15.33$, $SD = 3.38$, $t(29) = .705$, $p = .487$.

H_4: Students will give significantly higher ratings on participation engagement in the high expressive aesthetics online environment than the low expressive aesthetics online environment.

For participation engagement, mean scores in the high expressive aesthetics environment, $M = 25.73$, $SD = 6.81$, were not found to be significantly different from mean scores in the low expressive aesthetics environment, $M = 26.17$, $SD = 6.74$, $t(29) = .496$, $p = .624$.

H_5: Students will give significantly higher ratings on performance engagement in the high expressive aesthetics online environment than the low expressive aesthetics online environment.

For performance engagement, mean scores in the high expressive aesthetics environment, $M = 9.00$, $SD = 1.68$, were not found to be significantly different from mean scores in the low expressive aesthetics environment, $M = 8.79$, $SD = 1.83$, $t(27) = 1.10$, $p = .281$.

Table 6

Summary of Experimental Data

Dependent Variable	Expressive-Aesthetic	*n*	*M*	*SD*	*t*	*p*	Reject Null Hypothesis?
Student Engagement	High	28	84.66	14.76	1.873	.072	No
	Low		83.48	14.19			
Skills Engagement	High	30	32.37	6.37	1.212	.235	No
	Low		33.07	5.51			
Emotional Engagement	High	30	15.57	2.60	.705	.487	No
	Low		15.33	3.38			
Participation Engagement	High	30	25.73	6.81	.496	.624	No
	Low		26.17	6.74			
Performance Engagement	High	28	9.00	1.68	1.10	.281	No
	Low		8.79	1.83			

Chapter V: Discussion

Overview of the Study

With the growing proportion of blended and online courses in higher education, it is increasingly important to understand how the online learning environments of these courses can impact student engagement. One issue within the area of online environment design is the role that aesthetic appeal plays within these environments. This experimental study explored the relationship between online environment aesthetics and student engagement in a blended learning course. Students in a blended Systematic Theology course encountered two different environments that were approximately equal in usability – except for aesthetics – to determine how this difference might affect student engagement. This study also investigated the potential effects of expressive aesthetics on the four different factors of student engagement. The findings of this study provided information regarding the relative impact of aesthetic emphasis in the online learning environment. This information is beneficial for educational leaders, instructional designers, and online instructors to consider as educational content is designed and delivered through learning management systems.

Research Questions

1. What differences, if any, exist in student engagement between an online environment with high expressive aesthetics and an online environment with low expressive aesthetics within the same blended learning course?
2. What differences, if any, exist between the four factors of student engagement based on the expressive aesthetics of the learning environment?

Conclusions

A quantitative repeated measures experimental design was utilized to determine if

differences existed between student engagement in online environments of differing aesthetic emphasis. This design accounted for order effects and allowed for comparison of students "to themselves" since their mean engagement score following course participation in the high expressive aesthetic environment was compared to their own mean engagement score following participation in the low expressive environment. Using paired *t*-tests, there were no significant differences in student engagement between an online environment with high expressive aesthetics and an online environment with low expressive aesthetics. Comparison of means showed that engagement was slightly higher in the high expressive aesthetic environment and was approaching significance ($p = .072$). Using paired t-tests, there were no significant differences in specific types of engagement (skills, emotional, participation, performance) between the two online environments.

Implications

Although further research is necessary to corroborate the results of this study, these findings carry the potential for major implications. Student engagement is an important element to education in-and-of-itself (Kuh, 2001) and is strongly related to other important educational concepts such as learning outcomes (Carini, Kuh, & Klein, 2006); use of course technology (Chen, Lambert, & Guidry, 2010), higher-order thinking (Pike, Smart, & Ethington, 2012), and persistence (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008). If manipulations to the expressive aesthetic do not result in increased student engagement - as the present research suggests – the value of increased aesthetic emphasis can be called into question.

Further, research has clearly shown that non-aesthetic manipulations of the online environment design can have significant impact on student engagement (Chen, Lambert, & Guidry, 2010; Delialioğlu, 2012, McNaught, Lam, & Cheng, 2012; Owston, York, & Murtha,

2013), so the finding of no significant difference between the high expressive aesthetic environment and the low expressive aesthetic environment creates even more difficulty for one hoping to herald the importance of aesthetics.

If students are equally engaged in online environments of differing aesthetic emphases, then it also becomes expedient to consider reducing extraneous aesthetic emphasis on these environments. Research has demonstrated that even though students appreciate the instructor taking on the design and instruction of the course (Chang, Shen & Liu, 2014; Hung & Chou, 2015), this workload proves to be too much for instructors (Seaman, 2009). Further, instructors report that they typically use only the basic tools present within a learning management system (Brown, Dehoney, & Millichap, 2015). A reduction in aesthetic emphasis, then, has the potential to lower the learning curve for online environments and consequently reduce the workload for an instructor-as-designer. This would allow instructors to have their hand in the course from beginning to end and could potentially save time and money currently spent on course designers who do not participate in course instruction.

Even if reduced aesthetic emphasis does not lead to diminishing roles for instructional designers and LMS developers, the results of this study can still be of benefit. These technologists cite the difficulty of working with faculty members as the primary challenge for offering blended learning courses (Oh & Park, 2009), so concessions on the importance of aesthetics could create rapport and inform the training and support of instructors (Bailey & Card, 2009).

The finding that expressive aesthetics do not significantly increase student engagement also holds potential benefits for improving student-technology interaction. Academic leaders suggest that discipline and self-regulation are key qualities for students in online education

(Allen & Seaman, 2015). Rather than desiring to encounter the most innovative online learning tools, students are more interested in clearly understanding the expectations for the technology use within a course (Dahlstrom et al., 2013). This desire for "just the basics" corresponds well with HCI research into online environments. Through studying Expectancy Disconfirmation Theory (EDT) (Chiu et al., 2005) and the Technology Acceptance Model (TAM) (Lee, Hsieh, & Chen, 2013), it is apparent that if the online environment facilitates self-regulation and is perceived as useful, users will be satisfied and continue to use that system. Usability, not aesthetics, seems to be the appropriate focal point of online environment design.

Relatedly, the findings of this study have implications for our understanding of the interplay of usability and aesthetics. HCI research has held a long-standing debate on this interplay, with one side proposing that the aesthetic impression of a system influences evaluation of the usability of that system (Tractinsky et al., 2000) and the other side suggesting that usability influences perceived aesthetics (Tuch et al., 2012). In the present study, student engagement was not significantly different while expressive aesthetics changed and usability stayed the same (as demonstrated through the field test). The findings of this study lend evidence to the importance of usability over aesthetics and help promote this vein of research beyond the realm of HCI research and into the field of higher education.

Recommendations for Practitioners

Further research is certainly needed in order to crystallize our understanding of expressive aesthetics in the online learning environment. Still, if we follow the evidence of this study, there are many practical steps that can be taken by educational leaders and course instructors. At the broadest level, the designers of the major learning management systems (Wright et al., 2014) could divert attention away from tools and capabilities that are aesthetics-

focused and toward elements that hold the potential to increase usability. For instance, when logging onto the popular LMS, Blackboard, the user encounters a Twitter feed, other live feeds, and a "community center" before even accessing their course. The results of this study call this tactic into question. Further understanding may lead to systems with fewer steps necessary to access course content and a reduction in the stimuli or activities on the screen that might take the learner in a different direction. These systems become the template for instructional designers and instructors to add their individual course content, so tailoring them toward a usability emphasis would allow for more efficient course development and implementation.

Unfortunately, academic leaders are largely dissatisfied with current learning management systems (Allen & Seaman, 2015; Dahlstrom et al., 2013). One contributing factor to this climate of dissatisfaction appears to be the complexity of these systems. Academic leaders label the complexity of delivering an online course as a barrier to distance delivery formats and believe the learning management system should catalyze discipline rather than display innovation (Allen & Seaman, 2015). If LMS developers are able to divert resources from aesthetic emphasis and new tools, they may be able to create the simple systems that academic leaders desire.

Instructors charged with facilitating online or blended courses can benefit from the present research as well. Instructors who carry out both the design and the implementation of the course can spend less time thinking through the look of the online learning environment and instead devote that time toward ensuring clarity between the syllabus and the online environment – perhaps by adding extra comments as they grade a paper or simply sending an email to a student. These activities are more directly tied to student engagement (Dixson, 2015) and thus represent a more potent use of time and energy in educating students.

The trajectory of this research into the role of the online environment seems to indicate that online learning environments do not need to be attractive in-and-of-themselves. Students do not log into an LMS in order to experience what that environment has to offer, but rather to execute the requirements of their course. The impetus on instructional designers and instructors, then, is to design an environment that efficiently connects students to the content, engages them in learning, and encourages achievement of learning outcomes with the fewest possible barriers.

Recommendations for Academics

The primary recommendations for academics based on this research include potential areas of future research. These areas of research become most evident through investigating the limitations of the present study. One such limitation was the semester-long design of the study. While this was a beneficial match to a student engagement survey intended to assess the impact of an entire course, it also meant that students were taking the survey apart from their interaction with the online environment. Students could have taken the survey minutes, hours, or even days since their last interactions with the online environment. Again, this study was concerned with how online environment aesthetics colored the student's engagement in the course as a whole, but it would also be advantageous to investigate student engagement or other dependent variables during or immediately after interaction with the online environment.

Another limitation was that the present research utilized a blended course rather than an online course. Students usually interact with the online environment even more in online courses than in blended courses, and this increased interaction time could enable researchers to find an increased impact of aesthetic emphasis. Indeed, finding a significant difference in engagement between the high expressive and low expressive aesthetic environments would have been remarkable given that content was delivered in a blended course. Since this was not the result of

the present study, future research can focus on studying the impact of the expressive aesthetic in fully online courses.

Related to the blended nature of the course, it is also important to note how the pedagogical approach may have impacted the results. Some unique elements of the course included the theological nature of the discussions, face-to-face interactions with the instructor, limited lecture times, and an emphasis on in-person small group meetings rather than online discussions. Manipulating any of these factors could have led to differing experiences with the online environment. For instance, students may have been so engaged by the Socratic nature of the course discussions that they may not have considered the online environment as they completed the student engagement survey. Future research could explore the relationship between aesthetics and student engagement across a variety of pedagogical approaches in order to account for this potential limitation.

The sensitivity of the adapted student engagement questionnaire was another potential limitation of the study. The scale demonstrated strong internal reliability, but – as a new scale – the possibility lingers that a significant difference in student engagement could have been present but not detected by this tool. Past studies have found significant differences and correlations using each of the questionnaires used to make the adapted measure (Handelsman et al., 2005; Jenkins, 2010; Dixson, 2015). Further research could employ this measure in student engagement research in order to improve the scale and gain more understanding on the related concepts.

This study also used a small convenience sample. The smaller sample size did make it easier to switch students between class sections and clearly communicate the details of the research. Additionally, it was expedient to work with only one instructor in order to make sure

the methodology was followed carefully throughout the study. However, researchers could overcome these barriers and increase the population and sample size in order to provide a stronger case for generalizability of results.

Future research should also be directed toward the interplay of aesthetics and usability of the online environment. Even though the results of the aesthetics do not indicate an independent impact of aesthetics on student engagement, it is still likely that aesthetics are a sub-factor within the broader concept of usability (Daskalakis & Tselios, 2011), as demonstrated by the inclusion of "visual design" and other aesthetics-oriented language in tools measuring usability (Ozkan & Koseler, 2009; Zaharias, 2009). The two online environments used in the study were demonstrably different on the level of expressive aesthetic emphasis, but only a few manipulations were made in order to create this difference (see Table 3). Yet, this was chiefly due to the scarcity of research on aesthetics in education (David & Glore, 2010). More research on this topic should elicit more methods of increasing the expressive aesthetic, and these manipulations could eventually result in increased student engagement in online environments. One interesting vein of research suggests that the role of aesthetics within usability has something to do with emotional valence (Heidig et al., 2015; Platt et al., 2014). The present study did show that emotional engagement was slightly – though not significantly – higher in the high expressive aesthetic condition. As future research ascertains how to continue increasing expressive aesthetic emphasis, the relationship of aesthetics to emotion could prove to be a missing link in this body of educational research.

Concluding Comments

The results of this research suggest that the expressive aesthetics of an online environment do not play a primary role in increasing student engagement in blended learning

courses. Future research is needed to further corroborate this finding, but the results can still be useful across the field of higher education. Instructional designers and teachers can collaborate and consider how to most efficiently and effectively direct the design of their online courses toward helping students achieve course outcomes. Academic leaders can consider this data in determining the LMS that would best fit the needs of their context. LMS developers can consider the role of aesthetics as they seek to create the right tools, features, and navigation within their systems. With millions of students encountering online and blended courses each year, the stakes are high. Academic leaders must ensure that these distance courses achieve intended learning outcomes while also being delivered in ways that do not overwhelm administrators, course instructors, or students. In accordance with the present study, reducing the complexity of online learning environments could play a key role in improving engagement and sustainability in online and blended courses.

References

Allen, E & Seaman, J. (2015). *Grade level: Tracking online education in the United States* (Research Report). Babson Survey Research Group and Quahog Research Group. Retrieved from http://onlinelearningconsortium.org/read/survey-reports-2014/

Astin, A. W. (1993). What Matters in College? *Four Critical Years Revisited. Jossey-Bass Higher and Adult Education Series.*

Astin, A. W. (1999). Student involvement: A developmental theory for higher education. *Journal Of College Student Development, 40*(5), 518-29. Retrieved from http://search.proquest.com/docview/195180247?accountid=8593

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

Bauk, S., Scepanovic, S., & Kopp, M. (2014). Estimating students' satisfaction with web based learning system in blended learning environment. *Education Research International, 2014*. doi:10.1155/2014/731720

Beabout, B., Foley, S., Rickard, M., Wriddle, J. V., MacDonald, L., Smith, S., & ... Strobel, J. (2006). What You Can Do. *Techtrends: Linking Research And Practice To Improve Learning, 50*(2), 57-61. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1007/s11528-006-7587-9

Bliuc, A., 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 & Education, 56*(3), 856-864. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.compedu.2010.10.027

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. *Internet and Higher Education, 10*(4), 231-244. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.iheduc.2007.08.001

Botturi, L. (2006). E2ML: A Visual Language for the Design of Instruction. *Educational Technology Research & Development, 54*(3), 265-293. doi:10.1007/s11423-006-8807-x

Botturi, L., & Stubbs, T. (Eds.). (2008). *Handbook of visual languages for instructional design*. Hershey, PA: Information Science Reference.

Boyle, T., Bradley, C., Chalk, P., Jones, R., & Pickard, P. (2003). Using blended learning to improve student success rates in learning to program. *Journal Of Educational Media, 28*(2/3), 165-178. doi:10.1080/1358165032000153160

Brown, M., Dehoney, J, & Millichap, N. (2015). *The next generation digital learning environment: A report on research.* Retrieved from http://net.educause.edu/ir/library/pdf/eli3035.pdf

Carini, R. M., Kuh, G. D., & Klein, S. P. (2006). Student engagement and student learning: Testing the linkages. *Research In Higher Education, 47*(1), 1-32. doi:10.1007/s11162-005-8150-9

Celik, V., & Yesilyurt, E. (2013). Attitudes to technology, perceived computer self-efficacy and computer anxiety as predictors of computer-supported education. *Computers & Education, 60*(1), 148-158.

Chang, C., Shen, H., & Liu, E. Z. (2014). University faculty's perspectives on the roles of e-instructors and their online instruction practice. *International Review Of Research In Open And Distance Learning, 15*(3), 72-92. Retrieved from http://eric.ed.gov.ezproxy.bethel.edu/?id=EJ1033101

Chen, P. D., Lambert, A. D., & Guidry, K. R. (2010). Engaging online learners: The impact of web-based learning technology on college student engagement. *Computers & Education, 54*(4), 1222-1232. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.compedu.2009.11.008

Chickering, A. (1981). *The modern American college: Responding to the new realities of diverse students and a changing society.* San Francisco, CA: Jossey-Bass.

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin, 39*(7), 3-7. Retrieved from http://www.eric.ed.gov.ezproxy.bethel.edu/contentdelivery/servlet/ERICServlet?accno=ED282491

Chiu, C., Hsu, M., Sun, S., Lin, T., & Sun, P. (2005). Usability, quality, value and e-learning continuance decisions. *Computers And Education, 45*(4), 399-416. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.compedu.2004.06.001

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: Sage.

Dahlstrom, E, Walker, J.D., & Dziuban, C. (2013). *ECAR study of undergraduate students and information technology*. Retrieved from https://library.educause.edu/resources/2013/9/ecar-study-of-undergraduate-students-and-information-technology-2013

Daskalakis, S., & Tselios, N. (2011). Evaluating e-learning initiatives: A literature review on methods and research frameworks. *International Journal Of Web-Based Learning And Teaching Technologies, 6*(1), 35-51. doi:10.4018/jwltt.2011010104

David, A., & Glore, P. (2010). The impact of design and aesthetics on usability, credibility, and

learning in an online environment. *Online Journal Of Distance Learning Administration, 13*(4). Retrieved from http://www.westga.edu/~distance/ojdla/winter134/david_glore134.html

Delialioğlu, Ö. (2012). Student engagement in blended learning environments with lecture-based and problem-based instructional approaches. *Journal Of Educational Technology & Society, 15*(3), 310-322. Retrieved from http://search.proquest.com.ezproxy.bethel.edu/docview/1287025353?accountid=8593

Derntl, M., Parrish, P., & Botturi, L. (2010). Beauty and Precision: Weaving Complex Educational Technology Projects with Visual Instructional Design Languages. *International Journal On E-Learning, 9*(2), 185-202. Retrieved from http://www.editlib.org/p/29505

Dixson, M.D. (2010). Creating effective student engagement in online courses: What do students find engaging? *Journal of the Scholarship of Teaching and Learning, 10*(2), 1-13. Retrieved from http://josotl.indiana.edu/article/view/1744

Dixson, M.D. (2015). Measuring student engagement in the online course: The online student engagement scale (OSE). *Online Learning. 19*(4). Retrieved from http://onlinelearningconsortium.org/read/online-learning-journal/

Frohlich, D. M. (2004). Beauty as a design prize. *Human-Computer Interaction, 19*(4), 359-366. doi:10.1207/s15327051hci1904_4

Garrison, D., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *Internet and Higher Education, 7*(2), 95-105. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.iheduc.2004.02.001

Gedik, N., Kiraz, E., & Ozden, M. Y. (2012). The optimum blend: Affordances and challenges of blended learning for students. *Turkish Online Journal of Qualitative Inquiry, 3(*3), 102-117. Retrieved from http://eric.ed.gov.ezproxy.bethel.edu/?id=ED537840

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

Glore, P., & David, A. (2012). Design and aesthetics in e-learning: A usability and credibility perspective. *International Journal On E-Learning, 11*(4), 383-390. Retrieved from http://www.editlib.org/p/35417/

Hamborg, K., Hülsmann, J., & Kaspar, K. (2014). The interplay between usability and aesthetics: More evidence for the 'what is usable is beautiful' notion. *Advances In Human-Computer Interaction, 2014*. Retrieved from http://www.hindawi.com/journals/ahci/2014/946239/.

Hancock, D. (2004). *Improving the environment in distance learning courses through the*

application of aesthetic principles. Retrieved from http://etd.fcla.edu/SF/SFE0000426/Thesis_Project_Hancock.pdf

Handelsman, M. M., Briggs, W. L., Sullivan, N., & Towler, A. (2005). A measure of college student course engagement. *Journal Of Educational Research, 98*(3), 184. Retrieved from http://ezproxy.bethel.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ698744&site=ehost-live&scope=site

Hannon, J., & D'Netto, B. (2007). Cultural diversity online: Student engagement with learning technologies. *International Journal Of Educational Management, 21*(5), 418-432. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1108/09513540710760192

Hassanzadeh, A., Kanaani, F., & Elahi, S. (2012). A model for measuring e-learning systems success in universities. *Expert Systems With Applications, 39*(12), 10959-10966. doi:10.1016/j.eswa.2012.03.028

Hassenzahl, M. (2004). The interplay of beauty, goodness, and usability in interactive products. *Human-Computer Interaction, 19*(4), 319-349. doi:10.1207/s15327051hci1904_2

Hassenzahl, M., Diefenbach, S., & Göritz, A. (2010). Needs, affect, and interactive products – Facets of user experience. *Interacting With Computers, 22*(5), 353-362. doi:10.1016/j.intcom.2010.04.002

Hassenzahl, M., & Monk, A. (2010). The inference of perceived usability from beauty. *Human-Computer Interaction, 25*(3), 235-260. doi:10.1080/07370024.2010.500139

Heidig, S., Müller, J., & Reichelt, M. (2015). Emotional design in multimedia learning: Differentiation on relevant design features and their effects on emotions and learning. *Computers In Human Behavior, 44*, 81-95. doi:10.1016/j.chb.2014.11.009

Hewett, T. T., & Hefley, B. (1996). Curricula for human-computer interaction. Retrieved February 26, 2016, from http://old.sigchi.org/cdg/cdg2.html#2_1

Hung, M., & Chou, C. (2015). Students' perceptions of instructors' roles in blended and online learning environments: A comparative study. *Computers & Education, 81*, 315-325. doi:10.1016/j.compedu.2014.10.022

ISO (2010). *ISO 9241-11(en): Ergonomics of human-system interaction: Part 11: Usability: Definitions and concepts*. Retrieved from https://www.iso.org/obp/ui/#iso:std:iso:9241:-11:dis:ed-2:v1:en

Jenkins, C.E. (2010) "The Relationship Between Formative Assessment and Student Engagement at Walters State Community College." *Electronic Theses and Dissertations*. Paper 1679. http://dc.etsu.edu/etd/1679

Kuh, G. D. (2001). Assessing what really matters to student learning: Inside the National Survey

of Student Engagement. *Change, 33*(3), 10-17. Retrieved from http://ezproxy.bethel.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ626616&site=ehost-live&scope=site

Kuh, G. D. (2009). The national survey of student engagement: Conceptual and empirical foundations. *New Directions For Institutional Research, 2009*(141), 5-20. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1002/ir.283

Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects of student engagement on first-year college grades and persistence. *Journal Of Higher Education, 79*(5), 540-563. Retrieved from http://ezproxy.bethel.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ809571&site=ehost-live&scope=site

Kuh, G. D., Schuh, J. H., Whitt, E. J., and Associates (1991). *Involving Colleges: Successful Approaches to Fostering Student Learning and Personal Development Outside the Classroom.* San Francisco: Jossey-Bass.

Lavie, T., & Tractinsky, N. (2004a). Assessing dimensions of perceived visual aesthetics of web sites. *International Journal Of Human-Computer Studies, 60*(3), 269. doi:10.1016/j.ijhcs.2003.09.002

Lavie, T., & Tractinsky, N. (2004b). Perceived Web Site Aesthetics Questionnaire [Database record]. Retrieved from PsycTESTS. doi: 10.1037/t25801-000

Lee, J., & Lee, W. (2008). The relationship of e-learner's self-regulatory efficacy and perception of e-learning environmental quality. *Computers In Human Behavior, 24*(1), 32-47. doi:10.1016/j.chb.2006.12.001

Lewis, J. R. (2014). Usability: Lessons learned…and yet to be learned. *International Journal Of Human-Computer Interaction, 30*(9), 663-684. doi:10.1080/10447318.2014.930311

Liaw, S., & Huang, H. (2013). Perceived satisfaction, perceived usefulness and interactive learning environments as predictors to self-regulation in e-learning environments. *Computers & Education, 60*(1), 14-24. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.compedu.2012.07.015

Lin, S. Y., & Overbaugh, R. C. (2009). Computer-mediated discussion, self-efficacy and gender. *British Journal of Educational Technology, 40*(6), 999-1013. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1111/j.1467-8535.2008.00889.x

Lindgaard, G., Fernandes, G., Dudek, C., & Browñ, J. (2006). Attention web designers: You have 50 milliseconds to make a good first impression!. *Behaviour & Information Technology, 25*(2), 115-126. doi:10.1080/01449290500330448

Lim, D. H., Morris, M. L., & Kupritz, V. W. (2007). Online vs. blended learning: Differences in

instructional outcomes and learner satisfaction. *Journal Of Asynchronous Learning Networks, 11*(2), 27-42. Retrieved from http://sloanconsortium.org/jaln/v11n2/online-vs-blended-learning-differences-instructional-outcomes-and-learner-satisfaction

Liu, Y. (2003). The aesthetic and the ethic dimensions of human factors and design. *Ergonomics, 46*(13-14), 1293-1305. doi:10.1080/00140130310001610838

Lopez-Perez, M. V., Perez-Lopez, M. C., & Rodriguez-Ariza, L. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education, 56*(3), 818-826. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.compedu.2010.10.023

Mandernach, J. (2015). Assessment of student engagement in higher education: A synthesis of literature and assessment tools. *International Journal of Learning, Teaching, and Educational Research, 12*(2), 1-14. Retrieved from http://www.ijlter.org/index.php/ijlter/article/viewFile/367/pdf

Mayadas, F., Miller, G., & Sener, J. (2015, July 7). *E-Learning Definitions*. Retrieved July 21, 2015, from http://onlinelearningconsortium.org/updated-e-learning-definitions-2/

McGill, T. J., & Klobas, J. E. (2009). A task–technology fit view of learning management system impact. Computers & Education, 52(2), 496-508. doi:10.1016/j.compedu.2008.10.002

McNaught, C., Lam, P., & Cheng, K. (2012). Investigating relationships between features of learning designs and student learning outcomes. *Educational Technology Research & Development, 60*(2), 271-286. doi:10.1007/s11423-011-9226-1

Miller, C. (2011). Aesthetics and e-assessment: the interplay of emotional design and learner performance. *Distance Education, 32*(3), 307-337. doi:10.1080/01587919.2011.610291

Moshagen, M., Musch, J., & Göritz, A. S. (2009). A blessing, not a curse: Experimental evidence for beneficial effects of visual aesthetics on performance. *Ergonomics, 52*(10), 1311-1320. doi:10.1080/00140130903061717

Moshagen, M., & Thielsch, M. T. (2010). Facets of visual aesthetics. *International Journal Of Human-Computer Studies, 68*(10), 689-709. doi:10.1016/j.ijhcs.2010.05.006

Ocak, M. A. (2011). Why are faculty members not teaching blended courses? Insights from faculty members. *Computers & Education, 56*(3), 689-699. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.compedu.2010.10.011

Oh, E., & Park, S. (2009). How are universities involved in blended instruction? *Educational Technology & Society, 12*(3), 327-342. Retrieved from http://www.ifets.info/others/abstract.php?art_id=976

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *Quarterly Review Of Distance Education, 4*(3), 227-33. Retrieved from http://ezproxy.bethel.edu/login?url=http://search.ebscohost.com/login.aspx ?direct=true&db=eric&AN=EJ678078&site=ehost-live&scope=site

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. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.iheduc.2012.12.003

Ozkan, S., & Koseler, R. (2009). Multi-dimensional students' evaluation of e-learning systems in the higher education context: An empirical investigation. *Computers & Education, 53*(4), 1285-1296. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.compedu. 2009.06.011

Oztekin, A., Kong, Z. J., & Uysal, O. (2010). UseLearn: A novel checklist and usability evaluation method for eLearning systems by criticality metric analysis. *International Journal Of Industrial Ergonomics, 40*(4), 455-469. doi:10.1016/j.ergon.2010.04.001

Pace, C.R. (1990). *The Undergraduates: A Report of Their Activities and Progress in College in the 1980's*. Retrieved from http://www.eric.ed.gov.ezproxy.bethel.edu/contentdelivery/ servlet/ERICServlet?accno=ED375701

Parrish, P. (2009). Aesthetic principles for instructional design. *Educational Technology Research & Development, 57*(4), 511-528. doi:10.1007/s11423-007-9060-7

Pascarella, E. T.. (1984). College environmental influences on students' educational aspirations. *The Journal of Higher Education, 55*(6), 751–771. doi:10.2307/1981512

Pike, G. R., Smart, J. C., & Ethington, C. A. (2012). The mediating effects of student engagement on the relationships between academic disciplines and learning outcomes: An extension of Holland's theory. *Research In Higher Education, 53*(5), 550-575. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1007/s11162-011-9239-y

Plass, J. L., Heidig, S., Hayward, E. O., Homer, B. D., & Um, E. (2014). Emotional design in multimedia learning: Effects of shape and color on affect and learning. *Learning And Instruction, 29*. 128-140. doi:10.1016/j.learninstruc.2013.02.006

Pomales-Garcia, C., & Liu, Y. (2006). Web-Based Distance Learning Technology: The Impacts of Web Module Length and Format. *American Journal Of Distance Education, 20*(3), 163-179. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1207/s15389286ajde 2003_4

Precel, K., Eshet-Alkalai, Y., & Alberton, Y. (2009). Pedagogical and design aspects of a blended learning course. *International Review Of Research In Open And Distance Learning, 10*(2). Retrieved from http://eric.ed.gov.ezproxy.bethel.edu/?id= EJ844031

Qualtrics (2015). *Security statement*. Retrieved from http://www.qualtrics.com/security-statement/

Robins, D., & Holmes, J. (2008). Aesthetics and credibility in web site design. *Information Processing & Management, 44*(1), 386-399. doi:10.1016/j.ipm.2007.02.003

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. *Internet and Higher Education, 17*, 29-37. Retrieved from http://dx.doi.org.ezproxy.bethel.edu/10.1016/j.iheduc.2012.09.004

Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (1999). Assessing social presence in asynchronous text-based computer conferencing. *Journal Of Distance Education, 14*(2), 50-71. Retrieved from http://www.ijede.ca/index.php/jde/article/view/153/341

Sauer, J., & Sonderegger, A. (2011). The influence of product aesthetics and user state in usability testing. *Behaviour & Information Technology, 30(*6), 787-796. doi:10.1080/0144929X.2010.503352

Schmidt, K. E., Liu, Y., & Sridharan, S. (2009). Webpage aesthetics, performance and usability: Design variables and their effects. *Ergonomics, 52*(6), 631-643. doi:10.1080/00140130802558995

Seaman, J. (2009). *Online learning as a strategic asset: Volume II: Paradox of faculty voices: Views and experiences with online learning*. Washington, DC: Association of Public and Land-grand Universities. Retrieved from http://www.eric.ed.gov.ezproxy.bethel.edu/contentdelivery/servlet/ERICServlet?accno=ED517311

So, H., & Brush, T. A. (2008). Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. *Computers & Education, 51*(1), 318-336. doi:10.1016/j.compedu.2007.05.009

So-Yeon, Y., Laffey, J., & Hyunjoo, O. (2008). Understanding Usability and User Experience of Web-Based 3D Graphics Technology. *International Journal Of Human-Computer Interaction, 24*(3), 288-306. doi:10.1080/10447310801920516

Stewart, M., Stott, T., & Nuttall, A. (2011). Student engagement patterns over the duration of level 1 and level 3 geography modules: Influences on student attendance, performance and use of online resources. *Journal Of Geography In Higher Education, 35*(1), 47-65. doi: 10.1080/03098265.2010.498880

Tinto, V. (1987). *Leaving College: Rethinking the Causes and Cures of Student Attrition*. Chicago, IL: University of Chicago Press.

Tinto, V. (1993). *Leaving College: Rethinking the Causes and Cures of Student Attrition. Second*

Edition. Chicago, IL: University of Chicago Press.

Tractinsky, N., Katz, A. S., & Ikar, D. (2000). What is beautiful is usable. *Interacting With Computers, 13*(2), 127-145. doi:10.1016/S0953-5438(00)00031-X

Tuch, A. N., Roth, S. P., Hornbæk, K., Opwis, K., & Bargas-Avila, J. A. (2012). Is beautiful really usable? Toward understanding the relation between usability, aesthetics, and affect in HCI. *Computers In Human Behavior, 28*(5), 1596-1607. doi:10.1016/j.chb.2012.03.024

van Schaik, P., & Ling, J. (2008). Modeling user experience with web sites: Usability, hedonic value, beauty and goodness. *Interacting With Computers, 20*(3), 419-432. doi:10.1016/j.intcom.2008.03.001

van Schaik, P., & Ling, J. (2009). The role of context in perceptions of the aesthetics of web pages over time. *International Journal Of Human-Computer Studies, 67*(1), 79-89. doi:10.1016/j.ijhcs.2008.09.012

U.S. Department of Labor, Bureau of Labor Statistics. (2015, November 17). *Occupational outlook handbook, 2014-15: Instructional coordinators*. Retrieved from http://www.bls.gov/ooh/education-training-and-library/instructional-coordinators.htm

Wright, C., Lopes, V, Montgomerie, T., Reju, S. & Schmoller, S. (2014). *Selecting a learning management system: Advice from an academic perspective*. Retrieved from http://er.educause.edu/articles/2014/4/selecting-a-learning-management-system-advice-from-an-academic-perspective

Zaharias, P. (2009). Usability in the context of e-learning: A framework augmenting 'tradition' usability constructs with instructional design and motivation to learn. *International Journal Of Technology And Human Interaction,5*(4), 37-59. doi:10.4018/jthi.2009062503

Zaharias, P., & Poylymenakou, A. (2009). Developing a usability evaluation method for e-learning applications: Beyond functional usability. *International Journal Of Human-Computer Interaction, 25(*1), 75-98. doi:10.1080/10447310802546716

Appendix A

Student Questionnaire

Block 1 – Combination of SCEQ and OSE

Within your course, how well do the following behaviors, thoughts, and feelings describe you?

Please answer using the following scale:

1. not at all characteristic of me
2. not really characteristic of me
3. moderately characteristic of me
4. characteristic of me
5. very characteristic of me

Prompts

--Skills Engagement--

1. Making sure to study on a regular basis (OSE/SCEQ)
2. Putting forth effort (OSE/SCEQ)
3. Doing all the homework problems (SCEQ)
4. Staying up on the readings (OSE/SCEQ)
5. Looking over class notes between getting online to make sure I understand the material (OSE)
6. Looking over class notes between classes to make sure I understand the material (SCEQ)
7. Being organized (OSE/SCEQ)
8. Taking good notes over readings, PowerPoints, or video lectures (OSE)
9. Taking good notes in class (SCEQ)
10. Listening/reading carefully (OSE/SCEQ)
11. Coming to class every day (SCEQ)

--Emotional Engagement--

12. Finding ways to make the course material relevant to my life (OSE/SCEQ)
13. Applying course material to my life (OSE/SCEQ)
14. Finding ways to make the course interesting to me (OSE/SCEQ)
15. Thinking about the course between class meetings (SCEQ)
16. Really desiring to learn the material (OSE/SCEQ)

--Participation Engagement--

17. Raising my hand in class (SCEQ)
18. Asking questions when I don't understand the instructor (SCEQ)
19. Having fun in online chats, discussions or via email with the instructor or other students (OSE)
20. Having fun in class (SCEQ)
21. Participating actively in small-group discussion forums (OSE)
22. Participating actively in small-group discussions (SCEQ)
23. Going to the professor's office hours to review assignments or tests or to ask questions (SCEQ)
24. Helping fellow students (OSE/SCEQ)

25. Engaging in conversations online (chat, discussions, email) (OSE)
26. Posting in the discussion forum regularly (OSE)
27. Getting to know other students in the class (OSE)
    --Performance Engagement--
28. Getting a good grade (OSE/SCEQ)
29. Doing well on the tests/quizzes (OSE/SCEQ)
30. Being confident that I can learn and do well in the class (SCEQ)

Block 2 – Global Engagement Question

1. How engaged are you in this class?

Please answer using the following scale:

1. Not at all engaged
2. Not really engaged
3. Moderately Engaged
4. Engaged
5. Very Engaged

Block 3 – Demographics, Blended Learning Experience, Background Knowledge

1. What is your current age?
2. What is the highest level of education you have completed
3. What is your race/ethnicity?
4. What is your gender?
5. Before taking the Theology I course, approximately how many courses have you taken that incorporate both online and in-person elements?
6. Before taking the Theology I course, how much did you know about the content that you encountered in the course?

Appendix B

Perceived Web Site Aesthetics Questionnaire (Lavie & Tractinsky, 2004b)

Classical Scale:

Clean
Clear
Pleasant
Symmetrical
Aesthetic

Expressive Scale:

Original
Sophisticated
Fascinating
Creative
Uses special effects

Appendix C

IRB Approval

Institutional Review Board
3900 Bethel Drive
PO2322
St. Paul, MN 55112

May 13, 2016

Shane Kelley
Bethel University
St. Paul, MN 55112

Re: Project SP-21-16 Beauty in online learning environments: A quantitative study of the impact of expressive aesthetics on student engagement in blended courses

Dear Shane,

On May 13, 2016, the Bethel University Institutional Review Board completed the review of your proposed study and approved the above referenced study.

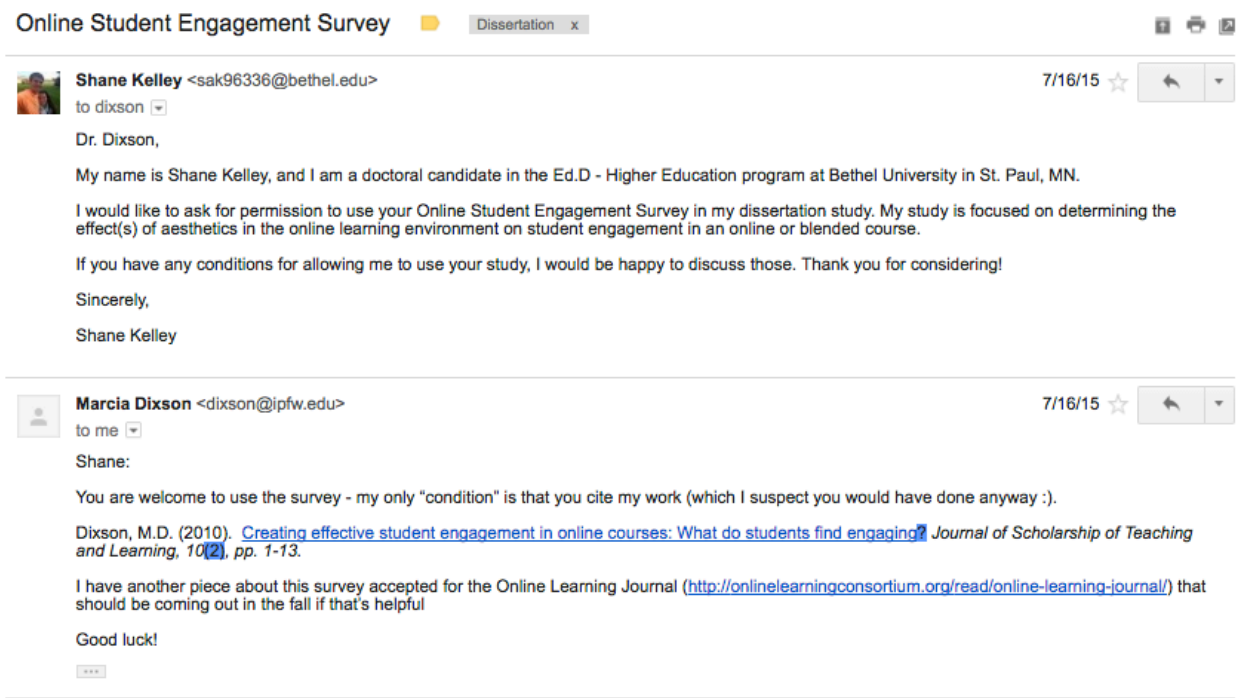
Please note that this approval is limited to the project as described on the most recent Human Subjects Review Form. Also, please be reminded that it is the responsibility of the investigator(s) to bring to the attention of the IRB any proposed changes in the project or activity plans, and to report to the IRB any unanticipated problems that may affect the welfare of human subjects. Last, the approval is valid until May 12, 2017.

Sincerely,

Peter Jankowski, Ph.D.
Chair, Bethel University IRB

Appendix D

Permission to Use Measure



Online Student Engagement Survey Dissertation x

Shane Kelley <sak96336@bethel.edu> 7/16/15

to dixson

Dr. Dixson,

My name is Shane Kelley, and I am a doctoral candidate in the Ed.D - Higher Education program at Bethel University in St. Paul, MN.

I would like to ask for permission to use your Online Student Engagement Survey in my dissertation study. My study is focused on determining the effect(s) of aesthetics in the online learning environment on student engagement in an online or blended course.

If you have any conditions for allowing me to use your study, I would be happy to discuss those. Thank you for considering!

Sincerely,

Shane Kelley

Marcia Dixson <dixson@ipfw.edu> 7/16/15

to me

Shane:

You are welcome to use the survey - my only "condition" is that you cite my work (which I suspect you would have done anyway :).

Dixson, M.D. (2010). Creating effective student engagement in online courses: What do students find engaging? *Journal of Scholarship of Teaching and Learning, 10*(2), *pp. 1-13.*

I have another piece about this survey accepted for the Online Learning Journal (http://onlinelearningconsortium.org/read/online-learning-journal/) that should be coming out in the fall if that's helpful

Good luck!

Appendix E

Student Informed Consent

You are invited to participate in a study of online learning environments. I hope to learn which aspects of the online learning environment lead to increased student engagement in blended learning courses. You were selected as a possible participant in this study because of your participation in the FA 2016 Theology I Course through Midwestern Baptist Theological Seminary. This research is being conducted in partial fulfillment of the requirements for the degree of Doctor of Education through Bethel University.

If you decide to participate, you will be asked to participate in one online environment for the first half of the course and another online environment for the second half of the course. Following experience with each environment, you will be asked to complete two 10-15 minute online surveys. The surveys will ask questions about your course experience along with some optional background questions (e.g., age, gender).

Although transitioning from one online course section to another in the middle of the course may cause some difficulty, the course instructor and researcher are committed to structuring this transition to the benefit of the students. The only time costs added by this research beyond the already-planned course experience are the time taken for the two surveys.

While it is possible that participants will not experience direct benefits from the study, it is also possible that you will find it helpful to reflect on the course experience at two points during the course. You will also be able to compare your experience with each module and emerge with greater understanding of what you value in an online learning environment.

Any information obtained in connection with this study that can be identified with you will remain confidential and will be disclosed only with your permission. In any written reports or publications, no one will be identified or identifiable and only aggregate data will be presented. All survey responses will be submitted anonymously through Qualtrics. Students will be randomly assigned their ID numbers using a random number generator and a pen-and-paper list. The course instructor, not the researcher, will have access to this list and the researcher will not be able to match responses back to individual students. Concurrently, the course instructor will not see the results of the student responses on Qualtrics. The physical copy of the list will be stored in a safe at the extension campus location and will be destroyed by the instructor upon completion of the Theology I course.

Your decision whether or not to participate will not affect your future relations with Midwestern Baptist Theological Seminary or Bethel University in any way. If you decide to participate, you are free to discontinue participation at any time without affecting such relationships. Should you decide not to participate in the course and the related research you may elect to either (a) take the course as delivered without participating in the surveys or (b) take the alternate FA 2016 Theology I course online.

This research project has been reviewed and approved in accordance with Bethel's Levels

of Review for Research with Humans. If you have any questions about the research and/or research participants' rights or wish to report a research-related injury, please call Shane Kelley at 515-520-8428 or email Dr. Joel Frederickson at frejoe@bethel.edu.

You will be offered a copy of this form to keep.

You are making a decision whether or not to participate. Your signature indicates that you have read the information provided above and have decided to participate. You may withdraw at any time without prejudice after signing this form should you choose to discontinue participation in this study.

_____

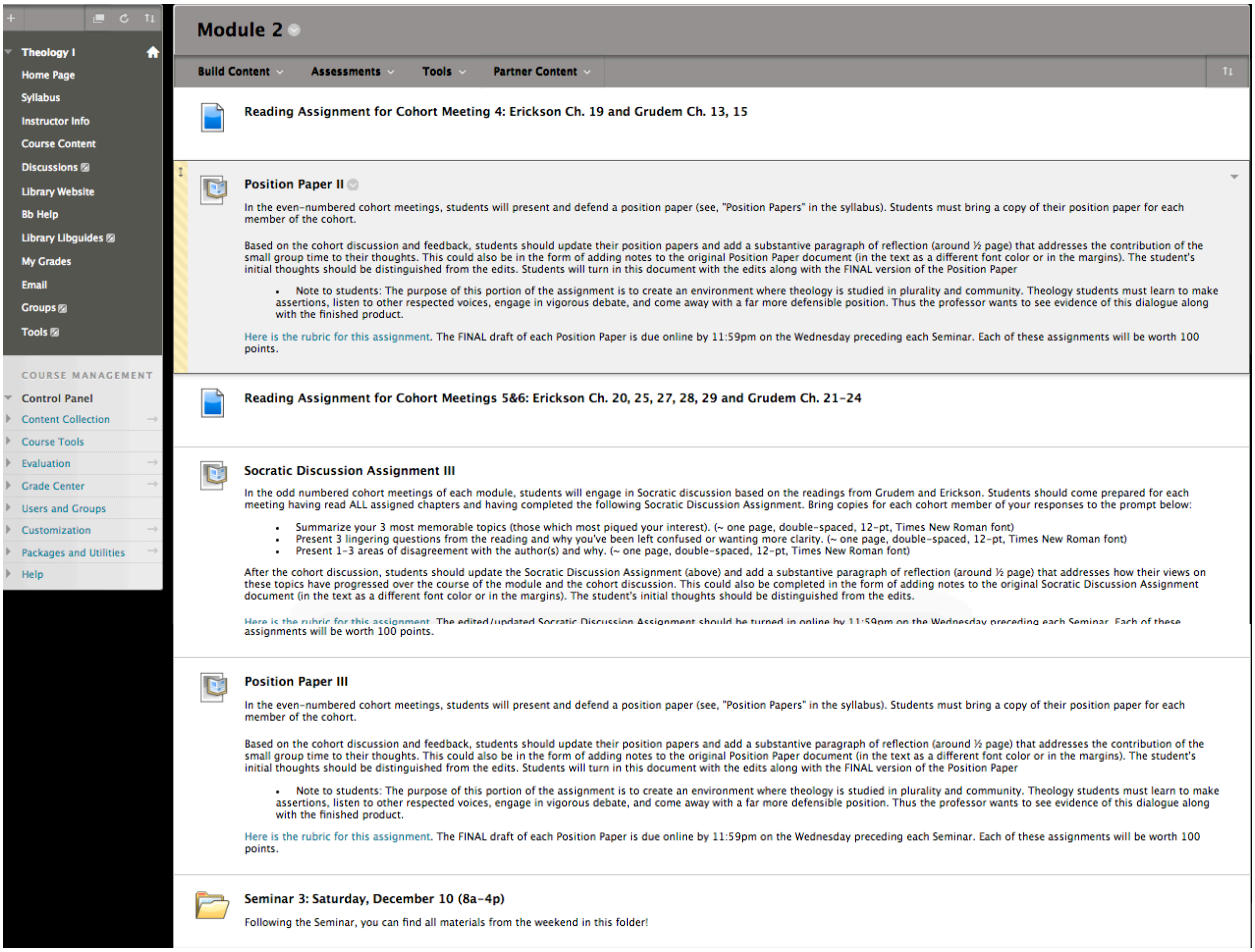
Signature Date

_____

Signature of Investigator

Appendix F

Screenshots of Low-Expressive Environment



Appendix G

Screenshots of High-Expressive Environment