THE INTERRELATIONSHIPS OF UNIVERSITY STUDENT CHARACTERISTICS AND THE KELLER ARCS MOTIVATION MODEL IN A BLENDED DIGITAL LITERACY COURSE

By

SHANE SCHARTZ

B.B.A., Fort Hays State University 2002

M.B.A., Fort Hays State University 2003

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Curriculum and Instruction
College of Education

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2014

Abstract

The purpose of this study was to examine student motivation in a blended learning digital literacy course and its relation to student characteristics. The study consisted of 136 student participants enrolled in a blended learning digital literacy course at a Midwestern university. The Keller ARCS Motivation Model was the theoretical framework. The Course Interest Survey was used in the study, which was designed to measure motivation using Keller ARCS categories. Data was collected through the Course Interest Survey to voluntary student participants and through data obtained from the research setting.

The study examined the following research questions: Research Question 1: Do statistically significant relationships exist between non-performance student characteristics and the Keller ARCS Course Interest Survey student motivation scores in a blended digital literacy course? Research Question 2: Do statistically significant relationships exist between pre-course performance student characteristics and the Keller ARCS Course Interest Survey scores in a blended digital literacy course? Research Question 3: Do statistically significant relationships exist between post-course performance student characteristics and the Keller ARCS Course Interest Survey student motivation scores in a blended digital literacy course?

To examine these relationships, the study utilized MANOVAs to analyze the student characteristics on the four categories of the Keller ARCS Motivation Model. One significant relationship was found for Confidence within Academic Rank ($p < .05$), between Seniors and Freshmen. Seniors reported a .4799 higher Confidence score, on average, than Freshmen. Other characteristics did not have significant relationships. The mean change in pretest and posttest scores in digital literacy on the ALTSA assessment was 6.64.

Recommendations for the research setting included the use of student focus groups to better understand and increase Freshmen confidence and the Freshmen experience, a review of course design and delivery methods, an exploration of variations of blended learning models, an examination of current test-out procedures, and adjustment of the scale used in this study to provide a wider range of motivation responses. Recommendations for future studies included a qualitative study of student performance characteristics, a mixed methods study of different learning models for course delivery, and an exploratory study aimed at expanding student characteristics.

THE INTERRELATIONSHIPS OF UNIVERSITY STUDENT CHARACTERISTICS AND THE KELLER ARCS MODEL OF MOTIVATION IN A BLENDED DIGITAL LITERACY COURSE

By

SHANE SCHARTZ

B.B.A., Fort Hays State University 2002

M.B.A., Fort Hays State University 2003

A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Curriculum and Instruction
College of Education

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2014

Approved by:

Major Professor
Dr. Rosemary Talab

Copyright

Abstract

The purpose of this study was to examine student motivation in a blended learning digital literacy course and its relation to student characteristics. The study consisted of 136 student participants enrolled in a blended learning digital literacy course at a Midwestern university. The Keller ARCS Motivation Model was the theoretical framework. The Course Interest Survey was used in the study, which was designed to measure motivation using Keller ARCS categories. Data was collected through the Course Interest Survey to voluntary student participants and through data obtained from the research setting.

The study examined the following research questions: Research Question 1: Do statistically significant relationships exist between non-performance student characteristics and the Keller ARCS Course Interest Survey student motivation scores in a blended digital literacy course? Research Question 2: Do statistically significant relationships exist between pre-course performance student characteristics and the Keller ARCS Course Interest Survey scores in a blended digital literacy course? Research Question 3: Do statistically significant relationships exist between post-course performance student characteristics and the Keller ARCS Course Interest Survey student motivation scores in a blended digital literacy course?

To examine these relationships, the study utilized MANOVAs to analyze the student characteristics on the four categories of the Keller ARCS Motivation Model. One significant relationship was found for Confidence within Academic Rank ($p < .05$), between Seniors and Freshmen. Seniors reported a .4799 higher Confidence score, on average, than Freshmen. Other characteristics did not have significant relationships. The mean change in pretest and posttest scores in digital literacy on the ALTSA assessment was 6.64.

Recommendations for the research setting included the use of student focus groups to better understand and increase Freshmen confidence and the Freshmen experience, a review of course design and delivery methods, an exploration of variations of blended learning models, an examination of current test-out procedures, and adjustment of the scale used in this study to provide a wider range of motivation responses. Recommendations for future studies included a qualitative study of student performance characteristics, a mixed methods study of different learning models for course delivery, and an exploratory study aimed at expanding student characteristics.

Table of Contents

List of Figures

List of Tables

Dedication

This dissertation is dedicated to my loving family and in memory

Of my father Gerald “Butch” Schartz.

Thank you all for your love, advice, smiles, and laughter.

Chapter 1 - Introduction

Chapter Overview

This chapter provides an overview of university enrollment growth and learning models. It then reviews technology integration and the use of learning management systems used by universities to deliver instruction and their integration at the research setting. Relevant requirements and initiatives at the research setting, state, and national levels are discussed. The theoretical framework for the study, the Keller ARCS Motivation Model, is introduced, followed by the statement of the problem, purpose and significance of the study, and the research questions. The chapter concludes with the limitations and delimitation of the study and a definition of terms.

University Enrollment Growth in the United States

Employers' demand for university graduates has continued to rise in recent years, encouraging the increase in enrollment in university programs. In 2009, approximately 55% of employment in the United States required postsecondary education in order for an applicant to qualify for a position (Oblinger, 2012). Allen and Seaman (2013), in *Changing Course,* a Sloan-C Consortium report, stated that overall university enrollment growth in 2009 increased by 7%. Over the next decade the 18- to 24-year-old population is expected to decline by 4%. However, college enrollment is expected to increase nearly 14% (Hussar & Bailey, 2014). This increasing demand can be met through traditional means, such as hiring additional faculty, or it can also be met by implementing new learning models and courses that are convenient and motivating for students and cost-effective for universities.

Postsecondary Learning Models

As postsecondary education enrollment rises, the infusion of technology into learning environments is changing how content is delivered to students. Allen and Seaman (2013) categorized learning models into four distinct types, based upon the percent of content delivered through web-based technologies. Table 1.1 provides the descriptions and percentages of content delivered online for these four types of learning models.

Table 1.1 Traditional and Online Course Types

Proportion of Content Delivered Online	Course Type	Typical Description
0%	Traditional	Course in which no online technology is used – content is delivered in writing or orally.
1 to 29%	Web-Facilitated	Course that uses web-based technology to facilitate what is essentially a face-to-face course. May use a course management system (CMS) or web pages to post the syllabus and assignments.
30 to 79%	Blended / Hybrid	Course that blends online and face-to-face delivery. Substantial proportion of the content is delivered online, and reduced face-to-face meetings.
80+%	Online	A course in which most or all of the content is delivered online, and typically has no face-to-face meetings.

Note. From *Changing Course: Ten Years of Tracking Online Education in the United States* by Allen and Seaman, 2013.

Faculty have a multitude of approaches in course content delivery to students (see Table 1.1). These distinctions further refine on-campus and virtual course variations by dividing the previous two forms of courses into four separate categories. On-campus courses include traditional, web-facilitated, and blended/hybrid types of courses, while virtual courses include only courses classified as completely online courses. Traditional courses are sometimes referred

to as “face-to-face” courses. However, Table 1.1 provides a framework for traditional courses that utilize web-based technologies. They are categorized as “web-facilitated” or “blended/hybrid” courses. Web-based technologies can be used in on-campus courses, as well, allowing “online learning” to occur in on-campus courses. The true distinction between these courses lies in how much learning occurs online and how often students meet face-to-face in a course.

The enrollment shift of students from traditional environments to online environments has positioned larger universities to use online pedagogies and technologies to develop new learning models to accommodate this shift. In 2012, 45% of institutions with enrollments larger than 7,500 students rated themselves as “above average” or “somewhat above average” in their ability to use web-based technologies to deliver new courses (Allen & Seaman, 2013, p. 15). Other research noted that in 2013 some educators were moving to hybrid environments that used both traditional and online teaching components through various strategies and technologies (Johnson, Adams, Cummins, Estrada, Freeman, & Ludgate, 2013). These courses are referred to as *blended learning* courses. However, neither report concluded that the measured shift to online course enrollment from on-campus course enrollment was due to additional online course offerings.

As evidence of the growing importance of online enrollment to institutional success, Allen and Seaman (2014) noted that of all higher education institutions surveyed in 2002, only 50% reported that online courses were critical to their long-term strategy. In 2013 that number was at an all-time high of nearly 70%. Allen and Seaman (2014) noted that every year since 2002, when the yearly survey of online enrollment began, “online enrollments have increased at rates far in excess of those of overall higher education” (Allen & Seaman, 2014, p. 8). While

terminology for hybrid courses varies and information is less available, a confluence of factors has made alternative approaches to teaching and learning more important and necessary in higher education over the years.

Postsecondary Technology Integration

As the distinction between virtual courses and traditional courses becomes better defined, many technologies are being used in both arenas, such as web 2.0 tools, mobile applications, and e-books. This possibility is mainly due to advances in learning management systems, which support both online and on-campus courses (Petherbridge, 2007; Advanced Distributed Learning, 2013). The instructional design of a course is critical, since the very description of the course can determine the technologies used and structure of the course. Web 2.0, for example, has added additional technological elements that allow for further customization and interaction with students.

Web 2.0, which has never been clearly defined, can be viewed as the ability of web-based tools and applications to allow interaction and collaboration (O'Reilly, 2005). It allows web users to make interactive videos, write blogs (online journals), create wikis, and join groups on virtually every topic through really simple syndication and social media (O'Reilly, 2005). By including multiple tools and strategies into teaching, educators have increased active student learning and enhanced student motivation in the United States (Hazari, North, & Moreland, 2009), Australia (Shih, 2011) and the United Kingdom (Prescott, 2014).

Web 3.0 can be viewed as a more intelligent web, using semantic web, natural language search, data-mining, machine learning, recommendation agents, and artificial intelligence technologies, etc., to provide a more productive, interactive, and intuitive experience (Markoff,

2006). With these changes in the web there will inevitably follow changes in teaching and learning.

Traditional Learning

The traditional learning model (commonly known as "face-to-face") relies on teacher-student contact through the traditional classroom experience with or without the use of technology. This would be a classroom in which all instruction has direct teacher-student contact. Adding technology to a traditional course is common. Allen and Seaman (2014) found that faculty were increasingly sophisticated and engaged with instructional technology, with the average faculty member reporting high levels of technology use (72%) and with positive attitudes toward technology (70%). Moreover, they generally had positive dispositions toward technology (65%), using laptops, "clickers," and various web tools in the classroom. "Assisting faculty with the instructional integration of information technology" was third of the top ten technology issues list for the 2014 study done by Allen and Seaman. This finding indicated that faculty saw the integration of technology into higher education as no longer being optional. It is now an essential component of a continuum of delivery environments in higher education.

Technologies found to be used and supported through face-to-face instruction included student response systems (Hoon & Finkelstein, 2013). These systems can only be used in face-to-face instruction. The challenge for faculty in using technology in the classroom becomes creating a student-based learning environment that encourages the use of multiple technologies in differentiated instructional approaches in order to increase motivation and retention (Borsheim, Merritt, & Reed, 2008; Allen & Seaman, 2014).

Due to the defining limits of types of courses (see Table 1.1), content delivered through web-based technology results in a traditional course being reclassified as either a "web-

facilitated" or a "blended learning" course, depending on the frequency of face-to-face meetings. Changes in the culture and practice of teaching in higher education have resulted in shifting education paradigms that "include more online learning, blended and hybrid learning, and collaborative models" (New Media Consortium, 2014, p. 12).

Web-Facilitated Teaching

Web-facilitated teaching is similar to traditional teaching, and it often has the same amount of face-to-face instruction. Perhaps the largest difference, according to Allen and Seaman (2014), is that web-facilitated instruction uses course management systems to deliver no more than 29% of course content. The majority of content is delivered traditionally in this teaching model. However, some content exists in a virtual format delivered outside of the classroom using web-based technologies. Faculty have introduced new technologies in instruction, including social networking tools such as Twitter (Junco, Heiberger & Loken, 2011) and classroom blogs (Cakir, 2013), which have been shown to increase student engagement and improve grades in an on-campus environment if their use is integral to instructional outcomes. However, the extent to which these technologies are used in a traditional teaching model, along with other technologies, determines the classification of the course.

Blended Learning

The term "blended learning" involves the "range of possibilities presented by combining Internet and digital media with established classroom forms that require the physical co-presence of teacher and students" (Friesen, 2012, p.1). Blended learning implements a slightly different approach to instructional design than web-facilitated and traditional learning. The instruction includes more than 29% (up to 79%) of the content to be delivered by web-based technologies and reduces the amount of face-to-face instruction in the course (Allen & Seaman, 2014).

Reduced face-to-face time is an essential part of blended learning (Allen, Seaman & Garrett, 2007; Sahare & Thampi, 2010). Blended learning is also the integration of traditional learning with online experiences (Garrison & Kanuka, 2004). The main goal of blended learning is to fuse the benefits of traditional learning, such as face-to-face meetings, with the benefits of web-based technologies. This mix of face-to-face and web-based technologies provides a desired learning environment for students today. The EDUCAUSE Center for Analysis and Research (ECAR) has found that the blended learning model is the most preferred learning model for college students (Dahlstrom, Walker, & Dziuban, 2013).

Online Learning

"Online learning" is defined in various ways by different groups in higher education, such as the Distance Education and Training Council, the American Distance Education Consortium, and the Online Learning Consortium. However, the Online Learning Consortium defined it as "one in which at least 80 percent of the course content is delivered online" (Allen & Seaman, 2014, p. 10). It has been estimated that more than 75% of colleges and universities in the United States offer online courses (Parker, Lenhart, & Moore, 2011). Including only four-year universities, the percentage of universities offering online courses increased from 14% to 89% (Allen & Seaman, 2014).

Online learning has created new challenges for educators, such as student dissatisfaction with the lack of interaction and technical problems with the learning management system (Watters & Roberston, 2009). There has been a public perception that online courses are inferior to on-campus courses (Parker et al., 2011), though that has changed over the years (Allen & Seaman, 2014). However, students have reported that the online structure provides flexibility and convenience, which can outweigh the possible disadvantages of online learning (Serhan,

2010; Johnson, 2012). Perhaps the greatest benefit of online learning to universities is cost savings (Battaglino, Haldeman, & Laurans, 2012).

Learning Management Systems

Pretorius and Judy (2010) defined a learning management system as "a web-based application used by institutions and companies" (p. 30). Certain features are standard, including student enrollment, message board, a grade book, chat, assignment submission, class/group messaging, portfolio, blog, wiki, and integrated mobile applications. Most universities use a learning management system to deliver web-based technologies for online learning to virtual and on-campus students.

According to the Campus Computing Survey (2013), learning management systems are increasingly important in higher education. They were considered to be a core instructional resource across all campus types in 2011. Over 93% of the 500 campuses it studied reported having a single, campus-wide standard learning management system in 2011. Approximately 62% of courses used their institution's learning management system in 2013 (Campus Computing Survey, 2013). Also, 58% of courses used one – an increase of 17% in the last decade from 2002.

The learning management system is important to learning models since it provides the flexibility for learning to exist outside of the traditional classroom. A learning management system allows traditional courses to migrate to new learning and delivery models to reach a broader audience. The most popular learning management systems used in education are Blackboard, Moodle, Desire2Learn, Sakai, Jenzabar, Pearson LearningStudio/eCollege, Canvas, Angel, Cengage, LoudCloud, Adrenna, and McGraw-Hill Connect (Riddell, 2013). Figure 1.1

compares the percentages of all institutional use of learning management systems as presented by Green (2013).

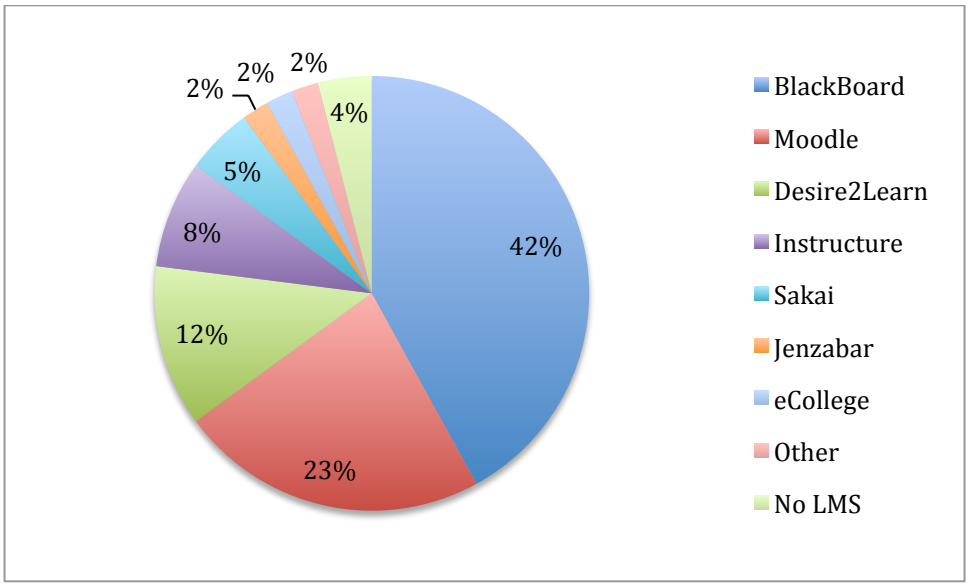


Figure 1.1 Learning Management System Use in Education in 2013

Note. From *Campus Computing, 2013*, *The National Survey of Computing and Information Technology in U.S. Higher Education* by K. Green, 2013.

At the research setting, Blackboard is the learning management system used by the entire campus, including the blended learning digital literacy course of this study. Although other technologies are used in conjunction with the learning management system across the university, Blackboard is used to deliver course content, learning requirements, assessment, and outcomes.

Research Setting Enrollment Growth

The research setting is one of the seven Kansas Board of Regents universities. It is located in a smaller western Kansas community. The community of the research setting is home to approximately 20,000 people. The community has a median family income of $62,755, and is 92.8% White, 1.8% Asian, and 1.1% African American. The median age of a person in the

community is 29.1 years old (U.S. Census Bureau, 2010). The research setting serves approximately 13,000 students, with approximately 36.6% of students considered on-campus students. The student body average age was 24, with 56% declared as White, 5% declared as Hispanic, 4% declared as African American, and 1% as Asian. Thirty one percent of students reported their race as "International" (Fort Hays State University College Portrait, 2014).

The research setting is unique compared to other Kansas Board of Regents universities, since its undergraduate enrollment growth has greatly exceeded that of other Kansas Board of Regents universities. In a 2012 State of the Campus address, Dr. Hammond, former president of the research setting, announced that the research setting's undergraduate 5-year enrollment (2006-2011) had increased 41.9% (Hammond, 2012). The next highest 5-year undergraduate enrollment growth by a Kansas Board of Regents university during the same time period reported by Pittsburg State University was 5.7%. This growth by the research setting has been attributed to the use of three different learning models, which are referred to as the on-campus, virtual (online), and China models. Much of this enrollment growth occurred in the virtual and China models, as shown in Figure 1.2.

Research Setting Learning Models

The research setting utilized three distinct learning models for course delivery: on-campus, virtual, and the China model. The on-campus learning model was web-facilitated, the virtual learning model was online, and the China model used web-facilitated. A significant difference between the on-campus and China models was that the China model was a transfer model that utilized partnership universities in China. Professors from the research setting visited China and resided to conduct web-facilitated courses. In order to graduate, students must

transfer completed credit hours from the partnerships to the research setting to receive credit towards a U.S. degree.

Regardless of the learning model, all courses at the research setting were required by the university to use the Blackboard learning management system. At the U.S. campus, this requirement classified all on-campus courses as web-facilitated or blended courses. However, instructors are given control of how and to what extent they use the learning management system within their courses. Instructors at a minimum have to record academic performance through the learning management system, and have the freedom to include external web-based technologies, such as a companion website, in their courses.

Figure 1.2 shows first-year enrollment of each model. The China model shows the largest enrollment of all models. However, the students are located at partnership universities and not the research setting. Since the study was focused on blended learning, the next largest population to consider for the study is on-campus university students.

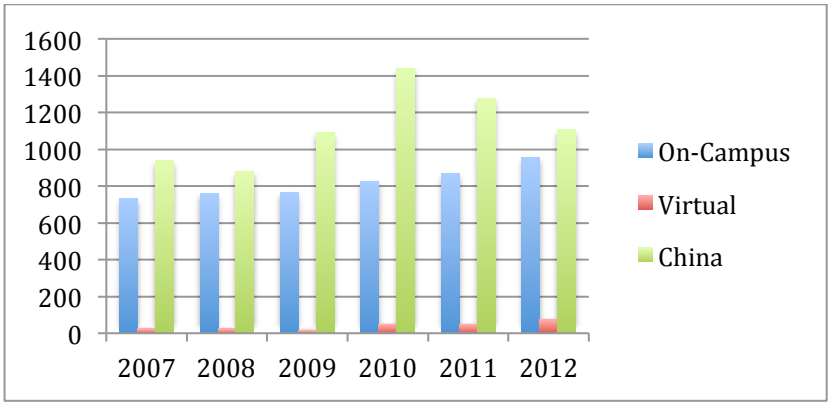


Figure 1.2 First-Year Student and China Transfer Enrollment by Learning Model

Note. From *ISM Retention Report Fall 2012, 2012,* Appendix D.

Each learning model at the research setting has a different rate of growth. Figure 1.3 below shows the growth of each model by percentage. On-campus student growth showed a stable, upward trend of growth from 2008-2012. The virtual model showed an unstable trend

during the same period, which may be due to the small population size of first-year virtual students. The China model showed a declining trend from 2008-2012, which was partly due to the phasing out of some programs from the China learning model. During this time period, only the on-campus learning model showed steady, continuous growth.

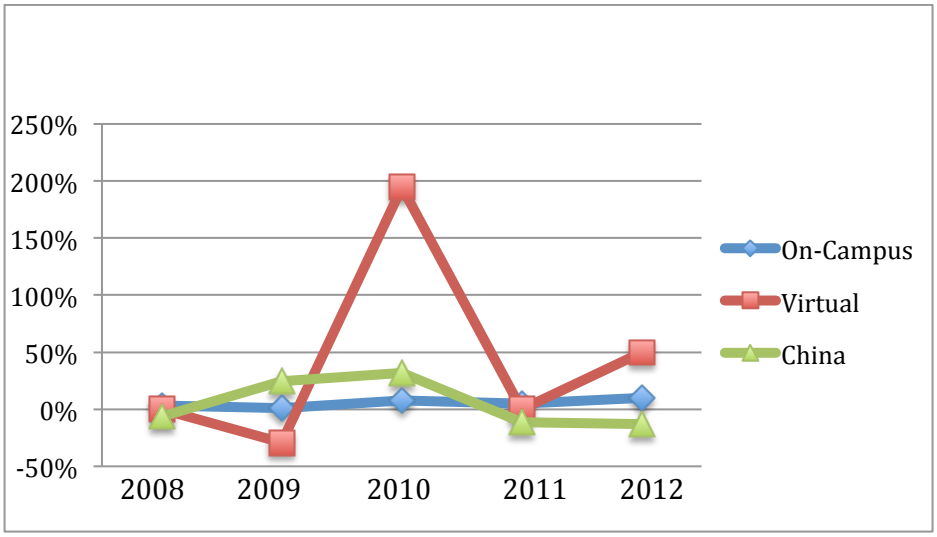


Figure 1.3 Percent Growth of First-Year and China Transfer Students by Learning Model

Note. From *ISM Retention Report Fall 2012, 2012,* Appendix D.

Research Setting Technology Integration

Ribble (2011) defined digital literacy as the process of teaching and learning about technology and the use of technology. The research setting requires all students, regardless of the model used, to enroll in a digital literacy course. The focus of this research study was limited to students enrolled in the on-campus learning model version of this course, which is a blended learning course. The on-campus course utilizes three unique ways of delivering content. First, the students are required to attend a face-to-face section of the course once per week in a computer lab. During this session, content is presented based upon an academic text, and activities are sometimes performed as well. Second, on-campus students are required to use computer simulation/self study to further reinforce concepts, and use two different software

programs to do so. MyITLab and Atomic Learning are used for the computer simulation/self study. Finally, the course is managed through the Blackboard learning management system. Blackboard is used to administer exams, present schedules, and deliver other class content.

MyITLab

MyITLab is a training and assessment simulation that simulates the Microsoft Office platform for students, allowing students to train in Microsoft office regardless of their system. MyITLab operates through the use of a web browser, and provides step-by-step instructions in audio and video. This software also interacts with the user, and guides the user through simulated tasks. MyITLab is assigned to students individually, but does have group capabilities. This software is required for all on-campus sections of the blended digital literacy course at the research setting.

Atomic Learning

Atomic Learning is a web-based software program that is required for all students enrolled in the blended digital literacy course, both on-campus and online. It is not a simulation, but instead consists of video modules that guide students through basic and popular features of commonly used software programs such as Microsoft Office. Started in 2000 by technology educators, Atomic Learning is now used by 16 million people in more than 45 countries (Atomic Learning, 2013). In the blended digital learning course, assigned training is constructed to group essential skills from the various Atomic Learning packages detailed to the version of the Microsoft Office the student may utilize in the course. This allows the course to be customized to the individual learners and the resources they have available to them off campus. These training modules are designed to improve digital literacy of students. Digital literacy is

measured in the course through the administration of a pretest and posttest Atomic Learning Technology Skills Assessment (ALTSA).

Atomic Learning integrates the International Society for Technology in Education National Educational Technology Standards for Students (ISTE NETS-S) into its learning outcomes. It is the only such testing program that uses these standards, which are used by national accrediting agencies for measuring student technology knowledge and skills. The National Council for the Accreditation of Teacher Education uses ISTE NETS-S (2014), as do other colleges, universities, and school districts. The research setting uses Atomic Learning to measure technology knowledge and skills, though the Atomic Learning Tech Skills Assessment construction is proprietary and does not provide information on test construction or individual items. The researcher requested additional information on the exam from Atomic Learning, but the information was not provided to the researcher.

The ISTE NETS Standards for Students (NETS-S) include:

- Creativity and innovation
- Communication and collaboration
- Research and information fluency
- Critical thinking, problem solving, and decision making
- Digital citizenship
- Technology operations and concepts

The ISTE NETS standards were originally designed for use in K-12 education (ISTE, 2014). However, they are used in colleges of teacher education, as well, as required by the National Council for Accreditation of Teacher Education (NCATE), now Council for the Accreditation of Educational Programs (CAEP) (National Council for Accreditation of Teacher

Education, 2014). Since the research setting is an educational program and offers a blended digital literacy course, the ISTE NETS standards provide a measure of attainment of the technology skills necessary for freshmen students to continue their college education at the research setting. Since freshman were the majority of the research setting population, they should have been exposed to the ISTE NETS standards in previous classes and were exposed through the required Atomic Learning assessments in the course offered at the research setting.

Blackboard Learning Management System

Blackboard is the most used learning management system in higher education, with approximately 41% of all institutions using Blackboard (or Blackboard-owned products, including Angel and WebCT) in 2013 (Green, 2013). Hill (2014) found that Blackboard was the leading provider of learning management systems for all schools with larger than 800 enrollment. In 2014 Blackboard held 33.9% of market share, followed by Moodle at 19.5%, though open-source options were growing (Chung, Pasquini, & Koh, 2013).

At the research setting, Blackboard is the main source of content delivery for all courses and contains many web-based technologies for educators to use. These tools may include discussion boards, video, live lecture chat, group content sharing, quizzes, exams, wikis, journals, scheduling systems, reminders, email, and messaging. A complete list of tools can be found in Appendix J. The tools that faculty choose to implement in a particular course are at the discretion of the faculty teaching the course.

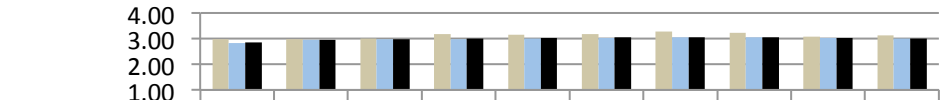
The National Survey of Student Engagement and Web-Based Technologies

"Engagement" is a student's involvement with academically meaningful activities (Delialioglu, 2012). Unlike retention, which is measured by assessing whether a student returned to the university, engagement at the research setting is analyzed with data obtained from the

National Survey of Student Engagement. This quantitative survey is administered yearly to freshman students. Its purpose is to document the undergraduate experience in such a way as to inform institutions on student learning, retention, persistence, and completion.

There are questions on student technology use, including "providing technology to help you learn, study or complete coursework" and "teaching you how to use available technologies to learn, study, or complete coursework" (National Survey of Student Engagement, 2012). The study's results aid institutions in deciding how to better deploy technology, resources, curriculum, and other learning opportunities in order to encourage students to complete coursework necessary for graduation. In comparing the research setting to other national institutions and to randomly selected peer Carnegie institutions, administrators and faculty at the research setting are better able to plan technology expenditures and use to support and raise student engagement.

Since web-based technologies are delivered through the learning management system to students, the use of computing and information technology by first-year university students is important to the research setting. Results from the 2012 National Survey of Student Engagement survey found that at the research setting first-year students used web-based technologies more than a random peer institution and more than the national average, as shown in Figure 1.4 below.



	2004	2005	2006	2007	2008	2009	2010	2011	2012	Mean
FHSU	2.99	2.98	3.00	3.17	3.16	3.19	3.29	3.23	3.08	3.12
Carnegie Peer	2.83	2.96	2.98	2.99	3.01	3.03	3.06	3.05	3.03	2.99
NSSE	2.85	2.96	2.99	3.01	3.04	3.05	3.05	3.05	3.04	3.00

Figure 1.4 National Survey of Student Engagement: Use of Computer and Information Technology 2012.

Note: From *Analysis of FHSU Results for the 2004-2012 NSSE Freshmen Scores Report, 2012*, *with permission,* Appendix E.

While first-year university students at the research setting used more computer and information technology than other universities, a 2012 Hanover Research qualitative study involving non-retained, first-year university students at the research setting found that the quality of instruction ranked third out of nine academic-based reasons for students leaving the university. Other major areas of concern were the quality of advising and lack of faculty contact (Appendix F).

While advising and faculty contact can occur without technology, technology and the learning management system at the research setting were most often used for teaching and advising activities. This suggested that while students at the research setting used these technologies, the way these technologies were being used may not have helped students to learn, study, or complete their coursework. Measures beyond those that measured simple use of technology by students were needed to better understand the relationship between student technology use and course completion and the attainment of a college degree.

Kansas Board of Regents Strategic Vision for Higher Education

In Kansas, public universities are directed and controlled by the Kansas Board of Regents. This board contains nine members who are appointed by the Governor of Kansas. The Board of Regents establishes guidelines and directs public universities and colleges toward their strategic visions for education within the state of Kansas. Foresight 2020 is a strategic plan that sets long-range goals for the state's higher education system. Universities and colleges are now focusing on the three goals of the Foresight 2020 strategic plan to help ensure success in implementing and measuring these goals.

Foresight 2020 Strategic Goals (Kansas Board of Regents, 2013):

- Increase higher education attainment among Kansans
- Improve alignment of the state's higher education system with the needs of the economy
- Ensure state university excellence

While all the outlined goals of the Kansas Board of Regents are important, the research setting is focused on finding solutions for the first Foresight 2020 strategic goal – increase higher education attainment among Kansans. The Kansas Board of Regents defined the goal of attainment as "adults who have a certificate, degree, or a bachelor's degree" (Kansas Board of Regents, 2013, p. 1). The Kansas Board of Regents further defined the strategic goal of attainment as including improvement of retention and graduate rates and stated "retention and graduation rates are traditional benchmarks and complement each other as retention rates are highly correlated to graduation rates" (Kansas Board of Regents, 2013, p. 5).

"Attainment," or graduation, is measurable. However, the research to date did not fully explain the complexities of what caused attainment. Certain research suggested that motivation might be related to attainment. For example, first-year students who had motivational goals, such as personal development, were found to have a significant positive relationship regarding retention and attainment in the National Survey of Student Engagement (2012). A study conducted on 156 first-year students by Morrow and Ackermann (2012) found that a sense of belonging positively influenced retention. The researchers used an online survey to collect data and regression analysis to determine results. The study also found that, although a sense of belonging affected retention, when combined with motivational factors, such as personal development, the inclusion of motivational factors changed the significance of retention factors

to being non-significant. This suggested that motivation might play an even larger role in retention and attainment than previously thought.

Another study by Bruinsma (2004) found similar results. A 2004 study of 565 first-year university students conducted on three different occasions found a positive correlation between the level of motivation of a student and the number of credits earned during the first and second year of college. The findings of this study suggested that motivation is related to retention through expectancy and value. In other words, students who experienced learning consistent with what they expected to learn were more likely to graduate. The goal then becomes to create experiences for students that match their expectations. The concepts of expectancy and value are the core elements of the Keller ARCS Motivation Model.

Theoretical Framework – Keller ARCS Motivation Model

The Keller ARCS Motivation Model provides a systematic approach to understanding and applying motivational factors to learning environments, regardless of the mode of delivery. It was one of the first motivational design models (Smith & Regan, 2004). Developed by Keller (1987), the ARCS model of motivational design is widely used in the development of instruction in multiple formats (Small, 1997), including online education (Keller, 2010). The Keller ARCS model of motivation has four basic strategies for encouraging student motivation—Attention, Relevance, Confidence, and Satisfaction, as shown in Figure 1.5.

Figure 1.5 Keller ARCS Motivation Model

Note: From *"Community College First-Year Business Student Online Course Motivation."* By R. Johnson, 2012.

These factors are further subdivided into components and are linked to motivational strategies (Keller, 2006). The Keller ARCSs Model of Motivation uses a systematic approach for the design of instruction to meet student motivational needs. While instructional design has been applied to online education for many years, motivational design in online education has had limited application (Margueratt, 2007; Johnson, 2012).

Figure 1.6 identifies the four motivation factors and subcomponents of motivation within each one, as well as the instructional strategies to apply. Figure 1.6 includes the ARCS psychological constructs that Keller identified in 2006. This motivational model can be combined with instructional design models for course development purposes (Tharp, Gould, & Potter, 2009).

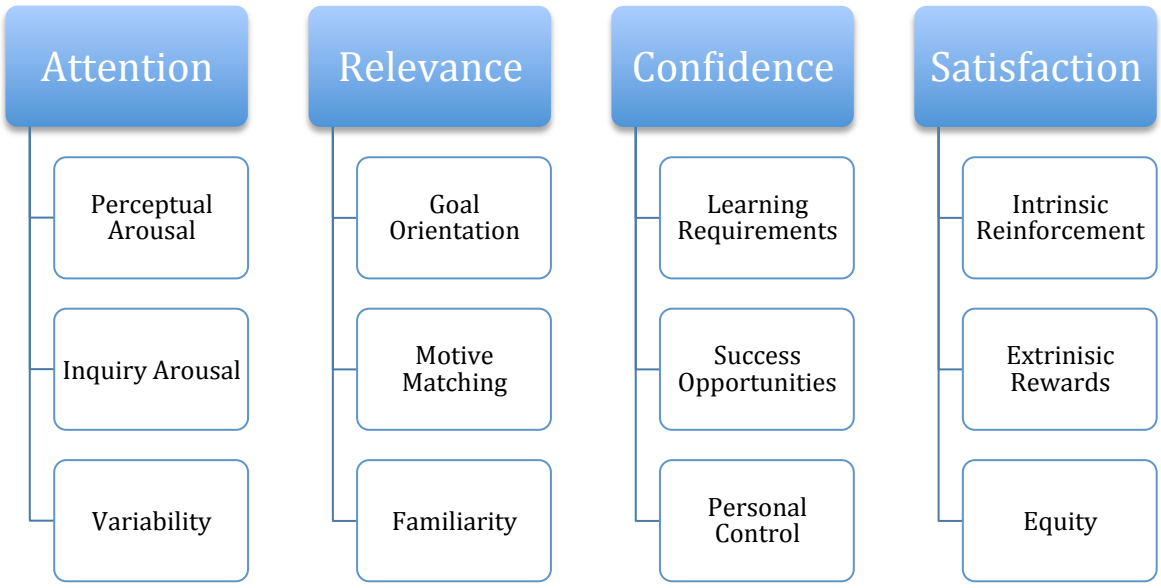


Figure 1.6 Categories of the Keller ARCS Motivation Model

Note: From *What are the Elements of Learner Motivation?, 2006,* J. M. Keller.

Keller ARCS, the University, and Blended Learning

Although the Keller ARCS Motivation Model has been researched in many settings, a search on the ProQuest Dissertations and Theses database found 19,831 results using the keyword "student motivation." However, after adding the keyword "blended learning," and "ARCS," 68 dissertations were found in non-university settings or on specific learning tools. Studies could not be found on its use in on-campus blended learning courses.

Huett (2006) used Keller ARCS in a dissertation on distance education in which he attempted to manipulate the category Confidence in an experimental design. The goal of the dissertation was to observe whether Confidence, when increased, affected the other categories. The dissertation was conducted at a Texas university with 81 participants. Data was analyzed using independent t-tests. The research found that by systematically applying confidence-enhancing tactics, Confidence was significantly increased. These tactics also increased

Relevance, Satisfaction, and overall motivation in the treatment group. While the small population affected the results, Huett (2006) suggested that the research indicated that the Keller ARCS Motivation Model was a viable tool to improve online learning.

A recent qualitative dissertation by Johnson (2012) was conducted at a Midwestern community college. It involved 18 first-year business student participants enrolled in online business courses, and three exemplary faculty participants selected by the student participants. Johnson used the Keller ARCS Motivation Model as the theoretical framework. Johnson found that course communication was a common motivational theme among students, and Satisfaction was the most common theme of the Keller ARCS Motivation Model. For faculty, Confidence was the most common theme, and related to providing key information initially in the course, and having progression present throughout the course. Further studies on second-year and beyond students' perceptions of motivation and studies on motivation in other settings, with different technologies, and use of learning management system elements were recommended.

Statement of the Problem

Technology has expanded and enhanced the traditional learning model in higher education. With a new generation of students armed with digital literacy skills, the learning environment has become increasingly complex, technological, and varied. Although research on online and other models at the university level, no research could be found on the relationships of student characteristics and motivation in a blended learning model at a university. Understanding the components of student motivation through Keller ARCS that could identify student sub-groups possibly can assist faculty in planning better content delivery and instructional design for student engagement, motivation, course completion, and college degree attainment.

Purpose of the Study

The purpose of this study was to examine the possible relationships of university student characteristics and perceived motivation in a blended digital literacy course. By examining these possible relationships, faculty may gain a better understanding of how student characteristics may impact motivation in a blended course design. This study attempted to increase understanding of motivation in today's university students, as well as help to provide a process for faculty to examine motivational levels of students in a blended course design in relation to student characteristics.

Significance of the Study

University students beginning their education in colleges and universities are considered members of a technology-enhanced generation (Barton & Skiba, 2006; Palfrey & Gasser, 2008; Martinez, 2009; Koutropolous, 2011). This has changed the way universities are delivering content to students along with a restructuring of the learning environment (Craig, 2007). At the research setting, all courses require the use of web-based technologies, regardless of the learning model used.

The Kansas Board of Regents is pursuing a vision document that includes retention as part of college degree attainment, and the document is expected to be completed by the year 2020 (Kansas Board of Regents, 2013). Their document, "Foresight 2020," challenges universities to have measurable indicators and strategies that match the strategic plan's goals by 2020.

The research setting has also created a vision of 2020 called "A Duty to Dream" (A Duty to Dream, 2013). "A Duty to Dream" specifically outlines retention of on-campus students as a

goal for 2020. This research can provide information helpful to a better understanding student motivation.

The results of this study can assist university faculty in course design and evaluation at the research setting and at other universities and provide data and insight into university student motivation for initiatives. The results can also inform strategic planning initiatives in technology acquisition and use at the research setting, in reaching the Kansas Board of Regents Foresight 2020 goals for Kansas universities, and universities that are using or considering the blended learning model in digital literacy courses.

Research Questions and Null Hypotheses

This study investigated motivational responses of participants in a blended digital literacy course to understand to what extent relationships existed between motivation and student characteristics. There were three primary research questions that focused on non-performance, pre-course performance, and post-course performance student characteristics, respectively.

Research Question 1: Do statistically significant relationships exist between non-performance student characteristics (age, gender, academic rank, Race / Ethnicity) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Null Hypotheses:

Ho 1.1. There are no statistically significant differences between student age and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 1.2. There are no statistically significant differences between student gender and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 1.3. There are no statistically significant differences between student academic rank and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 1.4. There are no statistically significant differences between student Race / Ethnicity and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Research Question 2: Do statistically significant relationships exist between pre-course performance student characteristics (pre-course digital literacy, high school GPA, ACT score) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Null Hypotheses:

Ho 2.1. There are no statistically significant differences between student pre-course digital literacy and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 2.2. There are no statistically significant differences between student high school GPAs and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 2.3. There are no statistically significant differences between student ACT scores and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Research Question 3: Do statistically significant relationships exist between post-course performance student characteristics (post-course digital literacy, change in digital literacy) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Null Hypotheses:

Ho 3.1. There are no statistically significant differences between student post-course digital literacy and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 3.2. There are no statistically significant differences between student change in digital literacy and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Limitations of the Study

1. Participants may have shared desirable responses instead of honest responses with the researcher due to the researcher being an instructor at the university.
2. Students may have developed adequate knowledge and use of available web-based technologies beyond the content of the course, and may not have been motivated by the course.
3. Participants existed only within the on-campus population of the university. Virtual students may not perceive the same motivational elements as on-campus students, and the findings may not pertain to all populations of students due to the nature of the survey instruments.
4. This study may provided motivational data on certain student characteristics. Other student characteristics may exist that have a significant impact upon the results.

5. Some on-campus university students may have been excluded from the study due to an insufficient number of class sections being offered for enrollment.
6. Some students may have dropped the course before the survey was administered. This could have been due to lack of motivation by the course and would not be included in the findings.
7. Atomic Learning Tech Skills Assessment standardization information was unavailable to the researcher, and not provided upon request.

Delimitation of the Study

1. The population of the study was limited to on-campus university students. The on-campus sections of the digital literacy course were the only sections that used a blended learning model.

Definition of Terms

Attainment – Completion of a certificate, degree, or bachelor's degree (Kansas Board of Regents, 2013, p. 1).

Engagement - Being involved or having interest in an activity.

Motivation – This study used Keller's definition of motivation: the choices people make to what experiences they will pursue or not pursue, and the degree of effort they will exert in order to pursue or not pursue those experiences (Keller, 1983).

Web-based technology – Any instructional "online" technology that is used to support and enhance a learning environment.

Chapter Summary

This chapter introduced the increasing online learning enrollment growth universities have experienced in recent years. As enrollment has increased, technology has reshaped the

learning model into several different learning models: traditional, web-facilitated, blended/hybrid, and online. Learning management systems have facilitated this transition, with the most commonly used system being the Blackboard learning management system.

The research setting, while having experienced much larger enrollment growth than similar universities, has also adapted to new models of course delivery for its students. Through the use of new approaches to instruction using technology in China, through online instruction, and on-campus instruction, the research setting has begun to utilize new and innovative learning models. To deliver these models the research setting has relied upon using a learning management system, specifically Blackboard. Other technologies have been integrated into the research setting, but all courses are ultimately managed through the use of the Blackboard learning management system.

In order to assess the use of technology in courses, the research setting has used national survey instruments, such as the National Survey of Student Engagement. The research setting has also relied upon students entering the university to have acquired the International Society for Technology in Education National Educational Technology Standards for Students (ISTE NETS-S) in previous learning experiences, as required by the Kansas Board of Regents. These standards are the basis for the exit test used by the research setting developed by Atomic Learning. The research setting has embraced state strategic plan – the Kansas Board of Regents Foresight 2020, while developing its own strategic plan, A Duty To Dream to respond to enrollment growth and student motivation. The chapter concludes by introducing the theoretical framework of the study, Keller ARCS Motivation Model, statement of the problem, purpose of the study, significance of the study, research questions, limitations and delimitations, and the definition of terms.

Chapter 2 - Literature Review

Introduction

Technology has changed academia, forcing it to adjust, adapt, and innovate into new areas and instructional designs (Craig, 2007; Pritchett, Wohleb, & Pritchett, 2013). From traditional to completely virtual universities, all of the critical components of education are adapting to new learning styles, new delivery styles, and a new generation of students. For example, Stanford and other universities have incorporated Massively Open Online Courses (MOOCs), which are free online courses for students that are available to the public, generally without college credit (Skiba, 2012). However, providers of MOOCs estimate 90% of students do not complete the courses, but two thirds of students reported they would try to complete the MOOC if credit was awarded (Marcus, 2013).

Today's traditional students at the university level have been referred to as *digital natives*, due to their inherent use of technologies (Prensky, 2001). Characterized as individuals that have lived with technology all their lives, particularly the Internet, they use technology in many aspects of life in addition to learning (Barton & Skiba, 2006; Palfrey & Gasser, 2008; Martinez, 2009; Koutropolous, 2011). They respond well to distance education and the integration of various technologies into the classroom through new innovative course designs (Allen & Seaman, 2014).

As faculty adapt to new instructional technologies and learn how to use these technologies effectively to facilitate and motivate student learning for course completion and college graduation attainment, several issues have developed. These issues include how to use instructional technologies in traditional and virtual settings, how to structure content and

assignments to be effective and motivational to digital native students, and how to adjust to technological demand in learning.

The Digital Native: Current University Students

The "digital native" is considered to be anyone born after 1980, since they inherently possess technology skills due to the availability and use of technology throughout their lives (Prensky, 2001; Prensky, 2010; Palfrey & Gasser, 2008). While there is not a unified agreement, a majority of the population is included in the term "Net Generation" (Tapscott, 1998). Barton and Skiba (2006) defined digital natives as Net Generation members and included anyone born after 1982 and before 1991 as members of this generation. Other writers have defined the Net Generation as including anyone born after 1977 (Martinez, 2009). Barton and Skiba (2006) defined the Net Generation as having ten characteristics:

- Fierce independence: Their sense of autonomy derives from their experiences of being an active information seeker and creator of information and knowledge.
- Emotional and intellectual openness: They value the openness of the online environment, like anonymity, and communicate through numerous technological tools.
- Inclusion: They view the world in a global context and move toward greater inclusion of diversity.
- Free expression and strong views: With access to knowledge resources at their fingertips, they are assertive and confident.
- Innovation: This group is constantly trying to push the technology to its next level and figure out how to create a better world.
- Preoccupation with maturity: Armed with knowledge, they strive to be more mature than their predecessors.

- Investigations: Curiosity, discovery, and exploration are key for this generation.
- Immediacy: This generation views the world as 24/7 and demands real time and fast processing.
- Sensitivity to corporate interest: Consumer savvy, these customers like customization and want to have options and to try before they buy.
- Authentication and trust: Net savvy individuals, they know the need to verify and check resources and authenticate people.

Digital natives have also been described as being fond of multi-tasking (Wesch, 2007). Multi-tasking includes using multiple devices and platforms at once, not just multi-tasking on a single computer. For example, a student may be reading an e-book, updating Facebook, texting on a phone, and listening to music all at the same time while learning. This suggests that students prefer variety and a non-linear format for content in courses. Certain learning models, such as blended courses, can fill this desire as students are constantly being "switched" from a face-to-face to an online environment.

However, not all digital natives are alike. In a literature review by Koutropoulos (2011) it was found that digital natives varied, largely based upon demographical factors. These factors included location, socioeconomic status, race, gender, and educational background. The review found that these factors do play a role in how and how much technology is used by digital natives. While digital natives can be inspired by technology, each subgroup may have unique perspectives and experience in regards to technology use. The review found that those in middle to low income used technology less than those in higher income categories.

Another notable characteristic of digital natives in research is the need for "immediacy" (Barton & Skiba, 2006). Immediacy refers to items such as instant feedback, quick responses,

and real-time processing used in social media and mediated instruction. Digital natives expect faculty to understand and use technology in the learning environment. This means that faculty need to be proficient in instructional technologies and find new ways to communicate quickly and efficiently in a more authentic approach to instruction.

Faculty use classroom technology and learning management systems that are constantly changing. Various services, such as mobile applications, social media, automatic grading, student analytics, instant messaging, chat groups, and feedback for exams and quizzes allow instructors to facilitate more student interaction and collaboration and to better analyze student progress. As Prensky noted in *Teaching digital natives: Partnering for real learning* (2010), "Ironically, it is the generation raised on the expectation of interactivity that is finally ripe for the skill-based and "doing-based" teaching methods that past experts have always suggested are the best for learning…"(p. xv).

Each of these 10 Net Generation themes needs to be considered in designing and delivering instruction. The challenge for faculty is to create customized instruction and learning environments that allow for the 10 themes of the Net Generation, while increasing interactivity and authentic experiences. However, faculty should consider the varying demographics of the digital natives, as well, since these students may require different models and delivery technologies in order to facilitate ideal learning (Martinez, 2009).

Blended Learning and Motivation

A blended learning environment is characterized as an environment with a significant amount of course material delivered online with reduced face-to-face instruction (Allen & Seaman, 2013). The concept of blended learning, relative to research, is still new. Bluic, Goodyear, and Ellis (2007) suggested in their review that research on blended learning was rare

before the 21st century. Research on blended learning in relation to motivation is even newer. However, some studies have been conducted to examine motivation in blended learning.

In a 2009 study by Uğur, Akkoyunlu, and Kurbanoğlu, of 31 senior students in Turkey, the study revealed that the use of blended learning was considered highly positive to students in their learning environment. This study used a comparative – causal approach to examine the relationship between learning styles and views on blended learning. Data was collected using an information form, Kolb's Learning Style Inventory, a Scale On Learners' View On Blended Learning And Its Implementation Process, and open-ended questions. Student participants were enrolled in a blended section of an information literacy course. Descriptive statistics and covariance analysis were used to find the results of the study.

A 2011 study by Echo360, a major software and lecture-capture company, surveyed 11 major institutions located throughout the world found that of 2,420 student respondents, 84% agreed that blended learning improved their understanding of course material. The same study also found that 72% of students liked the flexibility of blended learning, and 68% would recommend peers to take a course using a blended learning format.

A recent mixed methods dissertation by Perlas (2010) examined blended learning in higher education focused on students from underrepresented populations in a community college environment. The traditional course sample consisted of 49 students, compared to 40 students in the blended course. These students were defined as academically disadvantaged, first-generation, and financial-aid eligible college students. Perlas (2010) researched motivational categories similar to the Keller ARCS Motivation Model, but did not use the Keller ARCS definition for the categories. Instead, Carey's Academic Motivation Profile definitions were used, which were similar. The dissertation compared students' motivational profiles in a

traditional course and a blended course and found no significant difference in motivation at the $p < .05$ level in any of the categories. However, qualitative research found that the blended course did provide options that were considered to be motivational to students. The qualitative research was conducted as a focus group with four participants. While the sample was small and the qualitative research quite limited, it suggested that although a blended course did not provide significant results in motivation for a special population of students, the qualitative research portion indicated possibility the use of a blended learning model was perceived as being motivational to students.

At the community college level, Johnson (2012) researched first-year business students' motivational perceptions using a case study analysis of 18 first-year business students and three faculty members in an online course setting for his dissertation. The Keller ARCS Motivation Model was used as a theoretical framework in the dissertation. As one of the first research dissertations at the community college level to explore the motivational factors of the Keller ARCS Motivation Model through the perceptions and experiences of students and faculty, Johnson's research identified coded themes for each ARCS motivational category based on student perceptions. In the category of Attention, variability was found to be the significant theme. Variability in this dissertation referred to the variability in the instructional items used in the course. In Relevance, the significant theme was providing choices to students in the course. In Confidence, the significant theme was progression of difficulty. Finally, in Satisfaction, the significant theme was the ability for students to practice activities prior to grading. Johnson suggested in his dissertation that further research should be conducted on learning management systems and in other settings.

At the university level, the researcher found one dissertation of the Keller ARCS Motivation Model and student motivation perceptions of graduate teaching assistants (Ogawa, 2008). It was a mixed methods dissertation conducted with a sample of 320 students. The dissertation consisted of a survey given to the students. The data was used to select the most motivational graduate teaching assistants. The motivational graduate teaching assistants were then interviewed to find relevant themes for exemplary instructional practices based upon the Keller ARCS Motivation Model. Four common themes were found for the graduate teaching assistants. These themes were course coordinator/orientation, oral and written reflection, modeling of the previous undergraduate assistant that influenced the present assistant when the present assistant was a student, and modeling of the supervisor of the teaching assistant (Ogawa, 2008). While this dissertation was not conducted on a blended learning environment, the findings of how graduate teaching assistants influenced motivation in a face-to-face class, which is part of the blended learning experience, suggested that motivational behaviors can be passed from a graduate teaching assistant to students. The findings also suggested that the Keller ARCS Motivation Model could improve instruction.

These studies and dissertations provide insight into blended learning and motivation. Blended learning is perceived as a positive experience by students (Uğur et al., 2009) and is perceived to improve learning (Echo360, 2011; Perlas, 2010). In online courses, variability, choices, progression, and practice were perceived to increase student motivation (Johnson, 2012). For instructors, using the motivational practices from previous mentors may also influence the motivation of students (Ogawa, 2008). Although these studies were helpful in motivational research, further research is needed to understand the impacts of blended learning

on student motivation, the use of instructional technologies in these environments, and how student characteristics may influence motivation.

Evolution of the Keller ARCS Motivation Model

Regardless of the course design and delivery of content, there are different theories that explain motivation. Each of these theories provides a unique view into motivation and how it can affect desired outcomes. The achievement theory, for example, explains motivation in terms of human needs for achievement, power, and affiliation (McClelland, 1953). Reinforcement theory, on the other hand, argues behavioral motivation can be influenced and controlled by reinforcements and rewards (Skinner, 1969). In achievement theory, motivation occurs based upon a need, while in reinforcement theory, motivation is based on the reinforcement. In terms of the evolution of the Keller ARCS Motivation Model, Keller stated that the Expectancy-Value Theory served as the base theory for developing his Macro Theory of Motivation (Keller, 1979). The Macro Theory of Motivation eventually evolved into the ARCS Motivation Model (Keller, 1987).

Expectancy-Value Theory

The Expectancy-Value Theory was developed by John Atkinson in 1964, and has been used in many fields since its conception. The Expectancy-Value Theory suggests that motivation is created from expectancies and values. Expectancy is defined as the perceived probability of success, while value is defined as the perceived value of the outcomes of a particular action (Porter & Lawler, 1968). Eccles introduced the Expectancy-Value Theory into education in 1983 in an attempt to explain student motivation in regard to expectations and the values students place on outcomes (Eccles, 1983).

In developing the Macro Theory of Motivation, Keller modified and expanded the original Expectancy-Value Theory to include more specific, additional categories (1987). In particular, the value category was subdivided into two distinct categories—interest and relevance—and moved to beginning or base of the model. The expectancy category remained unchanged. An additional category—outcomes—was introduced at the end of the model (Keller, 1987). These new categories were subsequently renamed to form a useful acronym for the model and became the basis for the final iteration of the Keller ARCS (Attention, Relevance, Confidence and Satisfaction) Model Motivation Model, as shown in Figure 2.1.

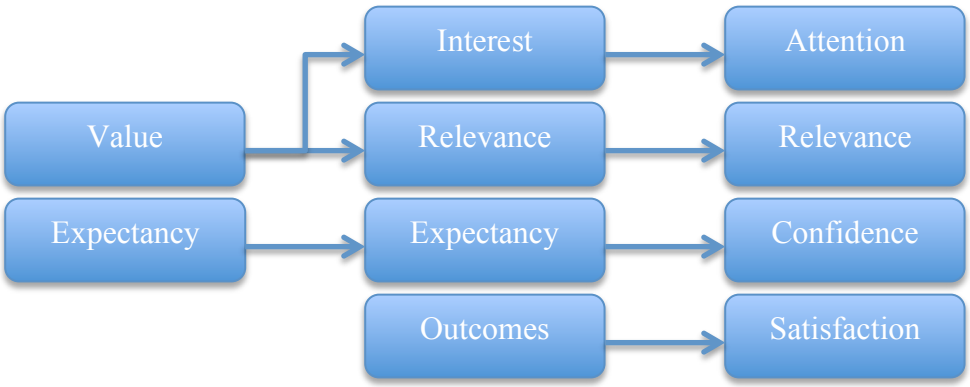


Figure 2.1 Evolution of Keller ARCS Motivation Model Categories

Keller ARCS Motivation Model

The final form of the Keller ARCS Motivation Model has four main categories: Attention, Relevance, Confidence, and Satisfaction (Keller, 2010). Figure 2.1 displays the final categories and how they combined to form the complete Keller ARCS Motivation Model.

Figure 2.2 Keller ARCS Motivation Model Categories

Note: From Ridley, M. (2014). http://mariannaridley.com/2014/02/24/transfer-of-training-leveraging-gagnes-nine-events-and-kellers-arcs-model/

Johnson (2012) developed a summary of each category and subcategory, along with motivational strategies, presented in Table 2.1. An important concept in the Keller ARCS Motivation Model is that the presence of motivational elements within the learning environment can lead to increased motivation. It is also important to note that Keller (1987) defined the model as a method for improving the motivational appeal of instructional materials. In order to better define the motivational process, Keller (1987) defined three features of the ARCS Motivational Model that are important:

1. Establish connections to motivational theory by using the ARCS model.
2. Enhance the appeal of instruction by using ARCS strategies.
3. Utilize a systematic design process in applying ARCS.

Table 2.1 summarizes these features by providing components and constructs that relate to multiple motivational theories, but also providing various motivational strategies in each category. Keller (2006) emphasized that the ARCS Model of Motivation should be part of an

empirical approach to instructional design, and that the design process is ultimately in the hands of the instructional designer as part of a systematic design process.

Table 2.1 Keller ARCS Components of Motivation and Motivational Strategies

ARCS Elements	Components	Psychological Constructs	Motivational Strategies
Attention – Get the learners attention and then guide and maintain it though the instruction. Use "surprise" and "curiosity" in the instruction to engage the learner.	1. Variability 2. Humor 3. Concreteness 4. Cognitive Conflict 5. Inquiry 6. Participation	A1-Perceptual Arousal A2-Inquiry Arousal A3-Variability	1. A change in instruction, such as short video clips, discussions, or team projects. 2. Use humor as a strategy to introduce the material, or to break-up instruction and refocus student attention. 3. Link from the topic to a real-world example. 4. Debate and student discovery of the topic. 5. Ask questions or problems for students to analyze and solve. 6. Allow students to be actively involved through simulations, games, labs, teamwork/groups, etc.
Relevance – Show the learners the benefits to them and how the instruction is relevant to their personal situation and future goals.	1. Experience 2. Present Worth 3. Future 4. Need Matching 5. Modeling 6. Choice	R1-Goal Orientation R2-Motive Matching R3-Familiarity	1. Show how prior knowledge will assist in comprehending new material. 2. Set up scenarios that show how the students' current situation may be changed by learning new material. 3. Make course materials relevant to students' future goals. Help students make the link between the material and future goals. 4. Organize instruction so that learners may demonstrate personal need factors such as taking risks, achievement, etc. 5. Model instructional activities, such as guest speakers, videos, tutoring, etc. 6. Provide activities which allow students choice.
Confidence – Develop learner confidence and help student to understand how to be successful in the class. Learners must feel that the time and effort will be worthwhile.	1. Learning Requirements 2. Difficulty 3. Expectations 4. Attributions 5. Self-Confidence	C1-Learning Requirements C2-Success Opportunities C3-Personal Control	1. Set clear learner objectives and prerequisites for each instructional activity. Provide examples and rubrics 2. Organize learning for success along the way. Start with activities that build confidence and then make activities progressively more difficult as students progress. 3. Help students develop realistic expectations about the amount of time and effort required to be successful. 4. Show how previous work correlates to knowledge to be gained. Share previous students' work and their achievements. 5. Provide feedback and opportunities to share success. 6. Allow opportunities to practice new knowledge. Students must feel successful before applying it to settings beyond class.
Satisfaction - Learners must perceive some type of satisfaction from the experience. A passing grade, praise or positive feedback, will spur interest in immediate use of knowledge.	1. Natural Consequences 2. Unexpected Rewards 3. Positive Outcomes 4. Avoiding Negative Influences 5. Scheduling Reinforcements	S1-Intrinsic Reinforcement S2-Extrinsic Rewards S3-Equity	1. Instruction must allow content use in natural setting. Instruction may include simulations, projects and other real-life activities. 2. Success should be rewarded. Offset tasks with anticipated rewards, as well as unforeseen rewards. Do not over simplify success or reward too often. Reward should match task difficulty. 3. Provide learners with intrinsic and extrinsic rewards, such as praise, or positive feedback for task. Feedback must be within a reasonable time of task completion. 4. Threats or negative consequences beyond appropriate levels should be avoided, as well as public evaluations. 5. Provide opportunities for practice. Organize reinforcements with more opportunities when material is introduced and less as material is learned.

Note: From *"Community College First-Year Business Student Online Course Motivation."* By R. Johnson, 2012.

Attention

Keller (2010) referred to Attention as the most important category of the Keller ARCS Motivation Model, as without Attention the other categories cannot be attained. Keller (2010) further defined attention as "Capturing the interest of learners; stimulating the curiosity to learn" (Keller, 2010, p. 45). Attention is divided into three main constructs: perceptual arousal, inquiry arousal, and variability. Perceptual arousal refers to simple changes in an environment, wherein inquiry arousal is a deeper sense of arousal, which is typically associated with mystery or knowledge-seeking behavior. Variability, on the other hand, refers to the variations that may be present or become present in the environment (Keller, 2010).

This definition of Attention suggests that the blended learning environment may provide attention-based motivation to students. Blended learning is characterized by changes in the learning environment from face-to-face to web-based learning (Allen & Seaman, 2013). In previous research students have reacted positively to blended learning (Uğur et al., 2009; Echo360, 2011), suggesting that blended learning as a course design could increase Attention for typical university students.

Relevance

Relevance is defined as "meeting the personal needs/goals of the learner to affect a positive attitude" (Keller, 2010, p. 45). It should be noted that relevance refers to perceived needs and not to the actual needs of the learner. Relevance contains three constructs: goal orientation, motive matching, and familiarity. Goal orientation pertains to the ability of the Instructor and/or the learning environment to establish an association between the goals of the learner (present or future) and the course in question. The positive attitude that a student feels in a learning environment and how comfortable the student feels in that environment matches the

person's motives. This is referred to as motive matching. Familiarity is defined as the ability for a student to connect prior learning experiences to the learning experiences that will/did occur in the course (Keller, 2010).

In a blended learning design populated by digital natives, familiarity may be the most applicable construct. The most preferred learning model for students today is the blended learning model (Dahlstrom et al., 2013). The first two constructs, goal orientation and motive matching, are highly dependent on the learner. Familiarity is more dependent upon the learning environment design than goal orientation and motive matching. Net Generation learners are considered to have an aptitude towards technology (Barton & Skiba, 2006), and by design a blended learning course incorporates a substantial set of technology through the use of web-based technologies.

Confidence

"Helping the learners believe/feel that they will succeed and control their success" is the definition of confidence (Keller, 2010, p. 45). Confidence is created through the use of learning requirements, success opportunities, and personal control. Learning requirements can exist in different forms, but are designed to let students know what to expect during a course. Success opportunities are slightly different than learning requirements. While a learner may be required to complete an assignment, the assignment can also be a success opportunity. The balance is to provide learners with opportunities that alleviate boredom, but are not too challenging to likely cause failure. Personal control refers to how much control the learner has over the learning experience. A learning experience occurs in the learning environment, but is separate from the environment. Typically the Instructor has control over the learning environment, but should

attempt to enable the learner to have as much control over the learning experience as possible (Keller, 2010).

A blended learning course, like virtually all other courses, consists of learning requirements. These requirements will outline the possibilities of success opportunities throughout the course. A blended learning course is different from other courses in the area of personal control. While possibly not having as much control as a completely online, self-paced course, a blended learning course can provide more personal control to learners through the use of the web-based technologies.

Satisfaction

Satisfaction is defined as "reinforcing accomplishment with rewards (internal and external)" (Keller, 2010, p. 45). Satisfaction is composed of natural consequences, positive consequences, and equity. Natural consequences, as a construct, describe the processes a learner goes through in a course. During a course, a learner should develop new skills and have the opportunity to put those skills to use. As a result, the learner should be able to perform tasks at the end of the course they could not perform at the beginning of the course. Another form of natural consequences also occurs through the use of praise. Positive consequences, on the other hand, can be similar to praise but in the form of rewards. These rewards can consist of mostly anything that provides positive recognition for achievements, etc. during the course. Equity is based on the previous two constructs, and is based on the idea that the consequences, when compared to other learners, are equitable. A reward or praise will provide less satisfaction if it is perceived by the recipient that it is "lesser" than a reward received by another learner for reaching a comparable goal or achievement (Keller, 2010).

Keller ARCS Course Interest Survey

Attention, Relevance, Confidence, and Satisfaction can be used to measure motivation in learning environments through the use of the Course Interest Survey (CIS) (2006) (Appendix B). The Course Interest Survey was designed by Keller to help measure students' reactions to instructor-led instruction. This survey was not designed to measure generalized levels of motivation, but instead, is designed to measure levels of motivation within a specific course. The survey consists of 34 questions and can be analyzed based on each category of the Keller ARCS Motivation Model. The Course Interest Survey is modifiable and can be scored using different scales. The instrument can be scored in slightly different ways, depending on the goals of the researcher. Each value in the scale can be assigned a point value, and those points can be summed to provide a measure for each category. However, not all categories contain the exact same number of questions, so to compare categories, average scores can be used instead. Some questions on the survey are reversed scored to provide a less biased approach for the survey. More information on how the survey was used specifically in this study is located in Chapter 4, Motivational Measures.

Selected Variables for the Study

The variables in this study consisted of two main groups, student characteristic variables and motivational variables. Student characteristics were divided into non-performance characteristics, pre-course performance characteristics, and post-course performance characteristics. Non-performance characteristics consisted of age, gender, academic rank, and Race / Ethnicity. Pre-course performance student characteristics were ACT score, high school GPA, and Atomic Learning Technology Skills Assessment (ALTSA) pretest scores. Post-course performance student characteristics were ALTSA posttest scores and change in digital literacy

(difference between ALTSA pretest and posttest scores). Motivational variables consisted of Attention, Relevance, Confidence, Satisfaction, and overall motivation.

Gender

Gender can play a significant role in regard to motivation. Motivation and gender are related when motivation is measured in a specific topic area, such as mathematics (Meece, Glienke, & Burg, 2006). Also, gender differences have been found to contribute to differences in attainment (Steinmayr & Spinath, 2008). Recent research has shown that gender is not a factor in technology use (Mims-Word, 2012). The researcher chose gender as a variable since it may have a relationship to motivation, due to the blended learning model of the course.

Race / Ethnicity

A study by Young, Johnson, Hawthorne, and Pugh (2011) found that each category of Race / Ethnicity was unique with regard to motivational predictors. For this reason, the researcher chose to include this variable in the study.

Age

The age of a student is important to this study since not all students are "digital natives." A digital native, or Net Generation member, is someone born near or after 1980, and is inherently comfortable with technology (Prensky, 2001; Barton & Skiba, 2006; Palfrey & Gasser, 2008; Martinez, 2009; Koutropolous, 2011). Not all students are in this age group at the research setting. Since this study involved digital literacy scores, it was beneficial for the researcher to ensure a vast majority of the participants were considered digital natives.

Academic Rank

Academic rank refers to the classification a student receives from the university based upon credit hours earned. In the research setting, a freshman will have completed less than 30

credit hours. A sophomore will have completed 30 to 59 hours, a junior 60 to 89, and a senior is 90 or more hours. Academic rank is not synonymous with the year in school, as multiple years can exist within a single rank if the student is part-time or enrolls in the minimum 12 credit hours to be considered full-time. The researcher chose to include student rank in the study as Johnson (2012) recommended the study of other academic ranks besides first-year Freshmen in his dissertation.

High School GPA

The researcher selected high school GPA since this measurement provided an overall approximation of a student's high school academic performance before entering the blended digital literacy course. While every high school curriculum is different, high school GPA provided an approximate 4-year cumulative measurement for participants. High school GPA was found to be significantly related to academic performance for beginning engineering students. (Haemmerlie & Montgomery, 2012). In the Haemmerlie and Montgomery (2012) study, 1,342 Freshmen engineering students (1,105 males, 237 females) at Missouri S&T in 2007 were administered the Hogan Personality Inventory (HPI). High school GPA (listed as rank in the study) was found to be significantly positively correlated to the trait of school success in the HPI (males, r=.19, females, $r = .17$, $p < .01$).

ACT Score

The ACT score, from the standardized ACT exam, has been found to be positively related to the likelihood of student retention (Wohlgemuth, Whalen, Sullivan, Nading, Mack, & Wang, 2007). The ACT score is used for admission purposes at the research setting, which research has shown that the ACT score was found to be significantly related to retention (Purdie & Rosser,

2011). While retention is not part of the proposed study, the researcher included ACT score as retention was found to relate to motivation (Morrow & Ackerman, 2012).

Pre-Course and Post-Course Digital Literacy Scores

At the research setting, for accreditation purposes, the Atomic Learning Tech Skills Assessment exam is administered to all students at the beginning and end of the course. This exam is specifically designed to gauge technology skill levels, and is directly based upon the ISTE NETS-S 2007 standards (Atomic Learning, 2013). Using these measures, the researcher gained an understanding of the level of digital literacy skills students possessed before the course and how much of a change occurred in a student's digital literacy as a result of the course.

The International Society for Technology in Education National Education Standards for Students (ISTE NETS-S) are now referred to as the ISTE NETS-S standards. The standards are refreshed every few years through member input. These standards provide a guide for evaluating digital skills students need to operate, learn, work, and contribute in a global and digital world (ISTE, 2014). The ISTE Standards consist of the following: Creativity and innovation, Communication and collaboration, Research and information fluency, Critical thinking and problem solving, and Digital citizenship. Each standard contains performance indicators that educators can incorporate into their courses to determine if students have reached adequate levels of digital literacy. The Atomic Learning Tech Skills Assessment is based upon these standards. Example questions are located in Appendix K. The test is proprietary and permission to publish examples of the test was not given.

Motivation Variables

All measures of motivation came directly from Keller ARCS Motivation Model Course Interest Survey (Appendix B). The motivation variables are Attention, Relevance, Confidence,

and Satisfaction. The scores for these variables are situational and are bound to the Instructor of the blended digital literacy course offered at the research setting. These variables provided a basis for measuring the perceived amounts of motivation students experienced in relation to the variables and measures listed above. These variables are discussed in greater detail in Chapter 3.

Chapter Summary

Technology serves as a foundation for learning for today's university students, the digital natives. These digital natives, along with the advancement of technology, have provided higher education the means necessary to provide new and innovative learning models such as blended learning. Motivation is a complex topic, but has been found to influence the learning experience. Keller ARCS Motivation Model has defined and outlined major categories, Attention, Relevance, Confidence, and Satisfaction that play a role in the motivation of students in learning environments. Although some research has been conducted in the field of motivation, very little research has been found by the researcher that connects motivation to characteristics of students in a university setting, and none could be found in the context of a blended learning environment. Other research has suggested that characteristics such as demographics and previous experience may play a role in student motivation. The blended learning model is posed as effective for digital native students, and the Keller ARCS Motivation Model Course Interest Survey allows the ability for motivation to be measured within a higher education course. Other assessments, such as the Atomic Learning Tech Skills Assessment, which is based on the National Society for Technology in Education National Educational Technology Standards for Students (ISTE NETS –S), that evaluates the digital literacy skills and knowledge of students. By combining these measures researchers, faculty, and administrators may be able to establish relationships between

digital literacy levels and other student characteristics and perceived motivation experienced during a higher education introductory digital literacy course.

Chapter 3 - Research Methods

Chapter Overview

This chapter explains the research design and methodology used to examine the relationships between student characteristics and motivation in university students enrolled in a required blended digital literacy course. The research questions, design, research setting, description of the population, data collection, and analysis are discussed, along with reliability, validity, and ethical concerns.

Research Questions and Null Hypotheses

The study investigated motivational responses of participants in a blended digital literacy course and if relationships existed between motivation and student characteristics. There were three primary research questions that focused on non-performance, pre-course performance, and post-course performance student characteristics respectively.

Research Question 1: Do statistically significant relationships exist between non-performance student characteristics (age, gender, academic rank, Race / Ethnicity) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Null Hypotheses:

Ho 1.1. There are no statistically significant differences between student age and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 1.2. There are no statistically significant differences between student gender and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 1.3. There are no statistically significant differences between student academic rank and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 1.4. There are no statistically significant differences between student Race / Ethnicity and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Research Question 2: Do statistically significant relationships exist between pre-course performance student characteristics (pre-course digital literacy, high school GPA, ACT score) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Null Hypotheses:

Ho 2.1. There are no statistically significant differences between student pre-course digital literacy and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 2.2. There are no statistically significant differences between student high school GPAs and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 2.3. There are no statistically significant differences between student ACT scores and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Research Question 3: Do statistically significant relationships exist between post-course performance student characteristics (post-course digital literacy, change in digital literacy) and

Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Null Hypotheses:

Ho 3.1. There are no statistically significant differences between student post-course digital literacy and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 3.2. There are no statistically significant differences between student change in digital literacy and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Research Design

Creswell (2009) defined a research design as "plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis" (p. 3). This study used a quantitative research design, which is defined as typically conducted by measuring concepts with scales that provide numeric values, and then use statistical computations to test hypotheses (Zikmund, Babin, Carr, & Griffin, 2010). A primary goal of quantitative research is to explain in a numerical fashion what is being observed by sampling a subset of a population through the use of a questionnaire, survey, or other quasi-experimental and experimental methods (Neill, 2007). The researcher chose a quantitative research design based upon the objective nature of the research questions, the large population of available participants, and the numerical nature of the available data - digital literacy scores.

In this study, quantitative data was collected through two sources: available data and collected data.

Available Data - Data pertaining to digital literacy was available from the learning management system, Blackboard, where performance scores were recorded for on-campus students enrolled in the blended digital literacy course. Pre-course scores were obtained at the beginning of the course and post-course scores were obtained at the end of the course. Scores were obtained using the Atomic Learning Technology Skills assessment, which is a standardized test that aligns with ISTE NETS-S 2007 standards (Atomic Learning, 2013). Examples of test questions on the Atomic Learning Technology Skills Assessment (ALTSA) are in Appendix K. These exams, pre-course and post-course, were part of the blended digital literacy course used in this study.

Collected Data - The researcher, through the use of close-ended survey questions, collected the second source of data collection from voluntary student participants enrolled in the blended digital literacy course. The researcher developed questions pertaining to student characteristics and used a modified version of the Keller's ARCS Course Interest Survey (Appendix B).

Data Analysis - In order for collected data to be considered representative of a population, it must meet assumptions of normality (Boslaugh & Watters, 2008). Since the Course Interest Survey (Keller, 2010) was constrained to one course with one instructor, the potential population of the study consisted of all on-campus students. The researcher chose to use this population for the study.

Typically, a sample size greater than 30 participants is found to be normally distributed (Arjomand, 2002). This study had a total sample size much larger than 30, for a total of 240. Of the 240, 170 students participated. Of the 170 participants, complete data was available for 135. The population was assessed for normality before additional analysis was conducted. All

data was analyzed using descriptive statistics, and then further analyzed using a series of one-way Multivariate Analysis of Variance (MANOVAs) to find values of significance. A MANOVA is an extension of an ANOVA, which is used to test situations that have only one dependent variable. The benefit of a MANOVA is that it can examine both multiple independent and dependent variables simultaneously for statistically significant relationships (Field, 2009). Statistically significant relationships found between two variables were further examined using an ANOVA. A Scheffe Post Hoc Test was then conducted to further analyze significant groups.

Research Setting

The research study was conducted at a medium-sized, four-year public Midwestern university that had a 2014 enrollment of 13,411 students. Of these students, 36.6% were classified as on-campus students while 73.4% were classified as virtual students. This research setting is home to 28 academic departments and offers both bachelors and masters degrees on-campus and online.

The undergraduate student population totaled 85.3% of the university student population in 2014. Of the undergraduate student population, 56% were declared as White, 5% declared as Hispanic, 4% declared as African American, 1% as Asian, 1% Other, and 31% of students were declared as simply "International". "International" may have referred to international students as the international student population is also 31%. In the undergraduate population, 59% were female, and 41% were male. It was also reported that within the undergraduate population, 50% of students referred to Kansas as their home and 31% of students declared another country besides the United States as their country of origin. The average age of an undergraduate student was 24. For first-year university students, of all applicants to the university, 89% were admitted to the university with 47% of admitted students enrolled in courses (Fort Hays State University

College Portrait, 2014). The university had a 17 to 1 student/faculty ratio, and 97% of courses had fewer than 50 students in one section. There were 295 faculty members at the university, with 69% that have obtained the highest academic degree in their field (Fort Hays State University College Portrait, 2014).

The Blended Learning Digital Literacy Course

The blended learning digital literacy course in this study is a foundation studies course required for all students, regardless of major. The researcher used Tigertracks to obtain the official course description. Tigertracks is a digital tool that allows a user to search by course. The researcher searched "MIS 101" for the "Fall 2014" semester to find the course description. The course was described as

> "an introduction to computing with an emphasis on improving productivity and communication through the effective use of available technology. Students acquire computing skills to increase their personal productivity in problem-solving, critical thinking and information management through the use of available software packages designed for office applications and telecommunications." (Tigertracks, 2014, para. 1).

Each section of the course met once per week during the semester, for an approximate time of 50 minutes. Students assembled in a mediated classroom for the face-to-face meeting. All other content in the course was delivered online through various technologies including the learning management system, Blackboard. Students were assessed in monitored labs for major exams and assessments during the course. Below were the course objectives and learning outcomes for the research setting blended digital literacy course. A syllabus for the course was not available to the researcher.

Course Objectives:

- Familiarization with the terminology, architecture, and capabilities of computers as related to end-user application in an information society.
- Mastery of file management techniques in the collection, storage, and retrieval of data and information.
- Mastery of the fundamentals of a modern integrated software application package that includes word processing, spreadsheet, presentation, and database functions.
- Mastery of telecommunication techniques including electronic mail, file transfer, and Internet-based applications.
- Exposure to ethical issues in an information society including Internet crime, software piracy, intellectual property, and Internet regulation.
- Introduction to mobile teaching, learning, and wireless communication.

Course Learning Outcomes:

- Identify the role of an operating system.
- Use the Internet to find information and determine its credibility.
- Use word processing software to create, edit, and produce professional documents.
- Create spreadsheets and charts for problem solving.
- Utilize a database.
- Use presentation software to create, edit, and produce professional presentations.
- Identify the ethical and social standards of conduct regarding the use of information and technology.
- Identify security threats and solutions.

Selecting the Population

The researcher surveyed all university students that were enrolled in an on-campus course section of the blended digital literacy course. The instructor of the course administered all available sections on-campus. While there were virtual sections of the course, these sections were not considered part of the population due to its online course design, which did not incorporate a blended model. The course sections to be used in the study were selected based upon the following criteria:

- Course is required for on-campus university students regardless of chosen major.
- Course is considered for credit toward a four-year degree.
- Course uses a blended learning model and is not considered a traditional, web-facilitated, or online course.
- Course uses the same instructor, as the instructor is considered part of Keller ARCS Motivation Model.

Using sectional data obtained from the research setting's course scheduling system, Tigertracks, the estimated population of the study consisted of 6 sections of MIS 101 Introduction to Computer Information Systems (the blended digital literacy course in this study) with a total enrollment of 240 students (Tigertracks, 2013). Table 3.1 shows the individual sections of the course at the time of the study. The Instructor in the study instructed all sections and used the same blended learning model in all sections.

Table 3.1 MIS 101 Enrollment

MIS 101 Introduction to Computer Information Systems	
Course	**Enrollment**
MIS 101 A	40
MIS 101 B	40
MIS 101 C	40
MIS 101 D	40
MIS 101 E	40
MIS 101 F	40

The total available population for student participants was 240 students. In order to participate in the study, student participants had to meet the selection criteria below.

Student selection criteria:

- Student was considered an undergraduate university student (part of a four-year program).
- Student was not enrolled in a different course instructed by the researcher.
- Student was enrolled in a course section of MIS 101 in the Spring 2014 semester.
- Student was at least 18 years of age.

Students who did not meet the selection criteria were not allowed to participate in the study. Of the 240 potential participants, 136 students participated in the study.

Data Collection

Data was collected for this research study from three different sources. The first source was student pre- and post-course performance scores on the Atomic Learning Technology Skills Assessment (ALTSA). These scores were collected at the beginning and the end of the blended digital literacy course by the instructor and were part of the assessment process of the course. The instructor provided these scores to the researcher after the assessments were administered. The researcher, through the use of surveys, collected the second source of data at the end of the course content delivery on April 14 and 16, 2014. The second source of data was a modified Keller ARCS Motivation Model Course Interest Survey, with additional characteristic-based questions added to this survey. The modified survey instrument can be found in Appendix B. The third source of data was from the university. Participants in the study consented for the university to release performance data to the researcher. This data was collected after the researcher submitted the names of the participants to the university.

The data collection process consisted of two separate phases. In the first phase, the researcher attended each section of the blended digital literacy course and presented the research study to potential participants. The instructor of the course was not present during the survey administration and did not have access to completed surveys at any time during the study. Before the survey was administered, the Participation Letter (Appendix C) was distributed and fully explained to the potential participants. Those who chose to participate then received a copy of the modified Course Interest Survey for completion. Completed surveys were collected from participants and stored in a safe location.

The second phase of the collection process consisted of the researcher receiving the digital literacy data from the instructor after the post-test exam scores were available. The researcher also received student characteristic data from the university for participants.

The survey instrument was administered to 170 potential participants that represented approximately 71% of the total population of 240. The remaining 29% were not present the days the survey was administered to all sections of the blended digital literacy course. Of the total 170 potential participants, 149 responded to the survey. A total of 136 participants consented, of the 149 responses, to allow the researcher to obtain additional data, for a total participation rate of 80% of the available potential participants. Participants represented 57% of the entire population of the on-campus blended digital literacy course.

A master database was created in order to combine participant data from the Course Interest Survey with the digital literacy data and university data. No identifiable information existed in the database, as each participant was assigned a number and only the researcher knew which participant was assigned to which number. The database was encrypted, and the researcher stored the completed surveys in a safe, secure location.

Keller ARCS Motivation Model Course Interest Survey (CIS)

Keller provided two different survey instruments for researchers examining the Keller ARCS Motivation Model, the Instructional Materials Motivation Survey and the Course Interest Survey (Keller, 2010). The Instructional Materials Motivation Survey (IMMS) is designed to measure motivation in self-directed learning, while the Course Interest Survey (CIS) is designed to measure motivation in instructor-facilitated courses (Keller, 2010). Because the research setting is an instructor-facilitated course, the CIS survey was used for data collection concerning motivation. It is important to note that Keller (2010) stressed this survey is bound to a particular

course, and should not be generalized across other courses. The data provided by this survey may be valuable to only the research setting, but the process of identifying areas of motivation as they related to specific characteristics may be valuable to other courses considering adopting, or that have adopted, the blended course learning model.

The Course Interest Survey consists of 34 questions and can be measured by the ARCS subcategories of Attention, Relevance, Confidence, and Satisfaction. The survey can provide an overall measure of motivation, and also a measure for each of the four subcategories. Each question on the Course Interest Survey in this study used a 4-item measurement scale: Strongly Disagree, Disagree, Agree, and Strongly Agree. The responses were scored as following: 0 = Strongly Disagree, 1 = Disagree, 2 = Agree, and 3 = Strongly Agree. The survey did contain reverse questions, which the answer is then scored opposite. For example, a response of Strongly Agree of would receive a numerical value of 0. To obtain a measure, the responses are modified (if a reverse question) and simply summed to provide a numeric value.

Data Analysis

Independent and Dependent Variables

This study used multiple independent and dependent variables. An independent variable is defined as a variable that influences a dependent variable, and a dependent variable is defined as a variable that is influenced by an independent variable (Zikmund et al., 2010). For this study, the independent and dependent variables are outlined in Table 3.1. It should be noted high school location was ultimately not included in the study (due to lack of grouping), but high school location can be found in Appendix L.

Table 3.2 Summary of Independent and Dependent Variables

Variables	Data Scale
Independent Variables	
Age	Ratio
Race / Ethnicity	Nominal
Gender	Nominal
Rank	Ordinal
High School Location	Nominal
High School GPA	Ratio
ACT Score	Ratio
Pre-Course Digital Literacy Score	Ratio
Change in Digital Literacy (Difference of Pre-Course/Post-Course)	Ratio
Dependent Variables	
Motivational Scores	Ratio

Note: Modified from Bakor, K. (2013). Concerns and professional development needs of faculty at King Abdul-Aziz University in Saudi Arabia in adopting online teaching. *Dissertation.*

Statistical Analysis

Survey collection for descriptive analysis included the total number of surveys, and the number of potential participants who did not participate. All surveys were analyzed using statistical software, specifically SPSS. Possible issues of response bias were examined. Response bias is the effect of nonresponses on survey estimates (Fowler, 2002). Incomplete surveys were excluded from the study.

First, data from the survey was combined with university data and coded into SPSS. After the descriptive analysis the data was assigned to groups within each variable using logical groups while attempting to keep the groups as even as possible.

A MANOVA requires the data to be multivariate normal and have no univariate outliers (Laerd Statistics, 2014). Most statistical tests assume that data is normally distributed, and therefore it is important to examine data for normal distributions (Fields, 2009). To determine if the data contained normal distributions, a Shapiro-Wilk test of normality was conducted. The Shapiro-Wilk test of normality is "a test of whether a distribution of scores is significantly different from a normal distribution" (Fields, 2009, p. 793). The Shapiro-Wilk test of normality will show significance if the data is possibly not normal, is affected by larger samples and may yield significant results even if the data is normal (Fields, 2009). A significant result for the Shapiro-Wilk test of normality can signify the possibility of univariate outliers (Laerd Statistics, 2014).

Univariate outliers can be identified using boxplots in SPSS (Fields, 2009; Laerd Statistics, 2014). SPSS, when graphing the boxplots, will signify an outlier with a * and include the data point number to be inspected. The researcher used boxplots to identify and inspect outliers. Suspicious or confirmed outliers were removed from the study. Multivariate outliers were addressed later in the statistical analysis.

When conducting a MANOVA, multicollinearity should moderately exist, since low multicollinearity would suggest using separate ANOVAs, and strong multicollinearity is problematic for the MANOVA (Laerd Statistics, 2014). The researcher conducted a bivariate analysis on the dependent variables to analyze multicollinearity. Multicollinearity is defined as "a situation when two or more variables are very closely linearly related" (Fields, 2009, p. 790).

The bivariate analysis used in the study was the Pearson Product-Moment Correlation Coefficient, which is "a standardized measure of the string of the relationship between two variables" (Fields, 2009, p. 791). The strength of the Pearson Correlation is measured between -1 and 1. The closer the value is to -1 or 1, the stronger the relationship that exists between variables.

A MANOVA requires that a linear relationship exists between each group of the independent variables and the dependent variables (Laerd Statistics, 2014). A linear relationship, or linear model, is a model that is based upon a straight line. A linear relationship can be viewed using a scatterplot, which is a graph that plots the values of a variable against the values of another variable (Fields, 2009). The researcher can then view the scatterplot to determine if a straight line has been created (Fields, 2009; Laerd Statistics, 2014). The researcher created scatterplots for each set of groups in the variables and examined them for a linear relationship. Non-linear groups were removed from the study.

Next, multivariate outliers were examined. Multivariate outliers are data points that may have an unusual effect on the dependent variables (Fields, 2009; Laerd Statistics, 2014). A Mahalanobis distance test can be used to determine multivariate outliers. The test works by assigning a distance to each value, and determining a cutoff distance point. A distance greater than the cutoff point is determined to be a multivariate outlier (Fields, 2009; Laerd Statistics, 2014). The researcher conducted a Mahalanobis distance test for each variable and removed any values that were determined to be a multivariate outlier.

Next, the MANOVAs were conducted. Each MANOVA was analyzed for homogeneity of variances using the Box's Test of Equality of Covariance Matrices. The Box's Test is a test of the assumption of homogeneity of variances, or that the variance of one variable is similar at all

levels of another variable (Fields, 2009). A non-significant value ($p > .001$) means that the assumption has been met. Significance was determined in the MANOVA using Wilks' Lambda. Wilks' Lambda is the most commonly recommended statistic to use to determine the results of a MANOVA (Laerd Statistics, 2014).

Significant MANOVA results were followed by a ANOVA for each dependent variable. Significant ANOVA results were then analyzed using a Scheffe post hoc test. A Scheffe post hoc test is the most popular post hoc procedure, but is conservative and has the least statistical power (Stevens, 1999). The tradeoff for low power is the flexibility of the test. The Scheffe post hoc test can show differences in means between the groups within a single dependent variable.

Trustworthiness of the Research

Reliability Reliability is an indicator of a measure's internal consistency (Zikmund et al., 2010). The main instrument in this study was the Course Interest Survey, and Keller (2010) addressed the reliability of this instrument: "The internal consistency measurements [of this instrument] were high, but further revisions were made to improve the instrument. The standard version was then administered … and the internal consistency estimates, based on Cronbach's alpha, were satisfactory" (p. 281). All alphas for all categories of the survey were reported above an alpha of 0.70, which is considered acceptable (Neill, 2007).

Validity

Validity is defined as the accuracy of a measure or the extent to which a score truthfully represents a concept (Zikmund et al., 2010). The Course Interest Survey was found to have strong situational validity, but is bound to the situation in which it is used (Keller, 2010). The survey is bound to the instructor of the course, meaning it cannot be used to generalize to other courses taught by other instructors. Keller determined situational validity exists by examining

the correlations of each category of the Keller ARCS Motivation Model and the course grade and GPA for 200 university students. Keller observed that the course grade was significant, but the GPA of the university students was not.

The largest threats to internal validity of the study were mortality and testing. Mortality is the loss of participants due to many possible reasons (Creswell, 2009). The researcher had little control of mortality issues and can only report possible loss of participants due to mortality. Testing, or the possibility of scoring higher on a repeat exam (Creswell, 2009), was minimized in the study due to the length of time that occurred between pre-course and post-course assessment.

External Validity refers to the generalizability of the results to a larger population (Creswell, 2009). The Course Interest Survey in this study, by design, is not intended for generalization of results (Keller, 2010). The Course Interest Survey is bound to the instructor, and therefore this study utilized the entire population for potential participants. The researcher intended for the *process* of this research to be generalized to other studies of motivation in other courses and course designs. While the findings are limited to the blended digital literacy course at the research setting due to the nature of the survey instrument, the methods used to reach the findings are not.

Protection of Human Subjects and Ethical Considerations

Ethical considerations that pertain to the protection of rights of participants should be a vital concern for researchers (Berg, 2004). For participants in this study, informed consent was explained to each participant and obtained by using the participation letter (Appendix C). This letter reinforced the anonymity and confidentiality of the participants. The research process made every attempt to uphold the ethical rights of the participants during the study. The researcher took measures to ensure the rights of participants by only using voluntary participants

and safeguarding any identifiable documentation through the use of data encryption and identifier coding. Only the researcher knew the identity of the participants.

Institutional Review Board (IRB) Approval

The researcher completed online ethical research training as required for both the research setting and Kansas State University. These training modules provided ethical background, concepts, and practices that emphasized the importance of human subject rights, protections, and risks. Once the training modules were complete, the researcher submitted to the Institutional Review Boards at each university for review. The researcher gained Institutional Review Board approval from Kansas State University and the research setting before conducting the research study (Appendix G). The ethical values of both of the institutional review boards involved were upheld throughout the study.

Chapter Summary

This chapter reviewed the overall design of the study and the research setting. Research questions and null hypotheses were presented. The study included three research questions, and 9 null hypotheses. The quantitative research design and rationale was discussed and the research setting was further explained. The population was described in detail, along with the selection process for the participants of the study. Data was provided from multiple sources, a survey instrument and available data from the university. Data from the participants and the university was obtained with permission. The survey instrument, the Course Interest Survey, was also described. This survey uses 34 questions to assess the motivation of student participants in an instructor-led course. The statistical analysis of the study was described in detail, along with the definitions and interpretations needed for the multiple statistical tests used in the study. These tests included the Shapiro-Wilk test, boxplots, scatterplots, Pearson's correlation, Mahalanobis

distance, MANOVA, ANOVA, and Scheffe post hoc tests. The process the researcher used in conducting the statistical tests and removal of data due to statistical issues was addressed as well. Trustworthiness of the study was examined, and threats to reliability and validity were discussed. Ethical considerations of the study, such as human rights protection and approval from the universities were presented in the chapter.

Chapter 4 - Data Analysis and Findings

Chapter Overview

The purpose of this study was to examine the relationships of university student characteristics and motivation in a blended digital literacy course. By examining these possible relationships, the research setting and other faculty and universities gained understanding of how student characteristics may impact motivation in a blended course design. Data was collected for the study through the use of a modified version of Keller ARCS Course Interest Survey and university provided data. Participants granted the researcher consent to obtain the additional university data (high school GPA, ACT score) before completing the survey instrument.

The chapter is divided into two main sections. The first section presented the research questions and null hypotheses while the second section presented the quantitative measures. In the quantitative measures section, all data for all student characteristics and motivational measures were investigated.

Research Questions and Null Hypotheses

The study investigated motivational responses of participants that participated in a blended digital literacy course and their relationships with student characteristics. There were three primary research questions that focused on non-performance, pre-course performance, and post-course performance student characteristics respectively.

Research Question 1: Do statistically significant relationships exist between non-performance student characteristics (age, gender, academic rank, Race / Ethnicity) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Null Hypotheses:

Ho 1.1. There are no statistically significant differences between student age and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 1.2. There are no statistically significant differences between student gender and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 1.3. There are no statistically significant differences between student academic rank and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 1.4. There are no statistically significant differences between student Race / Ethnicity and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Research Question 2: Do statistically significant relationships exist between pre-course performance student characteristics (pre-course digital literacy, high school GPA, ACT score) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Null Hypotheses:

Ho 2.1. There are no statistically significant differences between student pre-course digital literacy and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 2.2. There are no statistically significant differences between student high school GPAs and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 2.3. There are no statistically significant differences between student ACT scores and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Research Question 3: Do statistically significant relationships exist between post-course performance student characteristics (post-course digital literacy, change in digital literacy) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Null Hypotheses:

Ho 3.1. There are no statistically significant differences between student post-course digital literacy and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Ho 3.2. There are no statistically significant differences between student change in digital literacy and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Quantitative Measures

The survey instrument was administered to 170 potential participants. These potential participants represented approximately 71% of the total population of 240. The remaining 29% were not present the days the survey was administered to all sections of the blended digital literacy course. Of the total 170 potential participants, 149 responded to the survey and a total of 136 participants consented to allow the researcher to obtain additional data, for a total participation rate of 80% of the available potential participants, representing 57% of the entire population.

Multiple one-way multivariate analyses of variances (MANOVAs) were used to determine if significant differences existed between the dependent and independent variables. If significant differences were found, an ANOVA and Scheffe post hoc tests were used to further define these differences. For each research question, the seven assumptions of a MANOVA were considered. A MANOVA should satisfy the following assumptions to provide valid results (Hair, Black, Babin, & Anderson, 2014):

1. Independence of observations. To reach this assumption, each participant was located in only one group, with no participants in multiple groups for each MANOVA.
2. Adequate sample size. To reach this assumption, more than 50% of the population was used in the study.
3. No univariate or multivariate outliers. To reach this assumption, univariate outliers were identified using boxplots. A boxplot is a graphical display that shows the median and quartiles as a box, and shows more extreme values as highlighted points outside the box (Trochim & Donnelly, 2008). They are used to visualize key statistical measures, such as median, mean, and quartiles. Multivariate outliers were identified using a Mahalanobis distance test. A Mahalanobis distance test can identify multivariate outliers by assigning a "distance" to each value, that is then compared to an acceptable distance (McLachlan, 1992). Values with a larger distance are considered outliers.
4. Multivariate normality. To reach this assumption, normality was assessed and addressed for each group of the independent variables in relationship to the dependent variables using a Shapiro-Wilk Test. The Shapiro-Wilk Test can identify non-normal distributions if the significance of the test is $p < .05$ (Razali & Wah, 2011).

5. Linear relationship. To reach this assumption, scatterplots were used to examine the linear relationship between variables. A scatterplot is a graphical representation of data points based on two variables using a X and Y axis. A linear relationship is established if the data points form a "line" within the scatterplot (Utts, 2005).
6. Homogeneity of variance-covariance matrices. To reach this assumption, a Box's M test of equality of covariance was used.
7. No multicollinearity. To reach this assumption, correlations were assessed between the dependent variables.

Assumption 1 was addressed in the study by making each unique participant a member of only one group. Assumption 2 was addressed by including a majority of the population in the study. Assumptions 3, 4, and 5 were described within each variable. Assumption 7 is described below, and assumption 6 is addressed within the research questions later in this chapter.

Motivational Measures

The Keller ARCS Course Interest Survey provided measures on each category of the Keller ARCS Motivation Model, Attention, Relevance, Confidence, Satisfaction, and an overall score of motivation. A minimum score is 0, and a maximum score is 3. A maximum score signifies the highest level of motivation. Scores are averaged by each motivational category to allow comparison to the other categories of motivation. Since the Keller ARCS Course Interest Survey is a situational survey, no normalcy was expected in the responses (Keller, 2010).

Attention

Scores for Attention were compiled from the average score for questions 1, 4 (reversed), 10, 15, 21, 24, 26 (reversed), and 29. The mean score for all participants in Attention was .97, with a standard deviation of .473, as shown in Figure 4.1.

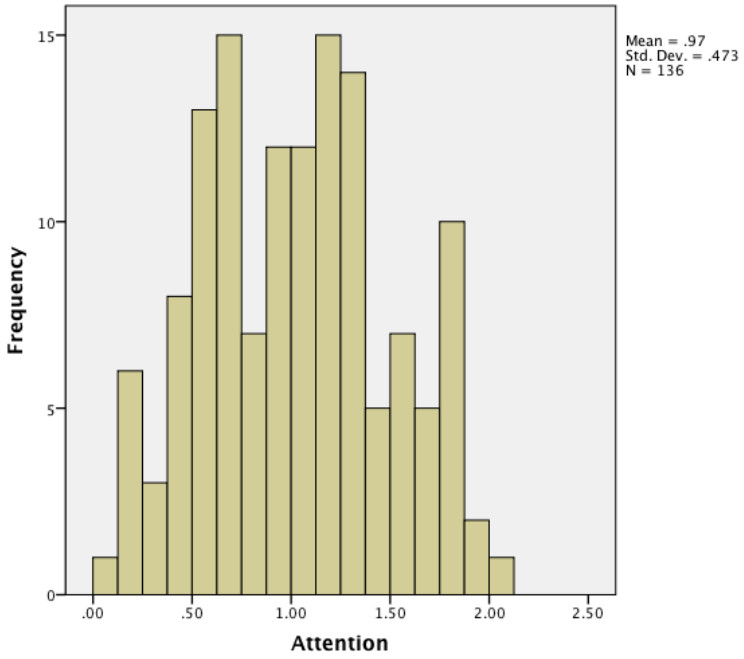


Figure 4.1 Keller ARCS CIS Attention Scores

Relevance

Scores for Relevance were compiled from the average score for questions 2, 5, 8 (reversed), 13, 20, 22, 23, 25 (reversed), and 28. The mean score for all participants in Relevance was 1.60, with a standard deviation of .436, as shown in Figure 4.2.

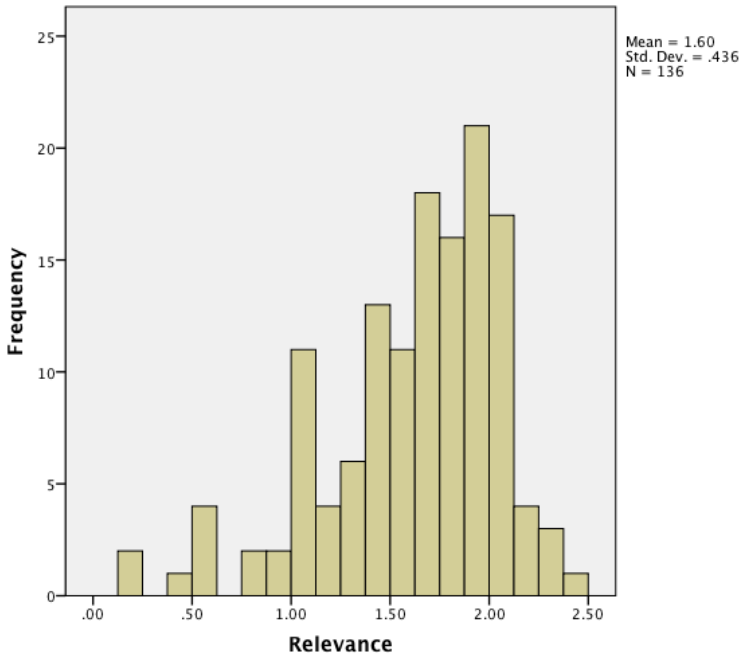


Figure 4.2 Keller ARCS CIS Relevance Scores

Confidence

Scores for Confidence were compiled from the average score for questions 3, 6 (reversed), 9, 11 (reversed), 17 (reversed), 27, 30, and 34. The mean score for all participants in Confidence was 1.67, with a standard deviation of .437, as shown in Figure 4.3.

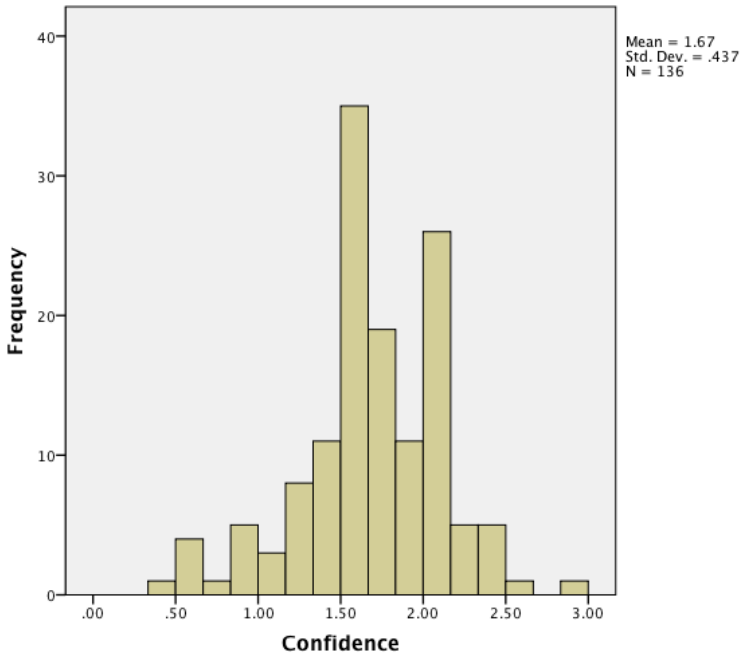


Figure 4.3 Keller ARCS CIS Confidence Scores

Satisfaction

Scores for Satisfaction were compiled from the average score for questions 7 (reversed), 12, 14, 16, 18, 19, 31 (reversed), 32, and 33. The mean score for all participants in Satisfaction is 1.34, with a standard deviation of .463, as shown in Figure 4.4.

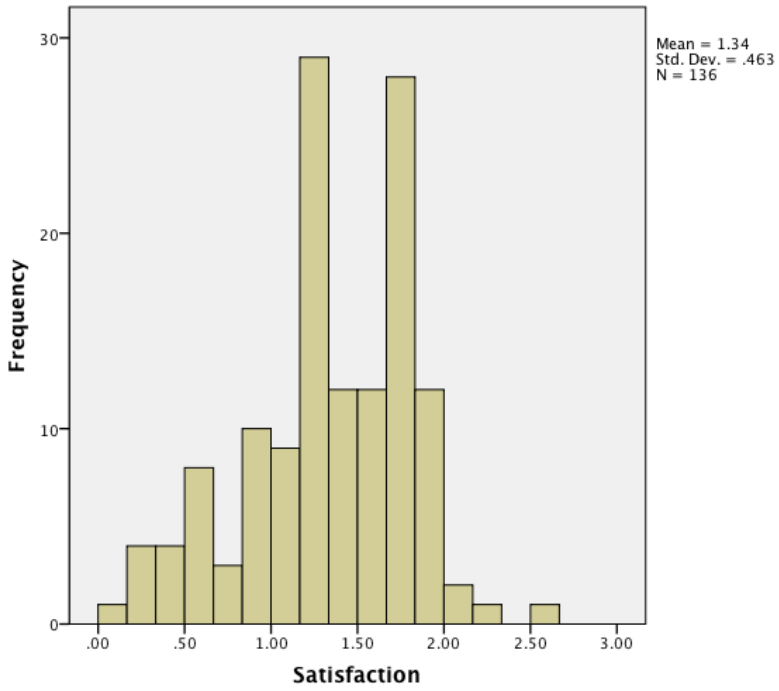


Figure 4.4 Keller ARCS CIS Satisfaction Scores

Keller ARCS Course Interest Survey Overall Score

The overall score consisted of the average of all scores within the Course Interest Survey. The mean score for all participants overall was 1.40, with a standard deviation of .372, as shown in Figure 4.5.

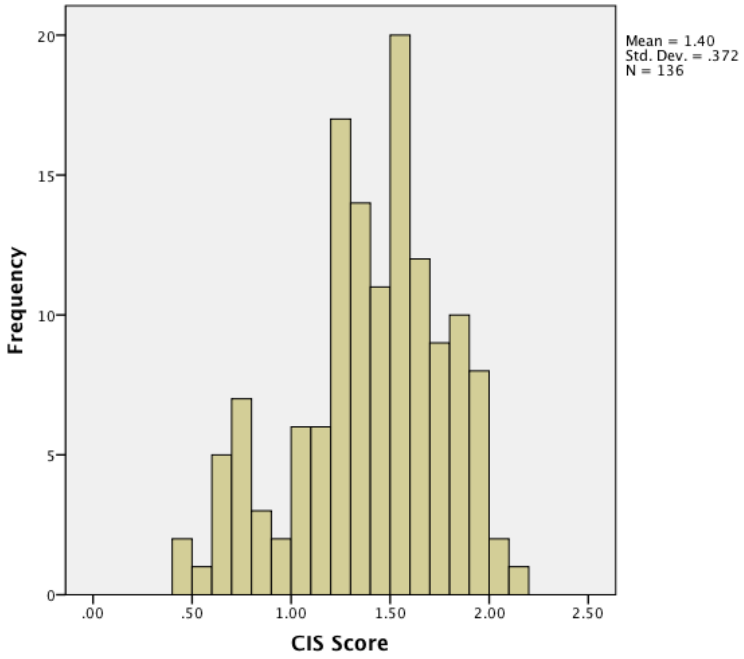


Figure 4.5 Keller ARCS CIS Overall Scores

Multicollinearity Analysis for Course Interest Survey Categories

A bivariate analysis was conducted on the four dependent variables of Attention, Relevance, Confidence, and Satisfaction in order to address possible concerns of multicollinearity. A bivariate analysis analyzes two variables to identify the possible relationship between the variables (Babbie, 2009). All correlations analyzed displayed a moderate correlation between variables, suggesting "no multicollinearity", as shown in Table 4.1. No multicollinearity was defined by Laerd Statistics (2014) as having moderate correlations between dependent variables.

Table 4.1 Correlations of Keller ARCS Course Interest Survey Categories

Correlations

		Attention	Relevance	Confidence	Satisfaction
Attention	Pearson Correlation	1	.644**	.276**	.631**
	Sig. (2-tailed)		.000	.001	.000
	N	136	136	136	136
Relevance	Pearson Correlation	.644**	1	.444**	.689**
	Sig. (2-tailed)	.000		.000	.000
	N	136	136	136	136
Confidence	Pearson Correlation	.276**	.444**	1	.682**
	Sig. (2-tailed)	.001	.000		.000
	N	136	136	136	136
Satisfaction	Pearson Correlation	.631**	.689**	.682**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	136	136	136	136

**. Correlation is significant at the 0.01 level (2-tailed).

There was no multicollinearity between Attention and Relevance, as assessed by Pearson correlation (r=.644, p < .05).

There was no multicollinearity between Attention and Confidence, as assessed by Pearson correlation (r=.276, p < .05).

There was no multicollinearity between Attention and Satisfaction, as assessed by Pearson correlation (r=.631, p < .05).

There was no multicollinearity between Relevance and Confidence, as assessed by Pearson correlation (r=.444, p < .05).

There was no multicollinearity between Relevance and Satisfaction, as assessed by Pearson correlation (r=.689, p<.05).

There was no multicollinearity between Confidence and Satisfaction, as assessed by Pearson correlation (r=.682, p < .05).

Summary of Motivational Measures

Table 4.2 displays the summary statistics for each of the motivational variables in the study.

Table 4.2 Summary of Motivational Measures

Motivation Variables	Mean Score	Std. Deviation
Attention	0.97	0.473
Relevance	1.6	0.436
Confidence	1.67	0.437
Satisfaction	1.34	0.463
Overall	1.4	0.372

Non-Performance Student Characteristics

The non-performance student characteristics in this study consisted of age, gender, academic rank, and race / ethnicity. Each measure was grouped into categories and assessed for normality using a Shapiro-Wilk test based upon group and CIS category. Boxplots were used to assess outliers, and a Mahalanobis distance test was used to identify any multivariate outliers within each measure.

Age

Participants ranged in age from 18 to 50, with 17.6% age 18, 40.4% age 19, 17.6% age 20, 14% age 21, 2.9% age 22, 2.2% age 23, .7% age 24, .7% age 25, .7% age 27, and .7% age 50. Three participants did not report their age. The average age, based upon 133 values, was 19.84 with a standard deviation of 3.015. Table 4.3 and Figure 4.6 summarize this information. The data values of age were divided into 5 groups, age 18, 19, 20, 21, and 22+ for preparation for statistical analysis. No participants were under the age of 18.

Table 4.3 Ages of Participants

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18	24	17.6	18.0	18.0
	19	55	40.4	41.4	59.4
	20	24	17.6	18.0	77.4
	21	19	14.0	14.3	91.7
	22	4	2.9	3.0	94.7
	23	3	2.2	2.3	97.0
	24	1	.7	.8	97.7
	25	1	.7	.8	98.5
	27	1	.7	.8	99.2
	50	1	.7	.8	100.0
	Total	133	97.8	100.0	
Missing	0	3	2.2		
Total		136	100.0		

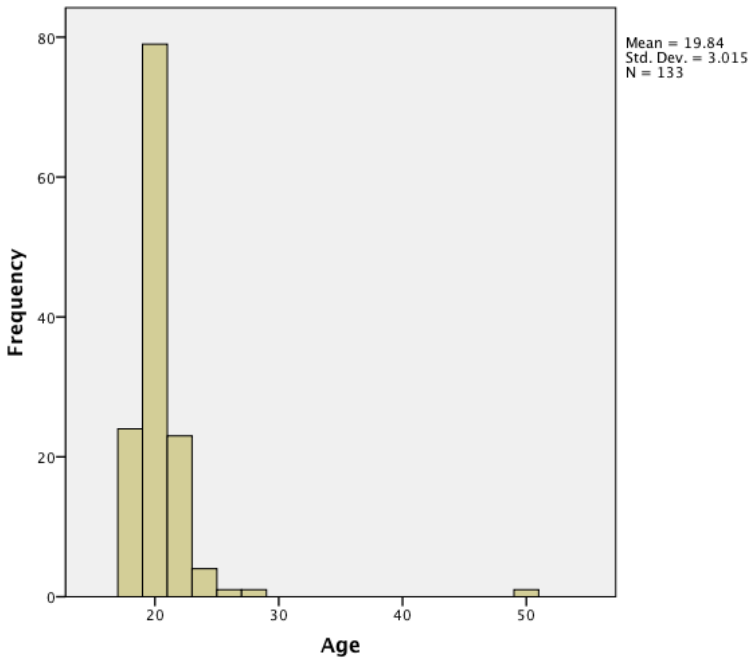


Figure 4.6 Ages of Participants

A Shapiro-Wilk test of normality was performed, and normality violations were discovered for Relevance in age group 19 and Satisfaction in the age group 22 and above, as

shown in Table 4.4. A normality violation suggests that the data is not normally distributed within the category and that outliers may exist. A normal distribution is a symmetrical distribution, and is assumed by many statistical analyses (Fields, 2009). A normality violation would alter the results of these analyses. Removal of outliers can help "return" a distribution to normal (Laerd Statistics, 2014).

Table 4.4 Shapiro-Wilk Test of Normality for Age Groups

Age Groups		Shapiro-Wilk		
		Statistic	df	Sig.
Attention	Age 18	.938	24	.151
	Age 19	.971	55	.198
	Age 20	.973	24	.745
	Age 21	.943	19	.299
	Age 22 and above	.953	11	.681
Relevance	Age 18	.957	24	.389
	Age 19	.920	55	**.001**
	Age 20	.888	24	.012
	Age 21	.908	19	.067
	Age 22 and above	.919	11	.308
Confidence	Age 18	.973	24	.729
	Age 19	.971	55	.201
	Age 20	.927	24	.084
	Age 21	.951	19	.408
	Age 22 and above	.963	11	.813
Satisfaction	Age 18	.973	24	.733
	Age 19	.949	55	.021
	Age 20	.946	24	.225
	Age 21	.905	19	.061
	Age 22 and above	.771	11	**.004**

Boxplots were created to identify possible outliers within the groups. Outliers were found in Satisfaction in age group 22 and above, as shown in Appendix M. The values were chosen to remain in the analysis due to their Satisfaction scores being within 2 standard deviations of the overall Satisfaction score.

A linear relationship was found between the motivational measures and each age group, as assessed by scatterplot in Appendix N.

A Mahalanobis distance ($p > .001$) was used to determine if multivariate outliers existed in the data. The chi-square critical value for the 4 dependent variables was 18.47. All Mahalanobis distances were below the critical value, signifying that no multivariate outliers existed for Age.

Gender

The participants were 42.6% male, 47.8% female, and 9.6% other / unknown. Participants were grouped into 3 groups for statistical analysis. Table 4.5 and Figure 4.7 summarize this information.

Table 4.5 Gender of Participants

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	58	42.6	42.6	42.6
	Female	65	47.8	47.8	90.4
	Unknown	13	9.6	9.6	100.0
	Total	136	100.0	100.0	

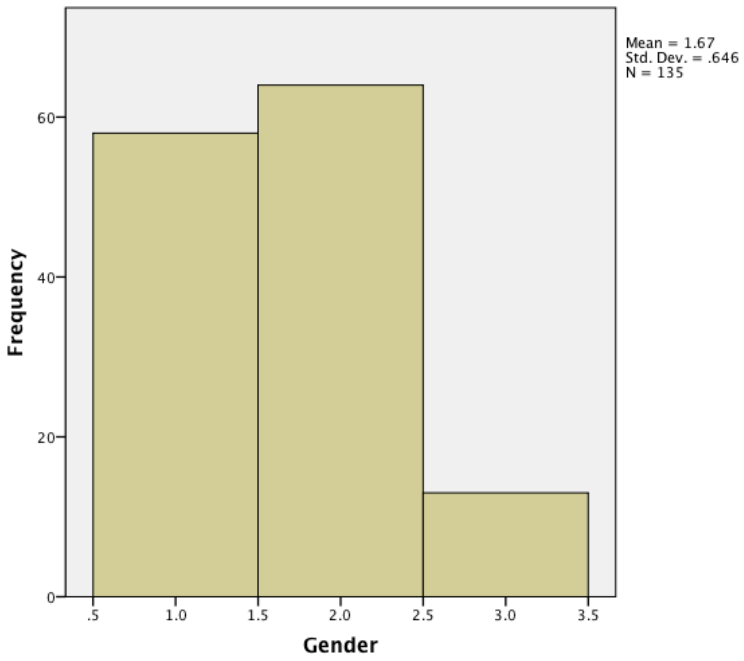


Figure 4.7 Gender of Participants

A Shapiro-Wilk test of normality was performed, and normality violations were discovered for females in all categories, and males in Relevance, as shown in Table 4.6.

Table 4.6 Shapiro-Wilk Test of Normality for Gender Groups

	Gender	Shapiro-Wilk		
		Statistic	df	Sig.
Attention	Male	.967	58	.117
	Female	.953	65	.014
	Unknown	.906	13	.162
Relevance	Male	.900	58	.000
	Female	.962	65	.045
	Unknown	.881	13	.074
Confidence	Male	.966	58	.108
	Female	.945	65	.006
	Unknown	.921	13	.257
Satisfaction	Male	.964	58	.084
	Female	.961	65	.037
	Unknown	.900	13	.134

Boxplots were created to identify possible outliers within the groups. No outliers were identified in all categories, as shown in Appendix M.

A linear relationship was found between the motivational measures and each gender group, as assessed by scatterplot in Appendix N.

A Mahalanobis distance ($p > .001$) was used to determine if multivariate outliers existed in the data. The chi-square critical value for 4 dependent variables was 18.47. One value was found to be larger than the critical value. The subject was examined and did not appear to contain data entry errors. The researcher chose to exclude the subject from Gender analysis to eliminate multivariate outliers from the study.

Academic Rank

Participants in the study were 47.1% Freshmen, 30.1% Sophomores, 11.8% Juniors, 6.6% Seniors, and 2.2% Other. Other was removed from the study as "other" contained a very small group of participants and was not a category of investigation for the study. Participants were grouped as reported, based upon rank. Table 4.7 and Figure 4.8 summarize this information.

Table 4.7 Academic Ranks of Participants

Academic Rank

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Freshman	64	47.1	48.1	48.1
	Sophomore	41	30.1	30.8	78.9
	Junior	16	11.8	12.0	91.0
	Senior	9	6.6	6.8	97.7
	Other	3	2.2	2.3	100.0
	Total	133	97.8	100.0	
Missing	0	3	2.2		
Total		136	100.0		

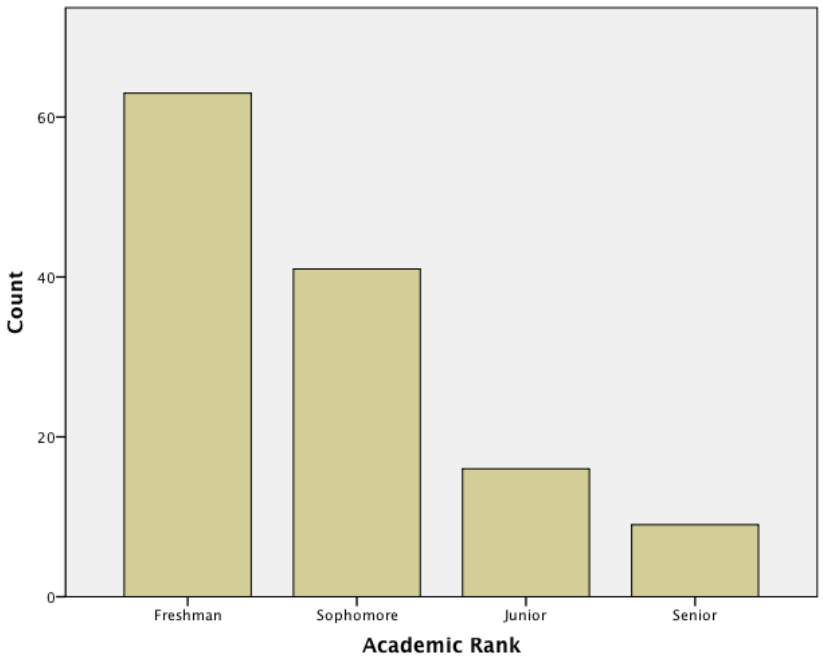


Figure 4.8 Academic Rank of Participants

A Shapiro-Wilk test of normality was performed, and normality violations were discovered for Freshmen in Attention, Relevance, and Satisfaction, and Seniors in Satisfaction, as shown in Table 4.8.

Table 4.8 Shapiro-Wilk Test of Normality for Academic Rank Groups

	Academic Rank	Shapiro-Wilk		
		Statistic	df	Sig.
Attention	Freshman	.961	64	.042
	Sophomore	.974	41	.453
	Junior	.918	16	.157
	Senior	.959	9	.793
	Other	.923	3	.463
Relevance	Freshman	.903	64	.000
	Sophomore	.963	41	.201
	Junior	.932	16	.261
	Senior	.881	9	.162
	Other	.980	3	.726
Confidence	Freshman	.964	64	.058
	Sophomore	.953	41	.091
	Junior	.952	16	.525
	Senior	.980	9	.964
	Other	.987	3	.780
Satisfaction	Freshman	.956	64	.022
	Sophomore	.952	41	.080
	Junior	.900	16	.080
	Senior	.710	9	.002
	Other	.910	3	.417

Boxplots were created to identify possible outliers within the groups. Outliers were found in Relevance and Satisfaction for Seniors, as shown in Appendix M. The outliers were not removed as they were within 2 standard deviations of the overall mean of all scores within the respective areas.

A linear relationship was found between the motivational measures and each academic rank group, as shown in Appendix N.

A Mahalanobis distance ($p > .001$) was used to determine if multivariate outliers existed in the data. The chi-square critical value for 4 dependent variables is 18.47. One value was found to be larger than the critical value. The subject was examined and did not appear to contain data entry errors. The subject was removed from Academic Rank analysis.

Race / Ethnicity

The participants were 81.6% White/Caucasian, 3.7% Hispanic or Latino, 3.7% Black or

African American, 2.2% Asian, 1.5% American Indian or Alaska Native, .7% Native Hawaiian or Other Pacific Islander, and 6.6% chose not to disclose a Race / Ethnicity. Participants were grouped as reported. Table 4.9 and Figure 4.9 summarize this information.

Table 4.9 Race / Ethnicity of Participants

Race / Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	American Indian or Alaska Native	2	1.5	1.5	1.5
	Asian	3	2.2	2.2	3.7
	Black/African American	5	3.7	3.7	7.4
	Hispanic or Latino	5	3.7	3.7	11.0
	Native Hawaiian or Other Pacific Islander	1	.7	.7	11.8
	White/Caucasian	111	81.6	81.6	93.4
	Choose not to disclose	9	6.6	6.6	100.0
	Total	136	100.0	100.0	

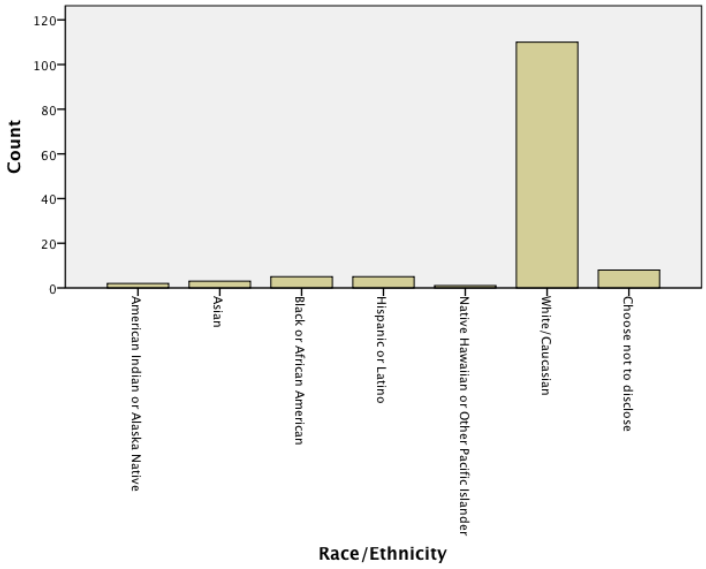


Figure 4.9 Race / Ethnicity of Participants

A Shapiro-Wilk test of normality was performed, and normality violations were discovered for White/Caucasian in Attention, Relevance, and Satisfaction, and "Choose not to disclose" in Confidence, as shown in Table 4.10.

Table 4.10 Shapiro-Wilk Test for Race / Ethnicity of Participants

	Race / Ethnicity	Shapiro-Wilk		
		Statistic	df	Sig.
Attention	American Indian or Alaska Native			
	Asian	.976	3	.702
	Black or African American	.845	5	.180
	Hispanic or Latino	.897	5	.392
	White/Caucasian	.965	111	.005
	Choose not to disclose	.951	9	.701
Relevance	American Indian or Alaska Native			
	Asian	.987	3	.780
	Black or African American	.941	5	.670
	Hispanic or Latino	.907	5	.451
	White/Caucasian	.928	111	.000
	Choose not to disclose	.946	9	.648
Confidence	American Indian or Alaska Native			
	Asian	1.000	3	1.000
	Black or African American	.908	5	.453
	Hispanic or Latino	.936	5	.641
	White/Caucasian	.981	111	.110
	Choose not to disclose	.747	9	.005
Satisfaction	American Indian or Alaska Native			
	Asian	.818	3	.157
	Black or African American	.821	5	.119
	Hispanic or Latino	.974	5	.899
	White/Caucasian	.963	111	.004
	Choose not to disclose	.886	9	.182

Boxplots were created to identify possible outliers within the groups, as shown in Appendix M. Outliers were identified in the group Choose not to disclose in Confidence and Satisfaction. Satisfaction's value was not removed as it was within 2 standard deviations of the overall mean of all scores within the respective areas. The Confidence outlier was removed from the Race / Ethnicity analysis due to the score being more than 2 standard deviations from the mean.

A linear relationship was found between the motivational measures and each Race / Ethnicity group, as assessed by Appendix N. American Indian or Alaska Native, and Asian, did

not show a linear relationship. Since these groups had very small sample sizes, the researcher chose to remove them from the analysis.

A Mahalanobis distance ($p > .001$) was used to determine if multivariate outliers existed in the data. The chi-square critical value for 4 dependent variables is 18.47. One value was found to be larger than the critical value. The subject was examined and did not appear to contain data entry errors. The subject was removed from Race / Ethnicity tests.

Summary of Non-Performance Student Characteristic Measures

Table 4.11 displays the summary statistics for each of the non-performance variables in the study.

Table 4.11 Summary of Non-Performance Student Characteristic Measures

Non-Performance Variables	Mean Score	Std. Deviation	Most Common
Age	19.84	3.015	19
Gender	N/A	N/A	Female
Academic Rank	N/A	N/A	Freshmen
Race / Ethnicity	N/A	N/A	White/Caucasian

Pre-Course Performance Student Characteristics

ACT Score

ACT scores were provided for the study by the university with permission from the participants. The average ACT score for 114 of 136 participants was 21.85, with a standard deviation of 3.58. Participants were grouped by ACT scores in groups 15 and below, 16-17, 18-19, 20-21, 22-23, 24-25, 26-27, 28-29, and 30 and above. Table 4.12 and Figure 4.10 summarize this information.

Table 4.12 ACT Scores of Participants by Group

ACT Grouped

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15 and below	23	16.9	17.0	17.0
	16-17	12	8.8	8.9	25.9
	18-19	18	13.2	13.3	39.3
	20-21	18	13.2	13.3	52.6
	22-23	28	20.6	20.7	73.3
	24-25	19	14.0	14.1	87.4
	26-27	10	7.4	7.4	94.8
	28-29	3	2.2	2.2	97.0
	30 and above	4	2.9	3.0	100.0
	Total	135	99.3	100.0	
Missing	.00	1	.7		
Total		136	100.0		

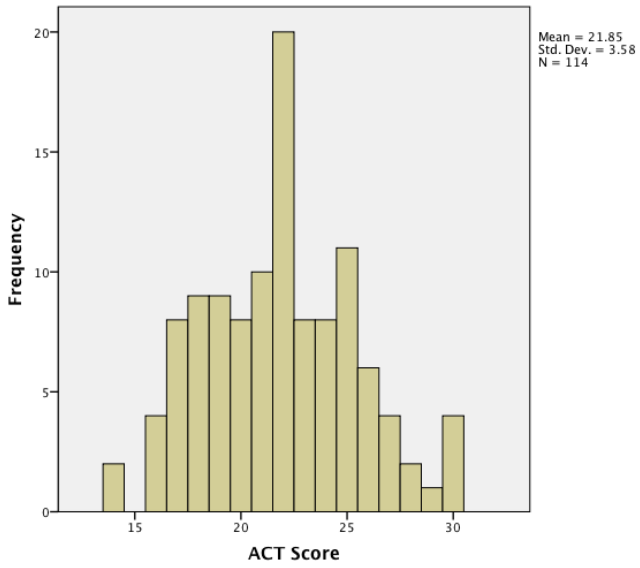


Figure 4.10 ACT Scores of Participants

A Shapiro-Wilk test of normality was performed, and normality violations were discovered in the following groups: Relevance 15 and below, 18-19, 22-23, 24-25; Confidence groups 18-19, 30 and above; and Satisfaction group 22-23, as shown in Table 4.13.

Table 4.13 Shapiro-Wilk Test of Normality for ACT Scores By Group

	ACT Grouped	Shapiro-Wilk		
		Statistic	df	Sig.
Attention	15 and below	.936	24	.130
	16-17	.923	12	.314
	18-19	.957	18	.545
	20-21	.936	18	.250
	22-23	.949	28	.192
	24-25	.946	19	.332
	26-27	.895	10	.190
	28-29	.832	3	.194
	30 and above	.935	4	.625
Relevance	15 and below	.821	24	.001
	16-17	.883	12	.096
	18-19	.870	18	.018
	20-21	.900	18	.058
	22-23	.860	28	.001
	24-25	.876	19	.018
	26-27	.946	10	.617
	28-29	.862	3	.274
	30 and above	.880	4	.337
Confidence	15 and below	.970	24	.656
	16-17	.906	12	.192
	18-19	.879	18	.025
	20-21	.947	18	.385
	22-23	.956	28	.275
	24-25	.971	19	.797
	26-27	.904	10	.242
	28-29	.942	3	.537
	30 and above	.630	4	.001
Satisfaction	15 and below	.968	24	.619
	16-17	.873	12	.071
	18-19	.916	18	.112
	20-21	.902	18	.062
	22-23	.877	28	.003
	24-25	.933	19	.199
	26-27	.918	10	.341
	28-29	.942	3	.537
	30 and above	.894	4	.403

Boxplots were created to identify possible outliers within the groups. One outlier was identified in Relevance group 15 and below. The subject was removed from ACT score analysis as the value was not within 2 standard deviations of the mean of all scores within the respective area, as shown in Appendix M.

A linear relationship was found between the motivational measures and each ACT score group, as assessed by scatterplot, as shown in Appendix N.

A Mahalanobis distance ($p > .001$) was used to determine if multivariate outliers existed in the data. The chi-square critical value for 4 dependent variables is 18.47. No multivariate outliers existed in the data.

High School GPA

High School GPA was provided for the study by the university with permission from the participants. The average high school GPA for 105 of 136 participants was 3.40, with a standard deviation of .486. Participants were grouped by high school GPA, as listed in Table 4.14. Table 4.14 and Figure 4.11 summarize this information.

Table 4.14 High School GPA of Participants by Group

HS GPA Grouped

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.25 and below	4	2.9	3.8	3.8
	2.26 - 2.5	4	2.9	3.8	7.7
	2.51 - 2.75	5	3.7	4.8	12.5
	2.76 - 3.00	5	3.7	4.8	17.3
	3.01 - 3.25	15	11.0	14.4	31.7
	3.26 - 3.5	16	11.8	15.4	47.1
	3.51 - 3.75	27	19.9	26.0	73.1
	3.76 - 4.00	28	20.6	26.9	100.0
	Total	104	76.5	100.0	
Missing	1.00	32	23.5		
Total		136	100.0		

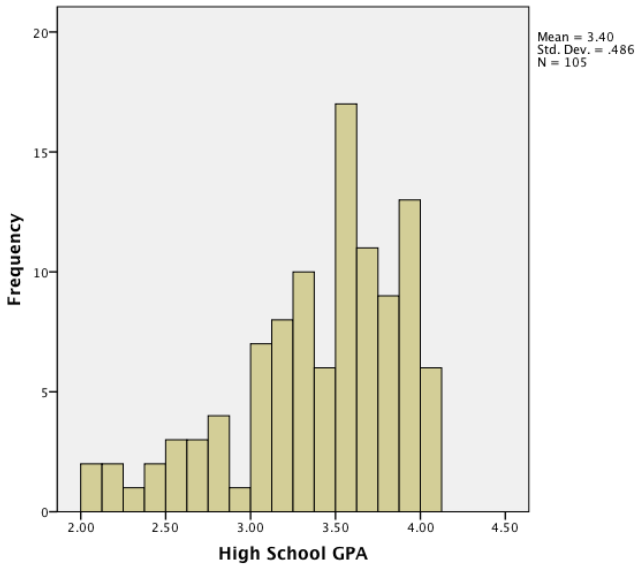


Figure 4.11 High School GPA of Participants

A Shapiro-Wilk test of normality was performed, and a normality violation was discovered for Relevance group 3.01-3.25; Confidence Groups 2.25 and below, 3.01-3.25; and Satisfaction Groups 2.25 and below, 3.26-3.5, and 3.76-4.00.

Table 4.15 Shapiro-Wilk Test of Normality for High School GPA Groups

	HS GPA Grouped	Shapiro-Wilk		
		Statistic	df	Sig.
Attention	2.25 and below	.920	4	.538
	2.26 - 2.5	.939	4	.650
	2.51 - 2.75	.897	5	.391
	2.76 - 3.00	.871	5	.272
	3.01 - 3.25	.967	16	.787
	3.26 - 3.5	.913	16	.131
	3.51 - 3.75	.944	27	.151
	3.76 - 4.00	.945	28	.150
Relevance	2.25 and below	.888	4	.374
	2.26 - 2.5	.965	4	.808
	2.51 - 2.75	.943	5	.685
	2.76 - 3.00	.945	5	.701
	3.01 - 3.25	.883	16	.043
	3.26 - 3.5	.981	16	.972
	3.51 - 3.75	.944	27	.150
	3.76 - 4.00	.952	28	.221
Confidence	2.25 and below	.630	4	.001
	2.26 - 2.5	.827	4	.161
	2.51 - 2.75	.853	5	.203
	2.76 - 3.00	.871	5	.269
	3.01 - 3.25	.838	16	.009
	3.26 - 3.5	.943	16	.391
	3.51 - 3.75	.962	27	.411
	3.76 - 4.00	.963	28	.410
Satisfaction	2.25 and below	.630	4	.001
	2.26 - 2.5	.818	4	.140
	2.51 - 2.75	.914	5	.492
	2.76 - 3.00	.852	5	.201
	3.01 - 3.25	.904	16	.093
	3.26 - 3.5	.874	16	.031
	3.51 - 3.75	.942	27	.139
	3.76 - 4.00	.869	28	.002

Boxplots were created to identify possible outliers within the groups. One outlier was identified in Confidence group 3.01 – 3.25. The subject was removed from High School GPA analysis as the value was not within 2 standard deviations of the mean of all scores within the respective area, as shown in Appendix M.

A linear relationship was found between the motivational measures and each high school GPA group, as shown in Appendix N.

A Mahalanobis distance ($p > .001$) was used to determine if multivariate outliers existed in the data. The chi-square critical value for 4 dependent variables is 18.47. No multivariate

outliers existed in the data.

Atomic Learning Technology Skills Assessment (ALTSA) Pretest

Participants completed the ATLSA pretest at the beginning of the blended digital literacy course. These scores were obtained from the Instructor of the course with permission from the participants. The average pretest score of 131 of 136 participants was 71.95, with a standard deviation of 11.694. Participants were grouped by pretest ALTSA in groups, as listed in Table 4.16. Table 4.16 and Figure 4.12 summarize this information.

Table 4.16 ALTSA Pretest Scores of Participants by Group

ALTSA Pretest Grouped

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	50 and Lower	11	8.1	9.4	9.4
	51-55	6	4.4	5.1	14.5
	56-60	8	5.9	6.8	21.4
	61-65	10	7.4	8.5	29.9
	66-70	12	8.8	10.3	40.2
	71-75	19	14.0	16.2	56.4
	76-80	19	14.0	16.2	72.6
	81-85	19	14.0	16.2	88.9
	86-90	7	5.1	6.0	94.9
	91-95	6	4.4	5.1	100.0
	Total	117	86.0	100.0	
Missing	0	19	14.0		
Total		136	100.0		

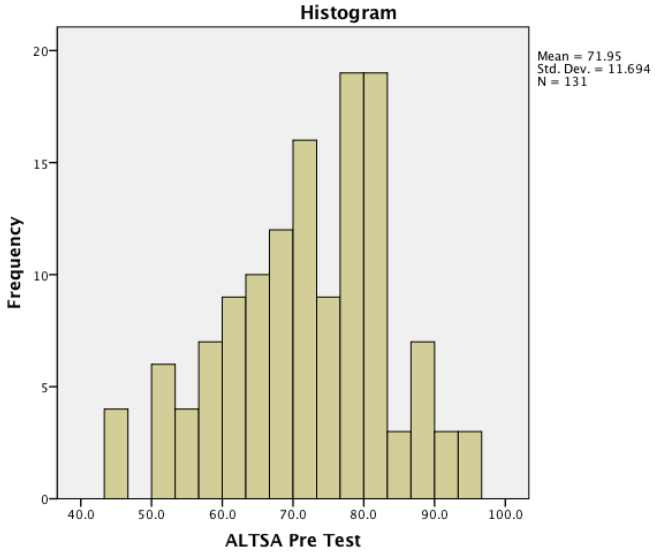


Figure 4.12 ALTSA Pretest Scores of Participants

A Shapiro-Wilk test of normality was performed, and normality violations were discovered for Relevance group 61-65; Confidence groups 50 and lower, 91-95; and Satisfaction group 76-80, as shown in Table 4.17.

Table 4.17 Shapiro-Wilk Test of Normality for ALTSA Pretest Groups

	ALTSA Pretest Grouped	Shapiro-Wilk		
		Statistic	df	Sig.
Attention	50 and Lower	.955	12	.708
	51-55	.831	6	.109
	56-60	.943	8	.646
	61-65	.921	11	.325
	66-70	.866	12	.059
	71-75	.946	19	.335
	76-80	.977	19	.900
	81-85	.943	19	.296
	86-90	.851	7	.125
	91-95	.965	6	.860
Relevance	50 and Lower	.915	12	.247
	51-55	.840	6	.129
	56-60	.944	8	.651
	61-65	.708	11	.001
	66-70	.934	12	.419
	71-75	.943	19	.301
	76-80	.951	19	.409
	81-85	.913	19	.085
	86-90	.840	7	.100
	91-95	.876	6	.252
Confidence	50 and Lower	.841	12	.029
	51-55	.889	6	.315
	56-60	.953	8	.740
	61-65	.923	11	.344
	66-70	.895	12	.138
	71-75	.955	19	.484
	76-80	.957	19	.510
	81-85	.976	19	.884
	86-90	.907	7	.375
	91-95	.753	6	.021
Satisfaction	50 and Lower	.891	12	.120
	51-55	.909	6	.430
	56-60	.845	8	.084
	61-65	.921	11	.329
	66-70	.978	12	.976
	71-75	.910	19	.075
	76-80	.844	19	.005
	81-85	.922	19	.125
	86-90	.970	7	.897
	91-95	.930	6	.577

Boxplots were created to identify possible outliers within the groups, as shown in Appendix M. Outliers were found in Attention group 61-65, Relevance group 61-65, Confidence group 50 and lower, and Satisfaction group 56-60. The outlier in Attention was the same subject as Relevance. The outlier was removed from the ALTSA Pretest study as the Relevance value was not within 2 standard deviations. The outlier in Confidence was not within 2 standard deviations of the overall mean of all scores within the respective area, and was removed from the ALTSA Pretest study. The outliers in Satisfaction were within 2 standard deviations of the overall mean of all scores within the respective area, and were not removed from the ALTSA Pretest study.

A linear relationship was found between the motivational measures and each ALTSA Pretest group, as assessed by scatterplot in Appendix N.

A Mahalanobis distance ($p > .001$) was used to determine if multivariate outliers existed in the data. The chi-square critical value for 4 dependent variables is 18.47. No values were found with a distance greater than the critical value.

Summary of Pre-Course Performance Student Characteristic Measures

Table 4.18 displays the summary statistics for each of the pre-course performance variables in the study.

Table 4.18 Summary of Pre-Course Student Characteristic Measures

Pre-Course Performance Variables	Mean Score	Std. Deviation	Most Common
ACT Score	21.85	3.58	22-23
High School GPA	3.4	0.486	3.76-4.00
ALTSA Pretest	71.95	11.694	71-75, 76-80, 81-85

Post-course Performance Student Characteristics

Atomic Learning Technology Skills Assessment (ALTSA) Posttest

Participants completed the ALTSA posttest at the end of the blended digital literacy course. These scores were obtained from the Instructor of the course with permission from the participants. The average pretest score of 125 of 136 participants was 78.75, with a standard deviation of 9.059. Participants were grouped by posttest ALTSA scores for analysis. Table 4.19 and Figure 4.13 summarize this information.

Table 4.19 ALTSA Posttest Scores for Participants by Group

ALTSA Posttest Grouped

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	51-55	3	2.2	2.4	2.4
	61-65	7	5.1	5.6	8.0
	66-70	13	9.6	10.4	18.4
	71-75	23	16.9	18.4	36.8
	76-80	18	13.2	14.4	51.2
	81-85	24	17.6	19.2	70.4
	86-90	30	22.1	24.0	94.4
	91-95	5	3.7	4.0	98.4
	96-100	2	1.5	1.6	100.0
	Total	125	91.9	100.0	
Missing	System	11	8.1		
Total		136	100.0		

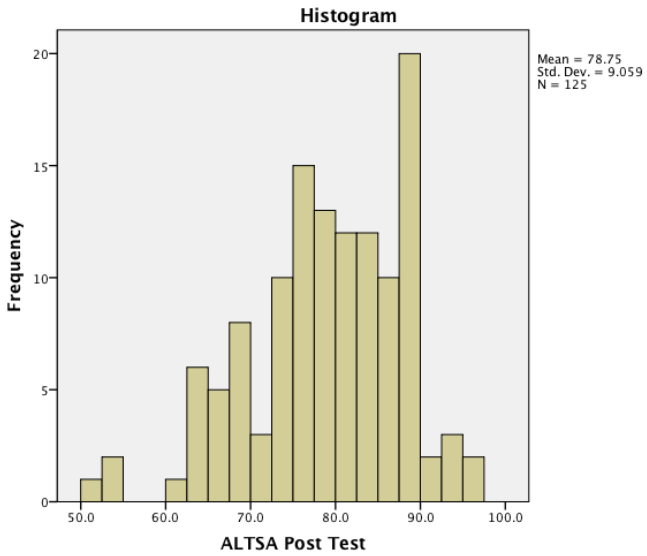


Figure 4.13 ALTSA Posttest Scores for Participants

A Shapiro-Wilk test of normality was performed, as shown in Table 4.20. Normality violations were discovered for scores Relevance group 71-75; Confidence groups 51-55, 71-75; and Satisfaction groups 61-65, 81-85, and 86-90.

Table 4.20 Shapiro-Wilk Test of Normality for ALTSA Posttest Groups

	ALTSA Posttest Grouped	Shapiro-Wilk		
		Statistic	df	Sig.
Attention	51-55	.987	3	.780
	61-65	.985	7	.980
	66-70	.906	13	.161
	71-75	.919	23	.065
	76-80	.960	18	.596
	81-85	.979	24	.873
	86-90	.952	30	.195
	91-95	.974	5	.898
	96-100			
Relevance	51-55	.987	3	.780
	61-65	.858	7	.144
	66-70	.945	13	.527
	71-75	.812	23	.001
	76-80	.932	18	.209
	81-85	.947	24	.232
	86-90	.936	30	.070
	91-95	.813	5	.103
	96-100			
Confidence	51-55	.750	3	.000
	61-65	.856	7	.140
	66-70	.984	13	.994
	71-75	.826	23	.001
	76-80	.958	18	.568
	81-85	.929	24	.091
	86-90	.986	30	.957
	91-95	.951	5	.747
	96-100			
Satisfaction	51-55	.964	3	.637
	61-65	.670	7	.002
	66-70	.974	13	.937
	71-75	.950	23	.296
	76-80	.928	18	.181
	81-85	.894	24	.016
	86-90	.848	30	.001
	91-95	.862	5	.237
	96-100			

Boxplots were created to identify possible outliers within the groups, as shown in Appendix M. were identified in Relevance group 71-75, Confidence group 71-75, and Satisfaction group 61-65. The Relevance outlier was not within 2 standard deviations of the overall mean for Relevance and was removed from the ALTSA posttest analysis. The Confidence outlier was the same subject, and therefore removed previously with Relevance. The Satisfaction outlier was not within 2 standard deviations of the overall Satisfaction mean and was removed from the ALTSA posttest analysis.

A linear relationship was found between the motivational measures and each ALTSA Posttest group, as assessed by scatterplot in Appendix N.

A Mahalanobis distance ($p > .001$) was used to determine if multivariate outliers existed in the data. The chi-square critical value for 4 dependent variables is 18.47. No values were found with a distance greater than the critical value.

Change in Digital Literacy

The change in digital literacy was calculated by subtracting the pretest ALTSA score from the posttest ALTSA score. This value gives the overall improvement or decline of a participant after completing the blended digital literacy course. The average change in digital literacy of 121 of 136 participants was 6.64, with a standard deviation of 9.392. Participants were grouped by the change in ALTSA scores. Table 4.21 and Figure 4.14 summarize this information.

Table 4.21 Change in Digital Literacy for Participants by Group

ALTSA Change Grouped

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-10.00 and below	6	4.4	5.0	5.0
	-9.99 to 0.00	27	19.9	22.3	27.3
	0.01 to 10.00	46	33.8	38.0	65.3
	10.01 to 20.00	31	22.8	25.6	90.9
	20.01 and above	11	8.1	9.1	100.0
	Total	121	89.0	100.0	
Missing	6.00	15	11.0		
Total		136	100.0		

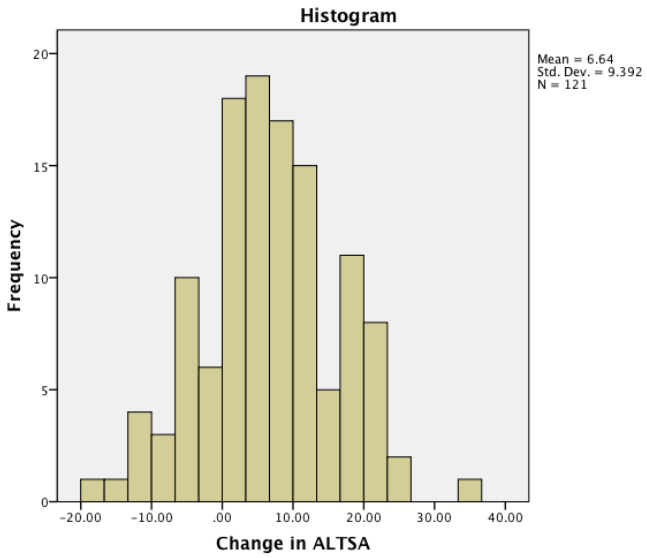


Figure 4.14 Change in Digital Literacy for Participants

A Shapiro-Wilk test of normality was performed, and a normality violation was discovered for changes in the digital literacy Confidence group .01 – 10.00, as shown in Table 4.22.

Table 4.22 Shapiro-Wilk Test of Normality for Change in Digital Literacy Groups

	ALTSA Change Grouped	Shapiro-Wilk		
		Statistic	df	Sig.
Attention	-10.00 and below	.951	6	.752
	-9.99 to 0.00	.946	27	.175
	0.01 to 10.00	.958	46	.094
	10.01 to 20.00	.973	31	.611
	20.01 and above	.921	11	.327
Relevance	-10.00 and below	.777	6	.036
	-9.99 to 0.00	.939	27	.117
	0.01 to 10.00	.951	46	.053
	10.01 to 20.00	.961	31	.310
	20.01 and above	.874	11	.087
Confidence	-10.00 and below	.968	6	.877
	-9.99 to 0.00	.946	27	.173
	0.01 to 10.00	.927	46	.007
	10.01 to 20.00	.966	31	.424
	20.01 and above	.944	11	.573
Satisfaction	-10.00 and below	.968	6	.876
	-9.99 to 0.00	.939	27	.118
	0.01 to 10.00	.957	46	.088
	10.01 to 20.00	.958	31	.266
	20.01 and above	.940	11	.521

Boxplots were created to identify possible outliers within the groups. No outliers were identified, as shown in Appendix M.

A linear relationship was found between the motivational measures and each change in digital literacy group, as assessed by scatterplot in Appendix N.

A Mahalanobis distance ($p > .001$) was used to determine if multivariate outliers existed in the data. The chi-square critical value for 4 dependent variables is 18.47. No values were found with a distance greater than the critical value.

Summary of Post-Course Performance Student Characteristic Measures

Table 4.23 displays the summary statistics for each of the post-course performance variables in the study.

Table 4.23 Summary of Post-Course Performance Student Characteristic Measures

Post-Course Performance Variables	Mean Score	Std. Deviation	Most Common
ALTSA Posttest	78.75	9.059	86-90
Change in DL	6.64	9.392	.01-10.00

Summary of All Measures

Table 4.24 displays the summary statistics for each of the variables in the study.

Table 4.24 Summary of All Measures

Summary of Quantitative Measures				
Category	**Variable**	**Mean Score**	**Std. Deviation**	**Most Common**
Non-Performance				
	Age	19.84	3.015	19
	Gender	N/A	N/A	Female
	Academic Rank	N/A	N/A	Freshmen
	Race / Ethnicity	N/A	N/A	White/Caucasian
Pre-Course Performance				
	ACT Score	21.85	3.58	22-23
	High School GPA	3.4	0.486	3.76-4.00
	ALTSA Pretest	71.95	11.694	71-75, 76-80, 81-85
Post-Course Performance				
	ALTSA Posttest	78.75	9.059	86-90
	Change in DL	6.64	9.392	.01-10.00
Motivation				
	Attention	0.97	0.473	
	Relevance	1.6	0.436	
	Confidence	1.67	0.437	
	Satisfaction	1.34	0.463	
	Overall	1.4	0.372	

Test Results of the Null Hypotheses

Research Question 1: Do statistically significant relationships exist between non-performance student characteristics (age, gender, academic rank, Race / Ethnicity) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Table 4.25 MANOVA Results for Non-Performance Student Characteristics

Independent Variables	Value	F	Df	Error df	Sig.	Eta
Age	0.917	0.696	16	512	0.799	0.021
Gender	0.935	1.094	8	258	0.368	0.033
Academic Rank	0.796	2.426	12	323.073	0.005	0.073
Race / Ethnicity	0.920	0.857	12	320.427	0.592	0.027

Ho 1.1. There are no statistically significant differences between student age and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Finding

A one-way multivariate analysis of variance was conducted to determine the relationship of on-campus student age and motivational scores of Attention, Relevance, Confidence, and Satisfaction on the Keller ARCS Course Interest Survey. Preliminary assumption checking revealed that Attention, Relevance, and Confidence were normally distributed, as assessed by Shapiro-Wilk test ($p > .05$). Satisfaction was found to contain two univariate outliers, as assessed by boxplots that remained in the study. A Mahalanobis distance ($p > .001$) found no multivariate outliers. Linear relationships were confirmed among dependent variables by age group, as assessed by scatterplot. No multicollinearity existed between dependent variables, and there was homogeneity of variance-covariance matrices, as assessed by Box's M test ($p=.339$). The differences between age groups and the combined dependent variables was not statistically significant, $F(16, 512) = .696$, $p < .05$; Wilks' Lambda = .917; partial Eta Squared = .021. The null hypothesis Ho 1.1 was not rejected.

Ho 1.2. There are no statistically significant differences between student gender and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Finding

A one-way multivariate analysis of variance was conducted to determine the relationship of on-campus student gender and motivational scores of Attention, Relevance, Confidence, and Satisfaction on the Keller ARCS Course Interest Survey. Preliminary assumption checking revealed that Attention, Relevance, Confidence, and Satisfaction were normally distributed for unknown gender, as assessed by Shapiro-Wilk test ($p > .05$). Attention, Confidence, and Satisfaction were normally distributed for male gender, as assessed by Shapiro-Wilk test ($p > .05$). After removal of a multivariate outlier, Satisfaction was normally distributed for female gender, as assessed by Shapiro-Wilk test ($p > .05$). No univariate outliers were found, as assessed by boxplot. A Mahalanobis distance ($p > .001$) found one multivariate outlier that was removed from the gender study. Linear relationships were confirmed among dependent variables by gender, as assessed by scatterplot. No multicollinearity existed between dependent variables, and there was homogeneity of variance-covariance matrices, as assessed by Box's M test ($p=.543$). The differences between gender and the combined dependent variables was not statistically significant, $F(8, 258) = 1.094$, $p < .05$; Wilks' Lambda = .935; partial Eta Squared = .033. The null hypothesis Ho 1.2 was not rejected.

Ho 1.3. There are no statistically significant differences between student academic rank and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Finding

A one-way multivariate analysis of variance was conducted to determine the relationship of on-campus student academic rank and motivational scores of Attention, Relevance, Confidence, and Satisfaction on the Keller ARCS Course Interest Survey. Preliminary assumption checking revealed that Attention, Relevance, and Satisfaction were not normally distributed for Freshmen, and Satisfaction was not normally distributed for Seniors, as assessed by Shapiro-Wilk test ($p > .05$). Univariate outliers were identified with boxplots, and remained in the study as they were within two standard deviations of the overall means. A Mahalanobis distance ($p > .001$) found one multivariate outlier that was removed from the academic rank study. Linear relationships were confirmed among dependent variables by academic rank except "Other", as assessed by scatterplot. "Other" was removed from the study due to lack of a linear relationship. No multicollinearity existed between dependent variables, and there was homogeneity of variance-covariance matrices, as assessed by Box's M test ($p=.323$). The difference between academic rank and the combined dependent variables was statistically significant, $F(12, 323.073) = 2.426$, $p < .05$; Wilks' Lambda = .796; partial Eta Squared = .033. Follow-up ANOVAS showed that Confidence was statistically significant ($F(3, 125) = 3.899$; $p < .05$; partial Eta Squared = .086). A Scheffe post hoc test showed that for Confidence, Seniors had statistically higher mean scores (.4799) than Freshmen ($p < .05$). The Ho 1.3 null hypothesis was rejected.

Ho 1.4. There are no statistically significant differences between student Race / Ethnicity and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Finding

A one-way multivariate analysis of variance was conducted to determine the effect of on-campus student Race / Ethnicity and motivational scores of Attention, Relevance, Confidence, and Satisfaction on the Keller ARCS Course Interest Survey. Preliminary assumption checking revealed that Attention, Relevance, and Satisfaction were not normally distributed for White/Caucasian, and Confidence for "Choose not to disclose," as assessed by Shapiro-Wilk test ($p > .05$). Confidence and Satisfaction were found to contain two univariate outliers in the "Choose not to disclose" group, as assessed by boxplot. The outlier was removed from Confidence while the outlier in Satisfaction remained in the study due to being within two standard deviations of the population. A Mahalanobis distance ($p > .001$) found one multivariate outlier. The outlier was removed. Linear relationships were confirmed among dependent variables by Race / Ethnicity group except American Indian or Alaska native and Asian, as assessed by scatterplot. These two groups were removed due to low sample size and no linear relationship. No multicollinearity existed between dependent variables, and there was homogeneity of variance-covariance matrices, as assessed by Box's M test ($p=.043$). The differences between Race / Ethnicity groups and the combined dependent variables was not statistically significant, $F(12, 320.427) = .857$, $p < .05$; Wilks' Lambda = .920; partial Eta Squared = .027. The null hypothesis Ho 1.1 was not rejected.

Research Question 2: Do statistically significant relationships exist between pre-course performance student characteristics (pre-course digital literacy, high school GPA, ACT score) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Table 4.26 MANOVA Results for Pre-Course Performance Student Characteristics

Independent Variables	Value	F	Df	Error df	Sig.	Eta
ALTSA Pretest	0.665	1.253	36	391.473	0.156	0.097
HS GPA	0.687	1.320	28	336.730	0.133	0.090
ACT Score	0.760	1.097	32	455.197	0.33	0.066

Ho 2.1. There are no statistically significant differences between student pre-course digital literacy and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Finding

A one-way multivariate analysis of variance was conducted to determine the relationship of on-campus ALTSA pretest scores and motivational scores of Attention, Relevance, Confidence, and Satisfaction on the Keller ARCS Course Interest Survey. Preliminary assumption checking revealed that Relevance, Confidence, and Satisfaction were not normally distributed in some groups, as assessed by Shapiro-Wilk test ($p > .05$). A total of five univariate outliers were found, as assessed by boxplot. Three outliers were removed as they were more than two standard deviations from the mean of the respective area. A Mahalanobis distance ($p > .001$) found no multivariate outliers. Linear relationships were confirmed, as assessed by scatterplot. No multicollinearity existed between dependent variables, and there was homogeneity of variance-covariance matrices, as assessed by Box's M test ($p=.179$). The differences between ALTSA pretest scores and the dependent variables was not statistically significant, $F(36, 391.473) = 1.253$, $p < .05$; Wilks' Lambda = .665; partial Eta Squared = .097. The null hypothesis Ho 2.1 was not rejected.

Ho 2.2. There are no statistically significant differences between student high school GPAs and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Finding

A one-way multivariate analysis of variance was conducted to determine the relationship of on-campus student high school GPAs and scores of Attention, Relevance, Confidence, and Satisfaction on the Keller ARCS Course Interest Survey. Preliminary assumption checking revealed that Relevance, Confidence, and Satisfaction were not normally distributed in some groups, as assessed by Shapiro-Wilk test ($p > .05$). One univariate outlier was found in Confidence group 3.01 – 3.25 and removed. A Mahalanobis distance ($p > .001$) found no multivariate outliers. Linear relationships were confirmed, as assessed by scatterplot. No multicollinearity existed between dependent variables, and there was homogeneity of variance-covariance matrices, as assessed by Box's M test ($p=.010$). The differences between High School GPA and the dependent variables was not statistically significant, $F(28, 336.738) = 1.320$, $p < .05$; Wilks' Lambda = .687; partial Eta Squared = .090. The null hypothesis Ho 2.2 was not rejected.

Ho 2.3. There are no statistically significant differences between student ACT scores and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Finding

A one-way multivariate analysis of variance was conducted to determine the relationship of on-campus student ACT scores and motivational scores of Attention, Relevance, Confidence, and Satisfaction on the Keller ARCS Course Interest Survey. Preliminary assumption checking

revealed that Relevance, Confidence, and Satisfaction were not normally distributed in some groups, as assessed by Shapiro-Wilk test ($p > .05$). One univariate outlier was found in Relevance, as assessed by boxplot, and removed. A Mahalanobis distance ($p > .001$) found no multivariate outliers. Linear relationships were confirmed, as assessed by scatterplot. No multicollinearity existed between dependent variables, and there was homogeneity of variance-covariance matrices, as assessed by Box's M test ($p=.167$). The differences between ACT scores and the dependent variables was not statistically significant, $F(32, 455.197) = 1.097$, $p < .05$; Wilks' Lambda = .760; partial Eta Squared = .066. The null hypothesis Ho 2.3 was not rejected.

Research Question 3: Do statistically significant relationships exist between post-course performance student characteristics (post-course digital literacy, change in digital literacy) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Table 4.27 MANOVA Results for Post-Course Performance Student Characteristics

Independent Variables	Value	F	Df	Error df	Sig.	Eta
ALTSA Posttest	0.734	1.133	32	414.631	0.275	0.074
Change in DL	0.882	0.914	16	345.858	0.559	0.031

Ho 3.1. There are no statistically significant differences between student post-course digital literacy and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Finding

A one-way multivariate analysis of variance was conducted to determine the relationship of ALTSA posttest scores and motivational scores of Attention, Relevance, Confidence, and Satisfaction on the Keller ARCS Course Interest Survey. Preliminary assumption checking

revealed that Relevance, Confidence, and Satisfaction were not normally distributed in some groups, as assessed by Shapiro-Wilk test ($p > .05$). Some univariate outliers were found, as assessed by boxplot. The three outliers were removed. A Mahalanobis distance ($p > .001$) found no multivariate outliers. Linear relationships were confirmed among dependent variables, as assessed by scatterplot. No multicollinearity existed between dependent variables, and there was homogeneity of variance-covariance matrices, as assessed by Box's M test ($p=.004$). The differences between ALTSA posttest scores and the dependent variables was not statistically significant, $F(32, 414.631) = 1.133$, $p < .05$; Wilks' Lambda = .734; partial Eta Squared = .074. The null hypothesis Ho 3.1 was not rejected.

Ho 3.2. There are no statistically significant differences between student change in digital literacy and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course.

Finding

A one-way multivariate analysis of variance was conducted to determine the relationship of the change in ALTSA pretest and posttest scores and motivational scores of Attention, Relevance, Confidence, and Satisfaction on the Keller ARCS Course Interest Survey. Preliminary assumption checking revealed that Confidence was not normally distributed in one group, as assessed by Shapiro-Wilk test ($p > .05$). No outliers were identified, as assessed by boxplot. A Mahalanobis distance ($p > .001$) found no multivariate outliers. Linear relationships were confirmed among dependent variables, as assessed by scatterplot. No multicollinearity existed between dependent variables, and there was homogeneity of variance-covariance matrices, as assessed by Box's M test ($p=.589$). The differences between changes in digital literacy and the dependent variables was not statistically significant, $F(16, 345.858) = .914$, $p <$

.05; Wilks' Lambda = .882; partial Eta Squared = .031. The null hypothesis Ho 3.2 was not rejected.

Chapter Summary

This study utilized data obtained from 136 participants enrolled in a blended learning digital literacy course. Data was collected from the administration of the Course Interest Survey to participants and from requests for data at the research setting. Data analysis consisted of descriptive statistics and quantitative analysis. One significant finding was found in Academic Rank in Confidence. Seniors reported significantly higher mean scores in the area of Confidence at $p < .05$. On average, a Senior reported .4799 higher Confidence than Freshmen. No other significant relationships were found between the Keller ARCS Motivation Model categories of Attention, Relevance, Confidence, Satisfaction and the student characteristics of age, gender, race/ethnicity, act score, high school GPA, pretest ALTSA scores, posttest ALTSA scores, and change in digital literacy (difference of pretest and posttest ALTSA scores).

Descriptive statistics of the 136 participants revealed the majority of participants were age 19 (40.4%) and age 20 (24%). The participants were 42.6% male and 47.8% female; 9.8% did not specify a specific gender. Almost half (47.1%) of all participants were classified as Freshmen. A large majority of the participants reported Race / Ethnicity as White/Caucasian (81.6%).

Pre-course performance characteristics of participants showed the largest group of ACT scores was 22-23 (20.6%). High school GPA reported a mean high school GPA of 3.40, with the largest group reported as high school GPAs of 3.76 – 4.00 (20.6%). The Atomic Learning Technology Skills Assessment pretest mean score for participants was 71.95. The largest pretest groups were 71-75 (14%), 76-80 (14%), and 81-85 (14%).

Post-course performance characteristics of participants showed the mean score of the Atomic Learning Technology Skills Assessment was 78.75. The largest posttest group was 86-90 (22.1%). The change in digital literacy (ALTSA posttest – ALTSA pretest) of participants was a mean score of 6.64. The largest group was a change in digital literacy of .01 – 10.00 (33.8%).

Motivational measures included Attention, Relevance, Confidence, Satisfaction, and overall motivation. The mean score for the categories and overall motivation with a minimum score of 0 and maximum score of 3 were: Attention (.97), Relevance (1.60), Confidence (1.67), Satisfaction (1.34), and overall motivation (1.40).

The research questions were analyzed using quantitative analysis, in particular MANOVAs, ANOVAs, and Scheffe Post Hoc Tests. Table 4.28 displays the categories within each research question and the results of the corresponding null hypotheses. The only rejected null hypothesis was Ho 1.3 in research question 1. Ho 1.3 was rejected as Confidence was found significant in Academic Rank ($p < .05$). A Scheffe post hoc test showed that for Confidence, Seniors had statistically higher mean scores (.4799) than Freshmen ($p < .05$).

Table 4.28 Research Question Results

RQ	Null Hypotheses		Action
RQ1	**Non-Performance Characteristics**		
	Age	Ho 1.1	Not Rejected
	Gender	Ho 1.2	Not Rejected
	Academic Rank	Ho 1.3	**Rejected**
	Race / Ethnicity	Ho 1.4	Not Rejected
RQ2	**Pre-course Performance Characteristics**		
	Pre-course Digital Literacy	Ho 2.1	Not Rejected
	High School GPA	Ho 2.2	Not Rejected
	ACT Score	Ho 2.3	Not Rejected
RQ3	**Post-course Performance Characteristics**		
	Post-course Digital Literacy	Ho 3.1	Not Rejected
	Change in Digital Literacy	Ho 3.2	Not Rejected

Note: Modified from Bakor, K. (2013). Concerns and professional development needs of faculty at King Abdul-Aziz University in Saudi Arabia in adopting online teaching. *Dissertation.*

Chapter 5 - Summary, Conclusions, and Recommendations for Future Studies

Chapter Overview

The purpose of this study was to examine student motivation in a blended learning digital literacy course and its relationship to non-performance-based and performance-based student characteristics. The study consisted of 136 student participants enrolled in a blended learning digital literacy course at a Midwestern university. The findings of this study can assist university faculty with the design of blended courses, enhance course design and evaluation at the research setting and at other universities, and it can provide data and insight into university student motivation for initiatives at the research setting, at the state level for the Kansas Board of Regents Foresight 2020 and at the national level to inform policy on student motivation in blended courses.

The Keller ARCS Motivation Model was used as a theoretical framework for the study. This model provides an overall framework for defining and using motivational elements in learning models. The model is divided into four categories: Attention, Relevance, Confidence, and Satisfaction (Keller, 2010). The model further provides motivational measurement instruments, such as the Course Interest Survey. The Course Interest Survey is a situational instrument designed to measure motivation in each of the four categories in an Instructor-led course. Data for the study was provided through the administration of the Course Interest Survey (Appendix B) to voluntary student participants, and through data obtained from the research setting.

The study examined the following research questions:

Research Question 1: Do statistically significant relationships exist between non-performance student characteristics (age, gender, academic rank, Race / Ethnicity) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Research Question 2: Do statistically significant relationships exist between pre-course performance student characteristics (pre-course digital literacy, high school GPA, ACT score) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Research Question 3: Do statistically significant relationships exist between post-course performance student characteristics (post-course digital literacy, change in digital literacy) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

To examine the relationships, the study utilized MANOVAs to analyze the student characteristics with the four categories of the Keller ARCS Motivation Model. Only one significant relationship was found in Confidence, between Seniors and Freshmen. Seniors had significantly higher Confidence means (.4799) than Freshmen at the $p < .05$ level. All other characteristics in the study, age, Race / Ethnicity, gender, academic rank, pre-course digital literacy, high school GPA, ACT score, post-course digital literacy, and change in digital literacy did not have significant relationships with the Keller ARCS Motivation Model categories.

This chapter also summarizes and discusses the findings of the study and provides recommendations for the research setting and future studies.

Summary

Non-Performance Student Characteristics

Non-performance student characteristics in this study consisted of characteristics that did not use a performance-based measure. They included age, gender, academic rank, and Race / Ethnicity.

Participants were required to be at least 18 years of age for the study. Based upon the responses, participants were grouped into 5 age groups: 18, 19, 20, 21, and 22 and over. One hundred and thirty-three participants reported their age, and the mean age was 19.84 with a standard deviation of 3.015 years. Of the participants 17.6% were age 18, 40.4% were age 19, 17.6% were age 20, 14% were age 21, and 8.1% were ages 22 and over. 3 participants did not report their age.

Participants reported their gender as 42.6% male, 47.8% female, and 9.6% chose not to disclose.

Participants in the study were 47.1% Freshmen, 30.1% Sophomores, 11.8% Juniors, 6.6% Seniors, and 2.2% Other. Other was removed from the study because the category contained a very small group of participants and was not a category of investigation for the study.

The participants were 81.6% White/Caucasian, 3.7% Hispanic or Latino, 3.7% Black or African American, 2.2% Asian, 1.5% American Indian or Alaska Native, 0.7% Native Hawaiian or Other Pacific Islander, and 6.6% chose not to disclose a Race / Ethnicity.

Pre-Course Performance Student Characteristics

ACT scores were provided for the study by the university with permission from the participants. The average ACT score for 114 of 136 participants was 21.85, with a standard

deviation of 3.58. Participants were grouped by ACT scores in groups 15 and below, 16-17, 18-19, 20-21, 22-23, 24-25, 26-27, 28-29, and 30 and above.

High School GPA was provided for the study by the university with permission from the participants. The average high school GPA for 105 of 136 participants was 3.40, with a standard deviation of .486.

Participants completed the ATLSA pretest at the beginning of the blended digital literacy course. These scores were obtained from the Instructor of the course with permission from the participants. The average pretest score of 131 of 136 participants was 71.95, with a standard deviation of 11.694.

Post-Course Performance Student Characteristics

Participants completed the ALTSA posttest at the end of the blended digital literacy course. These scores were obtained from the Instructor of the course with permission from the participants. The average posttest score of 125 of 136 participants was 78.75, with a standard deviation of 9.059.

The change in digital literacy was calculated by subtracting the pretest ALTSA score from the posttest ALTSA score. This value gives the overall improvement or decline of a participant after completing the blended digital literacy course. The average change in digital literacy of 121 of 136 participants was 6.64, with a standard deviation of 9.392.

Keller ARCS Motivational Measures

Motivation was measured in this study using the Keller ARCS Motivation Model Course Interest Survey. The survey provides an overall score of motivation, along with a score of motivation in each of the four categories: Attention, Relevance, Confidence, and Satisfaction. A minimum score is 0, and a maximum score is 3. A maximum score signifies the highest level of

motivation. The overall mean score of motivation in this study was 1.4 with a standard deviation of .372.

Scores for Attention were compiled from the mean score for questions 1, 4 (reversed), 10, 15, 21, 24, 26 (reversed), and 29. The mean score for all participants was .97 with a standard deviation of .473.

Scores for Relevance were compiled from the mean score for questions 2, 5, 8 (reversed), 13, 20, 22, 23, 25 (reversed), and 28. The mean score for all participants was 1.60, with a standard deviation of .436.

Scores for Confidence were compiled from the mean score for questions 3, 6 (reversed), 9, 11 (reversed), 17 (reversed), 27, 30, and 34. The mean score for all participants in Confidence was 1.67, with a standard deviation of .437.

Scores for Satisfaction were compiled from the mean score for questions 7 (reversed), 12, 14, 16, 18, 19, 31 (reversed), 32, and 33. The mean score for all participants in Satisfaction was 1.34, with a standard deviation of .463.

Quantitative Measures

Do statistically significant relationships exist between non-performance student characteristics (age, gender, academic rank, Race / Ethnicity) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

One-way MANOVA test results of the non-performance student characteristics indicated that the motivational measures of Attention, Relevance, Confidence, and Satisfaction in the blended digital literacy course were not significantly influenced by age, gender, and race / ethnicity. Motivational measures for Attention, Relevance, and Satisfaction were not

significantly influenced by academic rank as well. In the area of Confidence, significant differences were found in academic rank, $F(12, 323.073) = 2.426$, $p < .05$; Wilks' Lambda = .796; partial Eta Squared = .033. Follow-up ANOVAs showed that Confidence was statistically significant ($F(3, 125) = 3.899$; $p < .05$; partial Eta Squared = .086). A Scheffe post hoc test showed that for Confidence, Seniors had statistically higher mean scores (.4799) than Freshmen ($p < .05$). Null hypothesis Ho 1.3 was rejected, and null hypotheses Ho 1.1, Ho 1.2, Ho 1.4 were not rejected.

Do statistically significant relationships exist between pre-course performance student characteristics (pre-course digital literacy, high school GPA, ACT score) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

One-way MANOVA test results of the pre-course performance student characteristics indicated that the motivational measures of Attention, Relevance, Confidence, and Satisfaction in the blended digital literacy course were not significantly influenced by pre-course digital literacy, high school GPA, and ACT score. Null hypotheses Ho 2.1, Ho 2.2, and Ho 2.3 were not rejected.

Do statistically significant relationships exist between post-course performance student characteristics (post-course digital literacy, change in digital literacy) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

One-way MANOVA test results of the post-course performance student characteristics indicated that the motivational measures of Attention, Relevance, Confidence, and Satisfaction in

the blended digital literacy course were not significantly influenced by post-course digital literacy, and change in digital literacy. Null hypotheses Ho 3.1 and Ho 3.2 were not rejected.

Discussion

Research Question One

Do statistically significant relationships exist between non-performance student characteristics (age, gender, academic rank, Race / Ethnicity) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Research question one focused on non-performance student characteristics. These characteristics included age, gender, academic rank, and Race / Ethnicity. These characteristics were described as "non-performance" to indicate that the measures obtained were not based upon performance.

Age was found to not have a significant relationship with the Keller ARCS Motivation Model Categories, Attention, Relevance, Confidence, and Satisfaction. While the participants ranged in age from 18 to 50, 97% of the participants reported an age of 23 or under, and the average age was 19.84. At the research setting, the student population is reported to have an average age of 24 (Fort Hays State University College Portrait, 2014). The lower mean age of 19.84 in the study is consistent with the research setting as an introductory, Freshmen-level blended digital literacy course is likely to have a lower mean age than an a higher level course.

Gender was found to not have a significant relationship with the Keller ARCS Motivation Model Categories of Attention, Relevance, Confidence, and Satisfaction. The participants in the study reported 42.6% male, 47.8% female, and 9.6% unknown/other. At the research setting, the entire student population was reported as 41% male, and 59% female (Fort Hays State University

College Portrait, 2014). The results of the study are fairly consistent with the research setting, but have a lower reported percentage of females. Gender has been found to be significantly related to motivation in specific topic areas such as mathematics (Meece et al., 2006), but not in technology use (Mims-Word, 2012). The results of this study, based on a digital literacy course, were consistent with recent research.

Academic rank was found to not have a significant relationship with the Keller ARCS Motivation Model Categories of Attention, Relevance, and Satisfaction. A significant relationship was found between academic rank and Confidence ($F(3,125) = 3.899$; $p < .05$; partial Eta Squared = .086). A Scheffe post hoc test resulted in Seniors having statistically higher Confidence mean scores (.4799) than Freshmen. The higher Confidence score for Seniors may be attributed to Seniors having more experience in the university system compared to Freshmen. Confidence is typically created through the use of learning requirements, success opportunities, and personal control (Keller, 2010). Seniors, by nature, will have had more success opportunities and experience with learning requirements and personal control. The participants in the study were 47.1% Freshmen, 30.1% Sophomores, 11.8% Juniors, 6.6% Seniors, and 2.2% Other. Academic Rank data was not available from the research setting. However, with nearly 50% of the participants classified as Freshmen, and the other ranks decreasing in percentage for each rank. This level of Freshmen seems consistent with general expectations of a Freshman-level course. The only research of academic rank and motivation found by the researcher identified significant themes of motivation for first-year business student freshmen at a community college (Johnson, 2012). Johnson (2012) recommended study of other academic ranks, and this study provided motivational data for other academic ranks.

Race / Ethnicity was found to not have a significant relationship with the Keller ARCS Motivation Model Categories, Attention, Relevance, Confidence, and Satisfaction. Participants of the study reported Race / Ethnicity as 81.6% White/Caucasian, 3.7% Hispanic or Latino, 3.7% Black or African American, 1.5% American Indian or Alaska Native, 0.7% Native Hawaiian or Other Pacific Islander, and 6.6% chose not to disclose a Race / Ethnicity. At the research setting, the undergraduate population was reported as 56% White, 5% Hispanic, 4% African American, 1% Asian, and 31% international (Fort Hays State University College Portrait, 2014). The participants of the study contained a higher population of White/Caucasian students compared to the research setting. However, at the research setting 31% were reported as "international" race, which could be any race, which could change the race proportions. When comparing the university students to the study participants for all other categories besides White/Caucasian, the numbers are consistent. Other research (Young et al., 2011) found that each category of race / ethnicity was unique to motivational predictors. This research study did not find any significant uniqueness in regards to race / ethnicity; however, the sample was predominately White/Caucasian.

When comparing all the non-performance student characteristics of participants with those of the university, the population of the blended digital literacy course is very similar to that of the research setting's overall population. This suggests that the participants of the study were representative of the overall student body. Academic Rank was the only significance found in the study, particularly between Seniors and Freshmen. The result was expected, since Confidence can relate to the previous experiences of Seniors. A Senior, by definition, will have had more experience than a Freshman.

Research Question Two

Do statistically significant relationships exist between pre-course performance student characteristics (pre-course digital literacy, high school GPA, ACT score) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Research question two focused on pre-course performance student characteristics. These characteristics included pre-course digital literacy, high school GPA, and ACT score. These characteristics were described as 'pre-course' to indicate that the measures obtained were based upon performance measures that were measured before the actual course was administered.

Pre-course digital literacy was found to not have a significant relationship with the Keller ARCS Motivation Model Categories, Attention, Relevance, Confidence, and Satisfaction. Pre-course digital literacy was determined in the study by the Atomic Learning Technology Skills Assessment (ALTSA), a standardized exam based upon the ISTE NETS-S standards. The average score for 131 of the 136 participants was 71.95%, with a standard deviation of 11.694. No comparison data was available to the researcher in order to compare to previous semesters, national averages, etc.

High school GPA was found to not have a significant relationship with the Keller ARCS Motivation Model Categories, Attention, Relevance, Confidence, and Satisfaction. High school GPA data for the participants was provided by the research setting for 105 of the 136 participants. The average high school GPA for the 105 participants was 3.40 with a standard deviation of .486. Over 68.3% of participants had a high school GPA above 3.0. No comparison data was available to the researcher to compare participants to the overall student population of the research setting. However, the Nation's Report Card: America's High School Graduates

reported the national high school GPA of graduates as 3.0 (Nord, Roey, Perkins, Lyons, Lemanski, & Schuknecht, 2011). The increase of participant high school GPA as compared to the 2011 average may be due to the high school GPA inflation of graduates discussed in the Nation's Report Card.

ACT scores were found to not have a significant relationship with the Keller ARCS Motivation Model Categories, Attention, Relevance, Confidence, and Satisfaction. ACT score data for the participants was provided by the research setting for 114 of the 136 participants. The average ACT score for the 114 participants was 21.85 with a standard deviation of 3.58. Over 47.4% of participants had an ACT score higher than 21. No comparison data was available to the researcher to compare participants to the overall student population of the research setting. However, according to the ACT website, the national composite ACT score average in 2013 was 20.9 (ACT, 2014). The participants in the study had a slightly higher (.95) ACT score average than the national average. Research of ACT scores has shown ACT scores influence retention (Wohlgemuth et al., 2007), and that retention is influenced by motivation (Purdie & Rosser, 2011). However, this study showed no significant relationship between ACT scores and motivation.

Pre-course performance student characteristics were surprising to the researcher by not having a significant relationship with motivation. This may be due to the mean of the ALTSA score of 71.95. This suggests that on average a student in the course is 71.95% digitally literate. This leaves a possible gain of 28.05% in digital literacy in the course. The researcher did not compare independent groups, such as ACT scores and pre-course ALTSA scores, as that would be beyond the scope of the research questions. However, it may be that higher achieving students before the course may perform better on the pre-course digital literacy exam (pre-course

ALTSA). Since the pre-course ALTSA score was considered "high" by the researcher, there may also be little room for pre-course comparisons statistically, meaning the ALSTA assessment could potentially be too "easy" for the average student. ACT scores seemed average for a college-level student. High school GPAs, on the other hand, seemed very high. This may have been an issue with no significance in high school GPA, since the largest group of students was above a 3.76 GPA.

Research Question Three

Do statistically significant relationships exist between post-course performance student characteristics (post-course digital literacy, change in digital literacy) and Keller ARCS Course Interest Survey scores for Attention, Relevance, Confidence, and Satisfaction in a blended digital literacy course?

Research question three focused on post-course performance student characteristics. These characteristics included post-course digital literacy and change in digital literacy. These characteristics were described as 'post-course' to indicate that the measures obtained were based upon performance measures that were measured after the actual course was administered.

Post-course digital literacy was found to not have a significant relationship with the Keller ARCS Motivation Model Categories, Attention, Relevance, Confidence, and Satisfaction. The post-course digital literacy measure was obtained by re-administering the Atomic Learning Technology Skills Assessment (ALTSA) at the end of the course. The average posttest score for 125 of the 136 participants was 78.75 with a standard deviation of 9.059. No comparison data was available to the researcher in order to compare to previous semesters, national averages, etc.

Change in digital literacy was found to not have a significant relationship with the Keller ARCS Motivation Model categories of Attention, Relevance, and Satisfaction. Change in digital

literacy was a calculated measure, obtained by subtracting pretest scores from posttest scores on the ALTSA assessment. This measure was available for 121 of 136 participants, since not all participants completed both exams. The average change in digital literacy was 6.64 with a standard deviation of 9.392, which means an increase of over 6 points on average. This suggests that a small increase in digital literacy, on average, for participants in the course. However, this increase was not significant for the motivational categories measured by the Course Interest Survey. The increase may have occurred in testing, or the possibility of scoring higher on a repeated exam (Creswell, 2009). Testing is typically minimized with a significant length of time between exams. Due to the length of time (approximately one semester) between testing dates, 'testing' as a threat to internal validity is likely to not have occurred.

The change in digital literacy seemed low at an overall mean of 6.64. This means that participants, on average, increased their score from the pretest ALTSA to the posttest ALTSA score by 6.64 points, or 9.22% of the original mean score. Thirty-eight percent of the participants increased their score from 0.01 to 10, and 30.9% increased their score by 10.01 points or more. However, 27.3% of participants decreased their score on the posttest. This suggests that while some participants learned digital literacy skills, an almost equal number of participants either regressed in their digital literacy skills during the course, indicating a lack of motivation or new material in the course due to course design or low level of difficulty, or other factors. The largest group students increased their score only slightly. Why participants did not show a larger increase or more positive changes in digital literacy is unknown to the researcher. However, this may be related to the lack of motivation indicated in the Keller ARCS scores.

The post-course performance characteristics showed a small increase, overall, in digital literacy, with a mean of 6.64. A score increase of 6.64 seems small for a 16-week course

focused on the topic area covered in the assessment. This suggested to that further examination may be needed to determine why only a slight increase occurred in this course. Combined with low motivation scores, the smaller increase may have been due to a lack of motivation in the course or in previous knowledge of the subject, or both.

Keller ARCS Motivation Model Course Interest Survey Scores

The overall motivational score consisted of the average of all scores on the Course Interest Survey (CIS). The mean overall score on the CIS was 1.4. The CIS maximum score in this study was 3, and the minimum score was a 0. The standard deviation was .372. The survey consisted of 4 responses (Strongly Disagree to Strongly Agree), with a score of 0 representing no motivation, and a score of 3 representing maximum motivation. The mean score of 1.4 falls almost exactly in the middle, suggesting a mixture of motivation and non-motivation. However, the overall score can be greatly affected by Attention, the most important category, since without Attention the other categories can be 'lost' to participants. Attention is first needed before the other categories of motivation can be realized (Keller, 2010). The survey was further divided into the separate categories of Attention, Relevance, Confidence, and Satisfaction.

Attention scores were compiled from the average score on 8 attention-based questions. The average score for participants in Attention was .97 with a standard deviation of .473. This score is low, or signifies that participants did not feel Attention was reached at a motivational level. Attention pertains to "Capturing the interest of learners; stimulating the curiosity to learn" (Keller, 2010, p. 45). The 'low' score in Attention signifies that the scores in the other categories may not be as accurate. When combined with the pre-course digital literacy mean of 71.95 and the small increase in change in digital literacy of 6.64, this suggests that the small

increase may be due to students already being familiar with the content of the course and possibly finding the content non-motivating as it pertains to Attention.

Keller (2010, p.45) defined Relevance as "meeting the personal needs/goals of the learner to affect a positive attitude." Relevance relates to comfortability in the learning environment, and the ability to associate goals and past learning experiences with the course. Research has shown that digital natives do relate positively to blended learning (Echo360, 2011) and technology (Barton & Skiba, 2006; Koutropolous, 2011) – both present in the learning environment of the study. Relevance scores were compiled from the average score on 9 relevance-based questions. The mean score in Relevance was 1.60 with a standard deviation of .436. This score was slightly higher than the overall mean, but still low as a motivational score and suggests that the course may not have been relevant to student needs or abilities.

Confidence scores were compiled form the average score on 8 confidence-based questions. The mean score in Confidence was 1.67 with a standard deviation of .437. This score is also higher than the overall mean for motivation, and is defined as "Helping the learners believe/feel that they will succeed and control their success" (Keller, 2010, p. 45). Confidence relates to the ability of the Instructor and learning environment to clearly communicate requirements and what is expected of students. This suggests that the course has a clearer layout of requirements, and provides success opportunities for students.

A significant difference was found between Seniors and Freshmen academic ranks in Confidence. Seniors scored higher in Confidence than Freshmen. This was likely due to the experiences and familiarity a Senior would have developed from previously completed courses. It could also mean that those who reached Senior level had different experiences or may have developed a more positive view of what was expected throughout the course for Seniors.

Satisfaction scores were compiled from the average score on 9 satisfaction-based questions. The mean score in Satisfaction was 1.34 with a standard deviation of .463. This score was lower than the mean of the overall score, and suggests that satisfaction was low in the course. Satisfaction is defined as "reinforcing accomplishment with rewards" (Keller, 2010, p. 45). A lower score in Satisfaction would suggest that the effort students put into the course might have been not rewarded as expected. Satisfaction can also exist in the form of praise and recognition, which may have not existed in the course, or did not exist to the extent that was expected by students.

Almost all the scores in motivation were low and revealed a lack of motivation in the course. Attention, the most important category of motivation, was the lowest score of the four categories. A score lower than 1.5 in this study could have reflected low or lack of motivation. This low motivation in the category of Attention is a cause of concern. It may have influenced the results of the study, as Attention can affect the other category scores (Keller, 2010). Without Attention, relationships could possibly not be established statistically between other categories of motivation and student characteristics. The lack of Attention may have been caused by the content of the course being too familiar (and no longer sparking interest), which could include the repetition of old skills, instead of new motivational content that would increase digital literacy.

Since students met with the instructor once a week, the structure of the course, although considered digital native friendly, may not have provided enough interaction for the students to talk to the instructor about course assignments or to be motivated in learning what may have been familiar skills.

Research Setting Recommendations

At the research setting, a blended learning course design is used to administer an introductory level digital literacy course. Knowledge of the characteristics of students in the required digital literacy course may aid in the creation of a more effective course that motivates students at an early level of their university academic career. The following are recommendations for the research setting.

1. Conduct focus groups of students utilizing Keller ARCS Motivation Model for the course, including elements of course design and delivery, and the perceptions of students of the need for such a course and the way that course is designed and delivered. These focus groups could help to identify areas in which motivation could be increased, particularly those areas not covered by the Course Interest Survey.
2. Conduct a focus group to provide insight into motivation for under-represented ethnicities and/or religions in this class and the Freshman class. Diversity is an increasingly important aspect of student recruiting and retention. When there is such a small group of under-represented students, this may indicate motivational or other difficulties in adjusting to Freshman life at the university.
3. Find ways to increase the Attention element of Keller ARCS through the using the findings of this study, the focus groups, and the application of various motivational strategies. The study found that the lowest score of all categories in the Course Interest Survey was Attention. Attention is considered the most important of the categories, and all categories can affect each other (Keller, 2010). Attention pertains to how the content of a course is presented, and Table 2.1 provides motivational strategies to help increase student attention. These strategies include changes in instruction, such as the inclusion of

video, discussions, and team projects. Humor can also be incorporated to raise the motivational level of students in the course. Real-world examples, more authentic experiences, and a discovery approach to learning, problem-solving exercises, simulations, games, and group projects may be incorporated as well. Research has shown that using the technology that students use can foster relationships and engagement (Bentrem, McNulty, Rousseau, VanBibbler, & Villacampa, 2014). Assuring use of course content on mobile devices may also help in the area of Attention, as use of mobile devices is considered positive for university students (Qudah, Hussain, & Matari, 2013).

Other data in the study revealed a pre-course digital literacy mean score of 71.95 and a mean increase in digital literacy of 6.64. The content of the course may be "on-level" with the students' previous knowledge of digital literacy, and the content may need to be updated to provide a greater increase in student digital literacy. While learning digital literacy skills is occurring in the course, the current content must be redesigned or else new content should be incorporated that is more motivational to students for the course.

4. Find ways to increase Freshman-level university student Confidence through various approaches. In the study a significant difference was found between Seniors and Freshmen in the area of Confidence. Seniors, in general, felt more confident throughout the course than did Freshmen. Confidence pertains to understanding and mastering the course learning requirements. Freshmen scored lower than Seniors. Freshmen may want to better understand course structures and how university study works before the course begins in order to feel more confident about the course and the need for it in their first year.

5. Require an explanation be given to Freshmen of the various topics covered in this course, the different learning models used by the university, the time required for each model, technology used, and the expectations of the university for Freshmen beginning the blended digital literacy course. This information could be incorporated into a "university success" short course, placed in an orientation, or else into the course at the beginning.
4. Introduce new or enhance existing rewards and praise for course completion: Participants of the study reported a low level of Satisfaction. Satisfaction relates to the reward system in a course, including grades, feedback, etc. As the second lowest score, this signifies that participants did not receive the rewards they were expecting from the course. A recommendation to increase the satisfaction of the course could take the form of reviewing the current grading and feedback process and looking for areas of improvement. It could also mean explaining the purpose of this course in the context of their academic studies and college degree attainment. Satisfaction could also be enhanced through changing the nature, degree, or type of feedback; improving grading mechanisms; or in implementing a better reward system for students.
5. Explore the blended course model in new ways: A blended course model is defined as having both an online and traditional component, with the model containing 30% to 79% of content delivered online, and a reduced amount of face-to-face time (Allen & Seaman, 2013). The current course model utilizes 1 hour of instruction for face-to-face delivery per week. This may not be sufficient. It may be beneficial to review the amount of content that is delivered traditionally versus online and to conduct focus groups to ascertain if 1 hour is enough or if the content provided in that hour is relevant. The current percentage of content delivery is between 30% to 79%, but the amount is

unknown to the researcher. One of these two delivery models may be less motivating to students. Assessing each delivery mode for motivation may reveal a more motivating delivery mode or improvements in either or both modes. By increasing the amount of content delivered through the more motivating mode or making changes to the less motivating mode, student motivation may increase.

6. Examine current "test-out" procedures. The instructor in the study offers a College Level Examination Program test option. If students score 50% level or higher then they receive college level credit for the class. Of the participants in this study, 27.4% scored higher than 80 out of 100 on the pretest of digital literacy. It could be that the test is too difficult, too costly at $80, or that it isn't advertised. Reducing the number of students in a class that is unessential would allow more faculty/student interaction.

Recommendations for Future Studies

While research exists on the blended learning model, little research exists on the relationship of blended learning and student motivation, particularly at the university level. The following opportunities exist for future investigations:

1. Conduct a qualitative study to enhance and explain the findings of this exploratory quantitative study. A qualitative study could help to identify and further explain areas in which motivation could be increased, particularly those areas not covered by the Course Interest Survey.
2. Conduct a qualitative study on other learning models: The Course Interest Survey used in this study was limited to the Instructor, but it is possible for Instructors to teach using other learning models. Examining student perceptions and pre- and post-course data of this course taught by the same Instructor using a traditional, web-

facilitated, and/or blended, may provide insight to which learning model is most effective in terms of motivation.

3. Use the process in this study on multiple courses: Although the courses can't be compared using Course Interest Survey scores, a course that exhibits higher motivation than other courses can be analyzed by the categories of the Keller ARCS Motivation Model to help identify possible course elements that provide motivation for students. These elements can then be incorporated into other courses and examined to see if they indeed increase the motivation of students in the other courses.
4. Examine other student characteristics in a mixed methods study. The characteristics examined in this study were available to and chosen by the researcher, but other characteristics may exist that have a significant relationship to motivation. Examples of other student characteristics may include loneliness, part-time work outside of class, and membership in student organizations or learning communities. The student characteristics in this study may have a significant relationship in other courses as well, as the Course Interest Survey is specific for a single Instructor. Additionally, student interviews could further elucidate the nature of and interaction of these characteristics with the course.

References

A Duty To Dream. (2013). A Duty to Dream: FHSU's revolutionary plan for preparing forward thinking and world ready graduates. *Online.* Available: http://www.fhsu.edu/president/Duty-to-Dream/

ACT. (2013). 2013 ACT National and State Scores. *Online.* Available: http://www.act.org/newsroom/data/2013/trends.html

Allen, E., & Seaman, J. (2013). Changing course: Ten years of tracking online education in the United States. *Online.* Available: http://sloanconsortium.org/publications/annual-surveys

Allen, E., & Seaman, J. (2014). Grade change: Tracking online education in the United States. Babson Survey Research Group and Quahog Research Group. Retrieved from http://www.onlinelearningsurvey.com/reports/gradechange.pdf

Allen, E., Seaman, J., & Garrett, R. (2007). Blending in: The extent and promise of blended education in the United States. Babson Survey Research Group/Sloan-C Consortium. *Online.* Available: http://onlinelearningconsortium.org/publications/survey/blended06

Arjomand, L. (2002). Sampling distribution of the mean. *Online.* Available: http://business.clayton.edu/arjomand/business/17.html

Atomic Learning. (2013). Atomic Learning Technology Skills Assessment. *Online.* Available: http://www.atomiclearning.com/assessment

Babbie, E. (2009). *The practice of social research.* (12th ed.). Belmont: Wadswoth Publishing.

Battaglino, T. B., Haldeman, M., & Laurans, E. (2012). *Thomas B Fordham Institute* (Rep.). Available: http://www.edexcellence.net/publications/the-costs-of-online-learning.html

Barton, A., & Skiba, D. (2006). Adapting your teaching to accommodate the net generation of learners. *The Online Journal of Issues in Nursing, 11*(2).

Bentrem, K., McNulty, C, VanBibbler, J., & Villacampa, I. (2014). Tweetful meaning: Student perceptions of Twitter and institutional tweets. *Journal of the Indiana University Student Personnel Association.* 59-77.

Berg, B. L. (2004). *Qualitative research methods for the social sciences* (5th ed.). Boston, MA: Pearson.

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

Borsheim, C., Merritt, K., & Reed, D. (2008). Beyond technology for technology's sake: Advancing multiliteracies in the twenty-first century. *The Clearing House, 82*(2), 87-90.

Boslaugh, S., & Watters, P. A. (2008). *Statistics in a nutshell: A desktop quick reference.* Sebastopol, CA: O'Reilly.

Bruinsma, M. (2004). Motivation, cognitive processing and achievement in higher education. *Learning & Instruction, 14*(6), 549-568.

Cakir, H. (2013). Use of blogs in pre-service teacher education to improve student engagement. *Computers & Education*, 68, October 2013, 244-252.

Campus Computing Survey. (2013). The 2013 campus computing survey. *Online.* Available: http://www.campuscomputing.net/item/2013-campus-computing-survey-0

Chung, C., Pasquini, L., & Koh, C. (2013). Web-based learning management system considerations for higher education. *Learning and Performance Quarterly, 1*(4), 24-37.

Craig, E. M. (2007). Changing paradigms: Managed learning environments and web 2.0. *Campus - Wide Information Systems, 24*(3), 152-161.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Dahlstrom, E., Walker, J. D., & Dziuban, C. (2013). ECAR study of undergraduate students and information technology. *EDUCAUSE Online.* Available: www.educause.edu/ecar

Delialioglu, O. (2012). Student engagement in blended learning environments with lecture-based and problem-based instructional approaches. *Journal of Educational Technology & Society, 15*(3), 310-n/a.

Eccles, J. (1983). Expectancies, values, and academic behaviors. In J.T. Spence (Ed.), *Achievement and achievement motives: Psychological and sociological approaches.* 75-146. San Franciso: Freeman.

Echo360. (2011). Blended learning technology: Connecting with the online-all-the-time student. *Online.* Available: http://echo360.com/annual-results

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Fort Hays State University College Portrait. (2014). *Online.* Available: http://www.collegeportraits.org/KS/FHSU

Fowler, F. J. (2002). *Survey research methods* (3rd Ed.). Thousand Oaks, CA: Sage.

Friesen, N. (2012). Defining blended learning. *Online.* Available: http://learningspaces.org/papers/Defining_Blended_Learning_NF.pdf

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

Green, K. (2013). Campus computing, 2013, the national survey of computing and information technology in U.S. higher education. *Online.* Available:

http://www.campuscomputing.net/sites/www.campuscomputing.net/files/CampusComputing2013.pdf

Haemmerlie, F. M., & Montgomery, R. L. (2012). Gender differences in the academic performance and retention of undergraduate engineering majors. *College Student Journal, 46*(1), 40-45.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate Data Analysis* (International 7th ed.). Essex, UK: Pearson.

Hammond, E. (2012). State of the campus 2012: Average is over. *Online.* Available: http://www.fhsu.edu/president/state-of-the-campus/

Hazari, S., North, A., & Moreland, D. (2009). Investigating pedagogical value of wiki technology. *Journal of Information Systems Education, 20*(2), 187-198.

Hill, P. (2014). New LMS market data: Edutechnica provides one-year update. *Online.* Available: http://mfeldstein.com/new-lms-market-data-edutechnica-one-year-update/

Hoon, J., & Finkelstein, A. (2013). Understanding the effects of professors' pedagogical development with clicker assessment and feedback technologies and the impact on students' engagement and learning in higher education. *Computers & Education*, 65, July 2013, 64–76.

Huett, J. B. (2006). The effects of ARCS-based confidence strategies on learner confidence and performance in distance education. *Doctoral Dissertation, University of North Texas.*

Hussar, W., & Bailey, T. (2014, February). *Projections of education statistics to 2022.* Washington, D. C.: National Center for Education Statistics.

ISTE. (2014). ISTE NETS Standards. *Online.* Available: http://www.iste.org/standards

Johnson, L., Adams, B. S., Cummins, M., Estrada, V., Freeman, A., & Ludgate, H. (2013). *NMC horizon report: 2013 higher education edition.* Austin, Tx: The New Media Consortium.

Johnson, R. (2012). *Community college first-year business student online course motivation* (Doctoral dissertation). Kansas State University.

Junco, R., Heiberger, G., & Loken, E. (2011). The effect of Twitter on college student engagement and grades. *Journal of Computer Assisted Learning* 27 (2), 1365-2729.

Kansas Board of Regents. (2013). Foresight 2020 progress report. *Online.* Available: http://www.kansasregents.org/foresight_2020

Keller, J. M. (1979). Motivation and instructional design: A theoretical perspective. *Journal of Instructional Development, 2*(4), 26-34.

Keller, J. M. (1983). *Motivational design of instruction. Instructional design theories and models: An overview of their current status.* Hillsdale, NJ: Lawrence Erlbaum.

Keller, J. M. (1987). Development and use of the ARCS model of motivational design. *Journal of Instructional Development, 10*(3), 2-10.

Keller, J. M. (2006). What are the elements of learner motivation?. *Online.* Available: http://www.arcsmodel.com/

Keller, J. M. (2010). *Motivational design for learning and performance: The ARCS model approach*. New York, NY: Springer.

Koutropoulos, A. (2011). Digital natives: Ten years after. *Journal of Online Learning and Teaching, 7*(4), 525-538.

Laerd Statistics. (2014). Laerd Statistics. *Online.* Available: http://statistics.laerd.com

Marcus. (2013). MOOCs keep getting bigger. But do they work? *Online.* Available: http://hechingerreport.org/content/moocs-keep-getting-bigger-but-do-they-work_12960/

Margueratt, D. (2007). *Improving learner motivation through enhanced instructional design* (Doctoral dissertation). Alberta, CA.

Markoff, J. (2006, November 12). Entrepreneurs see a web guided by common sense. *The New York Times*. Available: http://www.nytimes.com/2006/11/12/business/12web.html?pagewanted=all&_r=0

Martinez, M. (2009). It's all about "me". *Phi Delta Kappan, 91*(2), 74-75.

McLachlan, G. (1992). *Discriminate Analysis and Statistical Pattern Recognition.* New York,NY: Wiley-Interscience.

McClelland, D. (1953). *The achievement motive.* New York,NY: Appleton-Century-Crofts.

Mims-Word, M. (2012). The importance of technology usage in the classroom, does gender gaps exist. *Contemporary Issues in Education Research (Online), 5*(4), 271.

Meece, J. L., Glienke, B. B., & Burg, S. (2006). Gender and motivation. *Journal of School Psychology, 44*, 351-373.

Morrow, J. A., & Ackermann, M. E. (2012). Intention to persist and retention of first-year students: The importance of motivation and sense of belonging. *College Student Journal, 46*(3), 483-491.

National Council for Accreditation of Teacher Education. (2014). *Online*. Available: http://www.ncate.org/Public/AboutNCATE/tabid/179/Default.aspx

National Survey of Student Engagement. (2012). *Online.* Available: http://nsse.iub.edu/html/about.cfm

Neill, J. (2007). Qualitative versus quantitative research: Key points in a classic debate. *Online.* Available: http://wilderdom.com/research/QualitativeVersusQuantitativeResearch.html

Nord, C., Roey, S., Perkins, R., Lyons, M., Lemanski, N., Brown, J., & Schuknecht, J. (2011). *The Nation's Report Card: America's High School Graduates* (NCES 2011-462). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Oblinger, D. (ed.). (2012). Game changers: Education and information technologies. *Online.* Available: http://www.educause.edu/research-and-publications/books

Ogawa, M. (2008). *Exemplary undergraduate teaching assistant instructional practices as framed by the ARCS model of motivation* (Doctoral dissertation).

O'Reilly, B. (2005). What is Web 2.0? Design patterns and business models for the next generation of software. Available: http://mediaedu.typepad.com/info_society/files/web2.pdf

Parker, K., Lenhart, A., & Moore, K. (2011). The digital revolution and higher education: College presidents, public differ on value of online learning. *Online.* Available: http://www.pewsocialtrends.org/2011/08/28/the-digital-revolution-and-higher-education/2/

Palfrey, J., & Gasser, U. (2008). *Born digital: Understanding the first generation of digital natives*. New York, NY: Basic Books.

Perlas, C. (2010). *Enhancing underrepresented, community college student motivation through blended curriculum* (Doctoral dissertation). Capella University.

Petherbridge, D. (2007). *A concerns-based approach to the adoption of web-based learning management systems* (Doctoral dissertation). (UMI No. 3269445)

Porter, L. W., & Lawler, E. E. (1968). *Managerial attitudes and performance.* Homewood, Ill.: R. D. Irwin.

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon, 9*(5), 1-6.

Prescott, J. (2014). Teaching style and attitudes towards Facebook as an educational tool. *Active Learning in Higher Education, 15*(2), 117-128.

Pretorius, M., & Judy, V. B. (2010). Learning management systems: ICT skills, usability and learnability. *Interactive Technology and Smart Education, 7*(1), 30-43.

Pritchett, C. C., Wohleb, E. C., & Pritchett, C. G. (2013). Educators' perceived importance of web 2.0 technology applications. *TechTrends, 57*(2), 33-38.

Purdie, J. R., & Rosser, V. J. (2011). Examining the academic performance and retention of first-year students in living-learning communities and first-year experience courses. *College Student Affairs Journal, 29*(2), 95-112,179.

Qudah, Y., Hussain, J., & Matari, R. (2013). Students' attitudes in colleges of education at the Jordanian universities towards mobile phone usage in university education. *International Journal of Interactive Mobile Technologies.* 7(1), 19-28.

Razali, N., & Wah, Y. (2011). Power comparisons of Shapiro-Wilk, Kolmogorov-Smirnov, and Anderson-Darling tests. *Journal of Statistical Modeling and Analytics, 2*(1), 21-33.

Ribble, M. (2011). *Digital citizenship in schools* (2nd Ed.). Eugene, OR: ISTE.

Riddell, R. (2013). 12 learning management system providers and what they bring to classrooms. *Online.* Available: http://www.educationdive.com/news/12-learning-management-system-providers-and-what-they-bring-to-classrooms/97613/

Sahare, S., & Thampi, G. (2010). *Blended learning: Current trends and issues.* Paper presented at the Global Learn Asia Pacific 2010, Penang, Malaysia.

Serhan, D. (2010). Online learning: Through their eyes. *International Journal of Instructional Media. 37*(1), 19-24.

Shih, R. (2011). Can Web 2.0 technology assist college students in learning English writing? Integrating Facebook and peer assessment with blended learning. *Australasian Journal of Educational Technology,* 2011, 27 (Special issue, 5), 829-845.

Skiba, D. (ed.). (2012). Disruption in higher education: Massively open online courses (MOOCs). *Nursing Education Perspectives, 33*(6), 416-7.

Skinner, B. (1969). *Contingencies of reinforcement; a theoretical analysis.* New York, NY: Appleton-Century-Crofts.

Small, R. (1997). Motivation in instructional design. *Online.* Available: http://ils.unc.edu/daniel/214/MotivationSmall.html

Smith, P., & Regan, T. (2004). *Instructional design, 3rd Edition.* New York, NY: Wiley.

Steinmayr, R., & Spinath, B. (2008). Sex differences in school achievement: What are the roles of personality and achievement motivation? *European Journal of Personality, 22*, 185-209.

Stevens, J. (1999). Post hoc tests in ANOVA. *Online.* Available: http://pages.uoregon.edu/stevensj/posthoc.pdf

Tapscott, D. (1998). *Growing up digital: The rise of the net generation.* New York, NY: McGraw-Hill.

Tharp, D., Gould, A., & Potter, R. (2009). *Air force research institute research study: Leveraging affective learning for developing future airmen.* Alabama: Maxwell Air Force Base.

Tigertracks. (2013). Tigertracks course scheduling. *Online.* Available: http://Tigertracks.fhsu.edu/

Tigertracks. (2014). Tigertracks course scheduling. *Online.* Available: http://Tigertracks.fhsu.edu/

Trochim, W., & Donnelly, J. (2008). *The research methods knowledge base.* Mason, OH: Cengage.

Uğur, B., Akkoyunlu, B., & Kurbanoğlu, S. (2009). Students' opinions on blended learning and its implementation in terms of their learning styles. *Educ Inf Technol*, doi: 10.1007/s10639-009-9109-9.

U.S. Census Bureau. (2010). Washington, D.C.: Government Printing Office. Available: http://www.census.gov/2010census/

Utts, J. (2005). *Seeing through statistics.* (3rd Ed.). Boston, MA: Cengage.

Watters, M. P., & Roberston, P. J. (2009). Online delivery of accounting courses: Student perceptions. *Academy of Educational Leadership Journal, 13*(3), 51-57.

Wesch, M. (2007). A vision of students today. *Online Video*. Available: http://www.youtube.com/watch?v=dGCJ46vyR9o

Wohlgemuth, D., Whalen, D., Sullivan, J., Nading, C., Mack, S., & Wang, Y. (2007). Financial, academic, and environmental influences on the retention and graduation of students. *Journal of College Student Retention, 8*(4), 457-475.

Young, A., Johnson, G., Hawthorne, M., & Pugh, J. (2011). Cultural predictors of academic motivation and achievement: A self-deterministic approach. *College Student Journal, 45*(1), 151-163.

Zikmund, W., Babin, B., Carr, J., & Griffin, M. (2010). *Business research methods* (8th Ed.). Mason, OH: Cengage Learning.

Appendix A - Permission to Use Participation Letter and Table

March 11, 2013

Hello Shane--

I hope all is going well. I give you permission to use and modify the Online Learning Questionnaire and Participation Letter of Consent.

Please inform me when you finish so that I may read your dissertation.

Let me know if you need anything.

March 14, 2013

Hello Shane--

Yes, you may use the Keller ARCS Components of Motivation and Motivational Strategies table.

Roy Johnson, Ph.D.

Business Instructor

Hutchinson Community College

1300 North Plum

Hutchinson, KS 67501

620.665.3357

johnsonr@hutchcc.edu

www.hutchcc.edu/business

Appendix B - Course Interest Survey

Course Interest Survey

Instructions: There are 34 statements in this questionnaire. Please think about each statement in relation to the class you have just taken and indicate how true it is. Give the answer that truly applies to you, and not what you would like to be true, or what you think others want to hear.

Think about each statement by itself and indicate how true it is. Do not be influenced by your answers to other statements.

Record your responses with the question/answer sheet on the following pages and follow any additional instructions that may be provided in regard to answering the questions.

Mark the circle that indicates your response.

Course Interest Survey Page 2

	Strongly Disagree	Disagree	Agree	Strongly Agree
The instructor knew how to make us feel enthusiastic about the subject matter of this course.	○	○	○	○
The things I learned in this course are useful to me.	○	○	○	○
I felt confident that I would do well in this course.	○	○	○	○
This class had very little in it that captured my attention.	○	○	○	○
The instructor made the subject matter of this course seem important.	○	○	○	○
You had to be lucky to get a good grade in this course.	○	○	○	○
I had to work too hard to succeed in this course.	○	○	○	○
I did NOT see how the content of this course related to anything I already knew.	○	○	○	○
Whether or not I succeeded in this course was up to me.	○	○	○	○
The instructor created suspense when building up to a point.	○	○	○	○
The subject matter of this course was just too difficult for me.	○	○	○	○
I felt that this course gave me a lot of satisfaction.	○	○	○	○
In this course, I tried to set and achieve high standards of excellence.	○	○	○	○
I felt that the grades or other recognition I received were fair compared to other students.	○	○	○	○
The students in this course seemed curious about the subject matter.	○	○	○	○
I enjoyed working for this course.	○	○	○	○
It was difficult to predict what grade the instructor would give my assignments.	○	○	○	○

Course Interest Survey Page 3

	Strongly Disagree	Disagree	Agree	Strongly Agree
I was pleased with the instructor's evaluations of my work compared to how well I thought I had done.	○	○	○	○
I feel satisfied with what I received from this course.	○	○	○	○
The content of this course related to my expectations and goals.	○	○	○	○
The instructor did unusual or surprising things that were interesting.	○	○	○	○
The students actively participated in the course.	○	○	○	○
To accomplish my goals, it was important that I did well in this course.	○	○	○	○
The instructor used an interesting variety of teaching techniques.	○	○	○	○
I do NOT think I benefitted much from this course.	○	○	○	○
I often daydreamed while in this course.	○	○	○	○
As I was taking this course, I believed I could succeed if I tried hard.	○	○	○	○
The personal benefits of this course were clear to me.	○	○	○	○
My curiosity was often stimulated by the questions asked or the problems given on the subject matter in this course.	○	○	○	○
I found the challenge level of this course to be about right: neither too easy nor too hard.	○	○	○	○
I felt rather disappointed with this course.	○	○	○	○
I felt that I got enough recognition of my work in this course by means of grades, comments, or other feedback.	○	○	○	○
The amount of work I had to do was appropriate for this type of course.	○	○	○	○
I got enough feedback to know how well I was doing.	○	○	○	○

Name: _____

High School Location: _____

Age: _____ Gender: ☐ Male ☐ Female ☐ Other

Race/Ethnicity:
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Hispanic or Latino
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White/Caucasian
- ☐ Other
- ☐ Choose not to disclose

Year:
- ☐ Freshman
- ☐ Sophomore
- ☐ Junior
- ☐ Senior
- ☐ Other

Appendix C - Participation Letter

PROJECT TITLE: THE INTERRELATIONSHIPS OF UNIVERSITY STUDENT CHARACTERISTICS AND THE KELLER ARCS MODEL OF MOTIVATION IN A BLENDED DIGITAL LITERACY COURSE

This study is being conducted as part of a dissertation research study at Kansas State University (KSU). The purpose of this research study is to examine the relationships of digital literacy and motivation of university students enrolled in a blended digital literacy course that utilizes a blended learning environment at a Midwest university. You are being invited to be a participant in this study because you fit the profile defined in the research study, which is that of a university student in a blended learning digital literacy course. Participation is not a requirement of your course. If you agree to voluntarily participate in this research, your participation will involve completing a 41-question survey regarding motivation. All survey responses will be kept completely confidential.

There are no known risks or discomforts associated with participation in this study. As a participant, you will benefit by gaining insights into your own motivation as a student. You will also be given the opportunity to review the final study to learn more about university student motivation in a blended digital literacy course. The results of this research will be useful to educators and course designers in higher education.

The identity of participants involved in this study will not be revealed in the final research report, and only the researcher will know your actual identity. Nothing you share will be shared with your instructor or with anyone else at any institution.

If you agree to participate, you may withdraw at any time without consequence or explanation, and without harming your relationship with the researchers or your instructor. If you choose to withdraw, you will be given the option of having the information you provided to that point in

time excluded from the analysis. The researcher will secure the information collected in this research project in a safe location, and encrypt all electronic data. All completed surveys will be destroyed after successful defense of the dissertation. Results of the study may be included in Shane Schartz's doctoral dissertation in part or whole, and may also be submitted to professional journals for publication.

Should you have any questions please contact the Major Professor, Dr. Rosemary Talab, at 226 Bluemont Hall, Kansas State University, Manhattan, Kansas 66506 or by email at talab@ksu.edu or by phone 785-532-5716. Question may also be directed to Rick Scheidt, IRB Chair at 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506 or by phone 785-532-3224 or Jerry Jaax, Associate Vice Provost for Research Compliance and University Veterinarian, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506 or by phone 785-532-3224.

Terms of participation: I understand this project is research, and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled.

I verify that my signature below indicates that I have read and understand this consent form, and willingly agree to participate in this study under the terms described, and that my signature acknowledges that I have received a signed and dated copy of this consent form.

*Participants must be at least 18 years of age in order to participate.

___ I certify that I am at least 18 years of age.

Participant Name: _____

Participant Email: _____

Participant Phone: _____

Participant Signature: _____ Date: _____

Witness to Signature: (project staff) _____ Date: _____

Appendix D - ISM Retention Report Fall 2012 Excerpt

On-Campus

	2007		2008		2009		2010		2011		2012	
	cnt	%	cnt	%	cnt	%	cnt	%	cnt	%	cnt	%
First Time, Full-Time, On Campus Degree Seeking Freshman	710/474	66.80%	735/543	73.90%	749/511	68.20%	777/545	64.60%	819/529	63.40%	878/606	69.00%
First Time, Full-Time, On Campus, Degree Seeking Transfers	369/265	71.82%	356/243	68.26%	335/246	73%	323/228	70.59%	381/274	71.92%	476/327	68.70%

• Traditional retention reporting figures.

Virtual College (Excluding China Partnerships)

	2007		2008		2009		2010		2011		2012	
	cnt	%	cnt	%	cnt	%	cnt	%	cnt	%	cnt	%
Full-Time Degree Seeking Freshman	24/14	58.30%	24/18	75.00%	17/10	58.80%	50/25	50.00%	50/22	44.00%	75/32	42.70%
Full-Time Degree Seeking Transfers	94/61	64.90%	119/64	53.80%	160/104	65.00%	228/129	56.60%	235/150	63.80%	306/181	59.20%
Part-Time Degree Seeking Freshman	19/7	36.80%	30/15	50.00%	22/12	54.50%	28/17	60.70%	35/17	48.60%	51/21	41.20%
Part-time Degree Seeking Transfers	164/94	57.30%	232/145	62.50%	204/127	62.30%	223/151	67.70%	221/122	55.20%	285/156	54.70%

China Partnerships

	2007		2008		2009		2010		2011		2012	
	cnt	%	cnt	%	cnt	%	cnt	%	cnt	%	cnt	%
Transfer	937/777	82.90%	877/740	84.40%	1091/849	77.80%	1440/1082	75.10%	1274/1138	89.30%	1105/928	84.00%

Appendix E - Permission to Use Analysis of FHSU Results for the 2004-2012 NSSE Freshmen Scores

April 11, 2013

Shane:

After listening to a wonderful presentation from Cable Green of Creative Commons on open access under copyright license...of course you can use the data in your dissertation. We place it on our website...so it is out there anyway...but I'm glad you asked.

Chris.

C. B. Crawford, Ph.D.
Assistant Provost for Quality Management
Fort Hays State University
600 Park Street
Hays, KS 67601
(785) 628-4531

Appendix F - Hanover Dropped Student Survey Analysis Excerpt

Reason	Examples	Count
Personal/unrelated to Fort Hays State University	❖ ♉Homesick ❖ ♉I really wanted to go play division 1 football. I had received offers out of High School and did not take advantage of it so I wanted to chase my dream. ❖ ♉I was getting married and wanted to be closer to family so I transferred to Colorado State University-Pueblo	32
Student interactions, concerns with social scene, issues with residential halls	❖ ♉Because I did not like the all the drunk people that were always going around. ❖ ♉I hated living in the dorms. ❖ ♉Not a very diverse school as I thought it was. The school was too much of a party school. Couldn't relate to any of the students unless you smoked marijuana or drank liquor. My grades took a turn for the worse b/c of the hectic schedule of the wrestling team and that was only for pre-season. I really wish I could come back and start over. but in that being my first year, I kind of know what is expected If I can or decide to attend in the future.	24
Transferred to a different program	❖ ♉I changed my major and felt it was unnecessary to live in hays and pay for a program I could take at home. ❖ ♉Transfer to a different, more well known school.	15

Finances	❖ ♉I cannot afford classes and don't want student loan debt ❖ ♉I left Fort Hays State University because I could not afford the out of state tuition, also because I moved to save so I can go back and finish my program.	14
Insufficient advising and lack of guidance	❖ ♉I was not keeping up with my class work. I tried to find help through the teachers and got no help. I felt like there was no other option but to drop out. I felt like the "system" just ran me in circles with no real help available. ❖ ♉Was not happy, I did not like the education program. Never had a set advisor. KSU's education program had much more to offer me	11
Dissatisfaction with professors	❖ ♉I want to find a school where the professors actually cared, and I wasn't just another name to them. ❖ ♉The teachers didn't know me personally. It was hard to get the one on one time to help me understand what I needed to know. Felt like I wasn't getting the help that I needed. I'm from a small school so it was hard to transition into larger classes.	10

Appendix G - IRB Approval

KANSAS STATE UNIVERSITY | University Research Compliance Office

TO: Rosemary Talab
Curriculum & Instruction
226 Bluemont

Proposal Number: 6925

FROM: Rick Scheidt, Chair
Committee on Research Involving Human Subjects

DATE: 11/20/2013

RE: Approval of Proposal Entitled, "THE INTERRELATIONSHIPS OF UNIVERSITY STUDENT CHARACTERISTICS AND THE KELLER ARCS MODEL OF MOTIVATION IN A BLENDED DIGITAL LITERACY COURSE."

The Committee on Research Involving Human Subjects has reviewed your proposal and has granted full approval. This proposal is **approved for one year from the date of this correspondence, pending "continuing review."**

APPROVAL DATE: 11/20/2013

EXPIRATION DATE: 11/20/2014

Several months prior to the expiration date listed, the IRB will solicit information from you for federally mandated **"continuing review" of the research.** Based on the review, the IRB may approve the activity for another year. **If continuing IRB approval is not granted, or the IRB fails to perform the continuing review before the expiration date noted above, the project will expire and the activity involving human subjects must be terminated on that date. Consequently, it is critical that you are responsive to the IRB request for information for continuing review if you want your project to continue.**

In giving its approval, the Committee has determined that:

☒ There is no more than minimal risk to the subjects.
☐ There is greater than minimal risk to the subjects.

This approval applies only to the proposal currently on file as written. Any change or modification affecting human subjects must be approved by the IRB prior to implementation. All approved proposals are subject to continuing review at least annually, which may include the examination of records connected with the project. Announced post-approval monitoring may be performed during the course of this approval period by URCO staff. Injuries, unanticipated problems or adverse events involving risk to subjects or to others must be reported immediately to the Chair of the IRB and / or the URCO.

1863 2013 150

203 Fairchild Hall, Lower Mezzanine, Manhattan, KS 66506-1103 | (785) 532-3224 | fax: (785) 532-3278 | k-state.edu/research/comply

FORT HAYS STATE UNIVERSITY

Forward thinking. World ready.

OFFICE OF SCHOLARSHIP AND SPONSORED PROJECTS

DATE:	February 14, 2014
TO:	Shane Schartz
FROM:	Fort Hays State University IRB
STUDY TITLE:	[567071-1] THE INTERRELATIONSHIPS OF UNIVERSITY STUDENT CHARACTERISTICS AND THE KELLER ARCS MODEL OF MOTIVATION IN A BLENDED DIGITAL LITERACY COURSE
IRB REFERENCE #:	14-051
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
APPROVAL DATE:	February 13, 2014
EXPIRATION DATE:	February 12, 2015
REVIEW TYPE:	Full Committee Review

Thank you for your submission of New Project materials for this research study. Fort Hays State University IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Full Committee Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form unless documentation of consent has been waived by the IRB. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document. The IRB-approved consent document must be used.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Leslie Paige at 785-628-4349 or lpaige@fhsu.edu. Please include your study title and reference number in all correspondence with this office.

Appendix H - Letters of Approval From University

FORT HAYS STATE UNIVERSITY

Forward thinking. World ready.

OFFICE OF THE REGISTRAR

November 8, 2013

To: KSU Institutional Review Board

From: Joey Linn, Ph.D.
Associate VP for Student Affairs/Registrar

The purpose of this letter is to explain the protocol of data attainment for Shane Schartz and his upcoming research.

Mr. Schartz will be supplying me with a list of student names asking for specific data. I will then obtain the data through my institutional research contact assuring confidentiality. I will send the data to Mr. Schartz for his research. The researcher agrees the data will not be shared or tied to specific students in his findings.

If you have questions, feel free to let me know.

302 Picken Hall · 600 Park Street · Hays, KS 67601-4099
(785) 628-4222 · FAX (785) 628-4085 · TOLL FREE 1-800-628-FHSU · www.fhsu.edu/registrar

Appendix I - Permission to Use and Modify the Keller ARCS Motivation Model Course Interest Survey

Dear Shane,

You are welcome to use the survey and I wish you success in your research.

Sincerely,
John K.

John M. Keller, Ph.D.
Professor Emeritus
Educational Psychology and Learning Systems
Florida State University

9705 Waters Meet Drive
Tallahassee, FL 32312-3746
Phone: 850-294-3908

Official ARCS Model Website: http://arcsmodel.com. UPDATED 18 SEP 2013
Professional Website: http://mailer.fsu.edu/~jkeller/JohnsHome/
Keller, J.M. (2010), ***Motivational Design for Learning and Performance: The ARCS Model Approach***. New York: Springer. Now available in English, Japanese, and Korean.

"When facing a difficult task, act as though it is impossible to fail.

If you are going after Moby Dick, take along the tartar sauce."

--Walter Smith

Appendix J - Blackboard Web-based Technologies

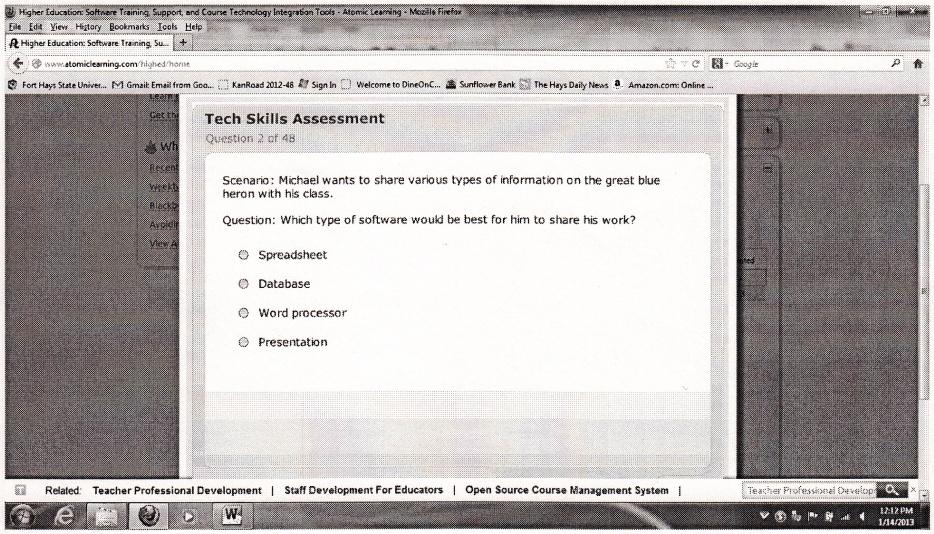
Blackboard Web-based Technologies		
Course Tools	**Sub-Category**	**Description**
Announcements		Provides details for posting important information about the Course, such as Assignment due dates, content changes or guest speakers.
Blackboard Scholar		The Blackboard Scholar page offers users to register with Blackboard Scholar and to turn external links into Blackboard Scholar bookmarks.
Blogs		Instructors can release the Blog tool to the group for use in the course, or for public consumption. Students within the group can post to the Blog and add comments to existing posts. Instructors can also comment on posts.
Collaboration		Collaboration Tools allow users and Instructors to engage in synchronous communication.
	Collaboration Tools	Provides an overview of the Virtual Classroom and Chat features.
	Collaboration Sessions	Explains how instances of each collaboration tool are organized.
	Create/Edit Collaboration Session	Gives instructions for creating a session.
	Virtual Classroom	Provides an overview of the Virtual Classroom.
	Menu Bar	Describes the functions available in the Menu Bar of the Virtual Classroom.
	Classroom Tool Box	Describes the functions available in the Virtual Classroom toolbox.
	Whiteboard	Explains the Whiteboard function in the Virtual Classroom.
	Group Browser	Describes how to view Web sites as a group during a session.
	Content Map	Explains how to access Course content in the Virtual Classroom.
	Ask Question	Describes how users pose a question to the session moderator.
	Question Inbox	Describes how the moderator organizes and answers questions.
	Chat	Explains the Chat tool.
	Record Menu	Reviews the functions for Recording a session.
	Session Recordings	Explains how users access the Recording of an earlier session.
	Recording Properties	Describes the attributes of a session Recording.
Contacts		Staff Contacts may be added or edited through the Contacts page
Course Calendar		Provides all the details for posting Course-related events on a Calendar.
Discussion Board		Describes the features of the Discussion Board page.
Glossary		Explains how to create and edit the Course Glossary. The Glossary may also be uploaded and downloaded.
Journals		Instructors can assign a journal to each user in a group that is accessible by only them and the user in order to communicate privately with the Instructor about the group experience.
Messages		Explains how messages are sent to users within a Course.
Safe Assign		A Building Block that helps prevent plagiarism and enables institutions to protect the originality of student work.
Self and Peer Assessment		A Building Block that facilitates student group work for faculty. Self Evaluation enables students to review and grade their own assessments by following criteria set by their Instructor. Peer Evaluation allows students to review work submitted by their peers using specific criteria, compare their responses and offer constructive criticism.
Send Email		Provides information on how to send email to other participants or groups of participants within a Course.
Tasks		Explains how to organize Course projects, priorities, and details.
Tests, Surveys, and Pools		The Tests, Surveys, and Pools page is a gateway to creating, editing, and managing tests, surveys, and pools of questions that are distributed to users.

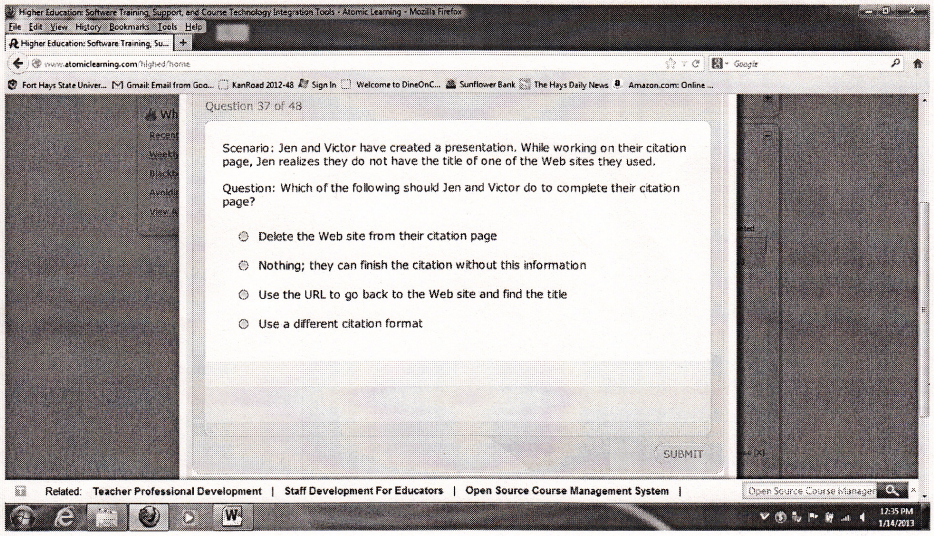
Group Tools		Tools that can be assigned to created groups.
Group Blog		Users within the group can post to the Blog and add comments. Instructors can enable the Blog tool for use only within the Course Group, or can grant the public access to the Blog.
Collaboration		Users within the group can participate in real-time lessons and discussions.
Group Discussion Board		The Group Discussion Board is an area where Course Group members can post messages and replies. Instructors can use this tool to encourage discussions of course material outside of the classroom. This Discussion Board is available only to Course Group members, not to the entire course.
File Exchange		Students and Instructors can use this tool to upload documents to the Course Group area and organize them through the creation of folders in which their items are stored. Students can access this material in the course. Instructors have access to all folders in their course.
Send Email		All members of a Course Group can send email messages to selected members or the entire group. These messages are internal to the Course Group; they are not available to anyone outside the group.
Group Journal		Instructors can assign a private Journal to each user in a group to allow private communication between the Instructor and the User.
Group Tasks		The Group Tasks page organizes projects or activities (referred to as tasks) by defining task priority and tracking task status.
Content-based Tools		
Item		A general piece of content such as a file, image, text, or link to which a description and other items may be attached. See Content Items for more information.
File		An HTML file that can be used in the Course. These files can be viewed as a page within the Course or as a separate piece of content in a separate browser window. See Content Files for more information.
Audio		An audio file that can be played directly from the page. The audio can be looped or started automatically when the page is opened. See File Attachments for a list of accepted formats.
Image		An image file that can be shown directly on the page. See File Attachments for a list of accepted formats.
Video		A video file that can be played directly from the page. See File Attachments for a list of accepted formats.
URL		Link to an outside Web site or resource. See URL for more information.
Offline Content		A direct path to a specified file on a drive, usually a CD-ROM. To access this file, users must have the correct CD-ROM in their computer.
Learning Module		A set of content that includes a structured path for progressing through the items. See Learning Modules for more information.
Lesson Plan		XXX
Syllabus		Content item that enables an Instructor to build a Course Syllabus by walking through a series of steps. See Syllabus for more information.
Course Link		Link to another item in a Course or in another part of the system such as Course Objectives or Content Management. See Course Link for more information.
IMS Content		Content that matches IMS specifications. Additional information may be found at http://www.imsproject.org.See The Open Standards Content Player and Adding SCORM, IMS, and NLN Content for more information.
NLN Content		A package of content developed by the National Learning Network. (NLN) Additional information may be found at http://www.nln.ac.uk. See The Open Standards Content Player and Adding SCORM, IMS, and NLN Content for more information.
SCORM Content		Content that adheres to Sharable Content Object Reference Model (SCORM) standards. See The Open Standards Content Player and Adding SCORM, IMS, and NLN Content for more information.
Content Folder		An organizational element that contains Content Items. Folders allow content to be structured with a hierarchy or categories. See Content Folders for more information.

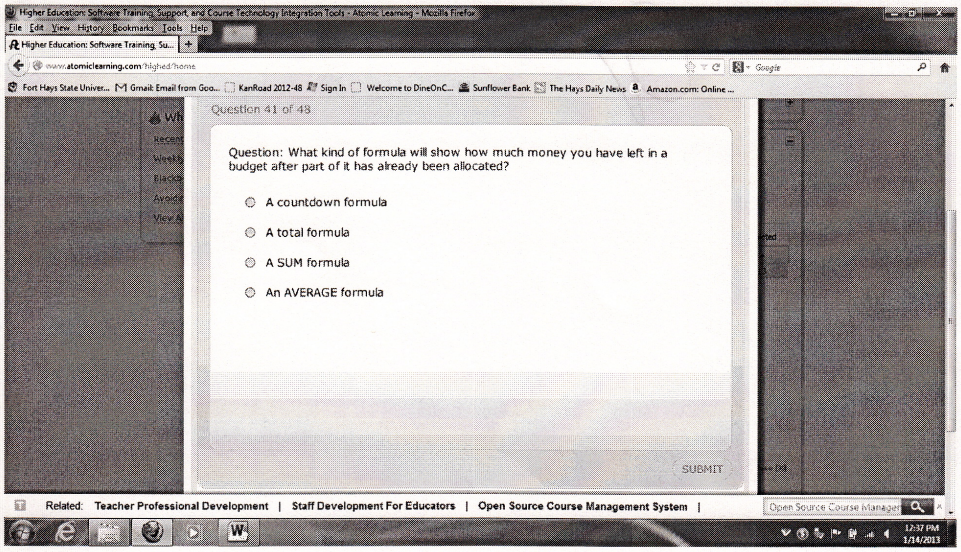
Module Page		A page containing dynamic personalized content modules that help users keep track of tasks, assessments, assignments, and new content added to the course. See Creating and Editing Module Pages for more information.
Tools Area		A shortcut to a specific tool in the Course, such as a Discussion Board or Messages. See Tools Area for more information.
Flickr Photo		A Mashup that includes a link to a site for viewing and sharing photographic images.
Slideshare Presentation		A Mashup that includes a link to a site for viewing and sharing PowerPoint presentations, Word documents, or Adobe PDF Portfolios.
YouTube Video		A Mashup that includes a link to a site for viewing and sharing online videos.
Textbook		Course Textbook.

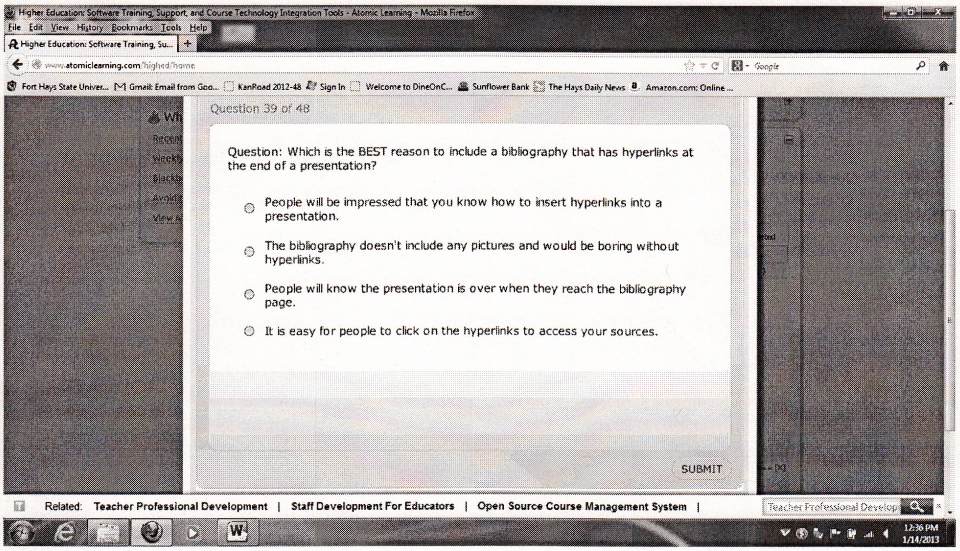
Appendix K - ALTSA Test Question Examples

Atomic Learning 21st Century Tech Skills Pre-Post Assessment (Examples)






Higher Education: Software Training, Support, and Course Technology Integration Tools - Atomic Learning - Mozilla Firefox
Question 41 of 48
Question: What kind of formula will show how much money you have left in a budget after part of it has already been allocated?
A countdown formula
A total formula
A SUM formula
An AVERAGE formula
SUBMIT
Related: Teacher Professional Development | Staff Development For Educators | Open Source Course Management System |


Higher Education: Software Training, Support, and Course Technology Integration Tools - Atomic Learning - Mozilla Firefox
Question 39 of 48
Question: Which is the BEST reason to include a bibliography that has hyperlinks at the end of a presentation?
People will be impressed that you know how to insert hyperlinks into a presentation.
The bibliography doesn't include any pictures and would be boring without hyperlinks.
People will know the presentation is over when they reach the bibliography page.
It is easy for people to click on the hyperlinks to access your sources.
SUBMIT
Related: Teacher Professional Development | Staff Development For Educators | Open Source Course Management System |

Appendix L - High School Locations

High School Location

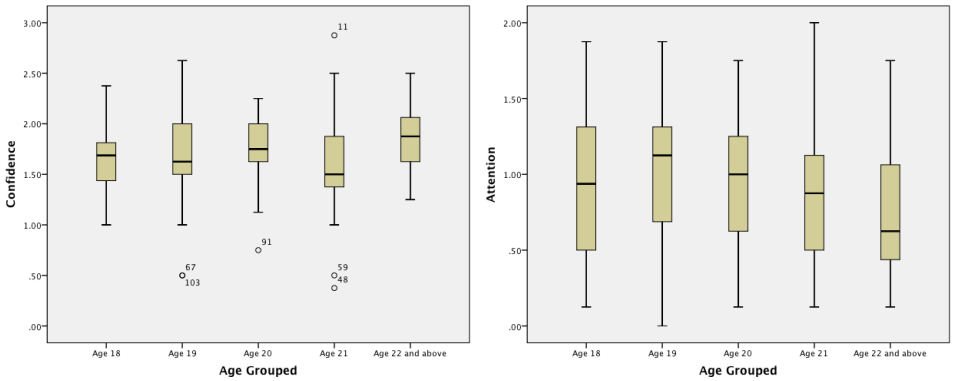
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hays, KS	17	12.5	13.2	13.2
	Strasburg, CO	1	.7	.8	14.0
	Smith Center, KS	2	1.5	1.6	15.5
	Salina, KS	4	2.9	3.1	18.6
	Maize, KS	1	.7	.8	19.4
	Ponoma, KS	1	.7	.8	20.2
	Weskan, KS	1	.7	.8	20.9
	Rexford, KS	1	.7	.8	21.7
	Syracuse, KS	1	.7	.8	22.5
	Kansas	1	.7	.8	23.3
	Missouri	1	.7	.8	24.0
	Scott City, KS	2	1.5	1.6	25.6
	Richmond, KS	1	.7	.8	26.4
	Manhattan, KS	2	1.5	1.6	27.9
	Eudora, KS	1	.7	.8	28.7
	Garden City, KS	2	1.5	1.6	30.2
	Cheney, KS	2	1.5	1.6	31.8
	Evergreen, CO	1	.7	.8	32.6
	Longmont, CO	1	.7	.8	33.3
	Downs, KS	2	1.5	1.6	34.9
	Topeka, KS	3	2.2	2.3	37.2
	Halstead, KS	1	.7	.8	38.0
	Edmonton, Canada	1	.7	.8	38.8
	Fort Collins, CO	1	.7	.8	39.5
	Mancato, KS	1	.7	.8	40.3
	Oklahoma City, OK	1	.7	.8	41.1
	St. Francis, KS	1	.7	.8	41.9
	Palco, KS	1	.7	.8	42.6

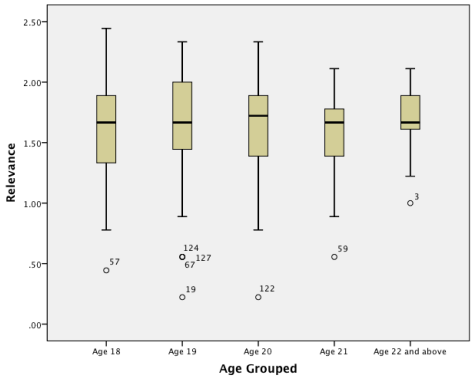
	Berthoud, CO	2	1.5	1.6	44.2
	Bennington, KS	1	.7	.8	45.0
	Bird City, KS	1	.7	.8	45.7
	Pinedale, WY	1	.7	.8	46.5
	Nebraska	1	.7	.8	47.3
	Aurora, CO	2	1.5	1.6	48.8
	Crete, NE	1	.7	.8	49.6
	Otis-Bison, KS	1	.7	.8	50.4
	Bucklin, KS	1	.7	.8	51.2
	Colorado Springs, CO	3	2.2	2.3	53.5
	Goddard, KS	2	1.5	1.6	55.0
	Norton, KS	1	.7	.8	55.8
	Pretty Prarie, KS	1	.7	.8	56.6
	Rock Hills, KS	1	.7	.8	57.4
	Sublette, KS	1	.7	.8	58.1
	Kansas City, MO	1	.7	.8	58.9
	Oklahoma	1	.7	.8	59.7
	Rose Hill, KS	1	.7	.8	60.5
	Hill City, KS	1	.7	.8	61.2
	Goodland, KS	2	1.5	1.6	62.8
	Great Bend, KS	3	2.2	2.3	65.1
	Plain, KS	1	.7	.8	65.9
	Russell, KS	1	.7	.8	66.7
	Golden, CO	1	.7	.8	67.4
	China	1	.7	.8	68.2
	Liberal, KS	1	.7	.8	69.0
	Herington, KS	1	.7	.8	69.8
	Overland Park, KS	1	.7	.8	70.5
	McPherson, KS	1	.7	.8	71.3
	Langdon, KS	1	.7	.8	72.1
	Calhan, CO	1	.7	.8	72.9
	Colorado	2	1.5	1.6	74.4
	Belleville, KS	1	.7	.8	75.2
	Alma, NE	1	.7	.8	76.0
	Franklin, NE	1	.7	.8	76.7

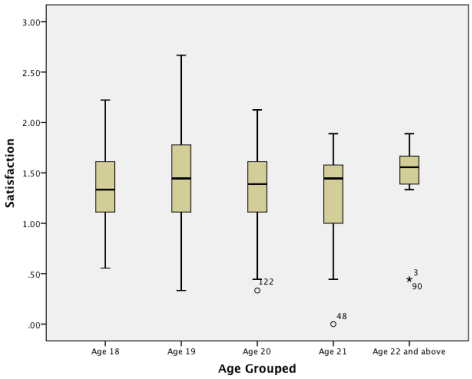
	Hugoton, KS	1	.7	.8	77.5
	Beloit, KS	3	2.2	2.3	79.8
	Stockton, KS	1	.7	.8	80.6
	Highlands Ranch, CO	1	.7	.8	81.4
	Wakeeney, KS	1	.7	.8	82.2
	Roeland Park, KS	1	.7	.8	82.9
	LaCrosse, KS	1	.7	.8	83.7
	Atchison, KS	1	.7	.8	84.5
	Lincoln, KS	1	.7	.8	85.3
	Ellis, KS	1	.7	.8	86.0
	Pawnee Heights, KS	1	.7	.8	86.8
	Andale, KS	2	1.5	1.6	88.4
	Platte County	1	.7	.8	89.1
	Wanneta, NE	1	.7	.8	89.9
	Fort Wayne, IN	1	.7	.8	90.7
	Oskaloosa, KS	1	.7	.8	91.5
	Elizabeth, CO	1	.7	.8	92.2
	Haven High	1	.7	.8	93.0
	Victoria, KS	1	.7	.8	93.8
	Valley Center, KS	1	.7	.8	94.6
	Kearney, NE	1	.7	.8	95.3
	Plainville, KS	1	.7	.8	96.1
	La Sunta	1	.7	.8	96.9
	Grant, NE	1	.7	.8	97.7
	St. John, KS	1	.7	.8	98.4
	Gypsum, KS	1	.7	.8	99.2
	Arizona	1	.7	.8	100.0
	Total	129	94.9	100.0	
Missing	0	7	5.1		
Total		136	100.0		

Appendix M - Boxplots of Variables

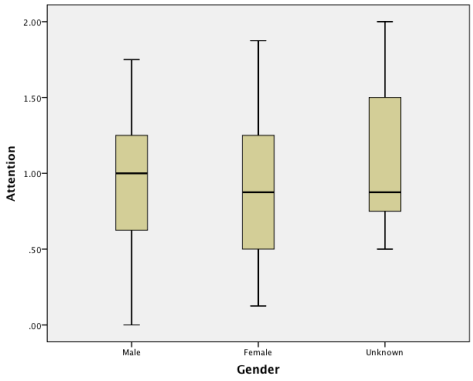
Age:

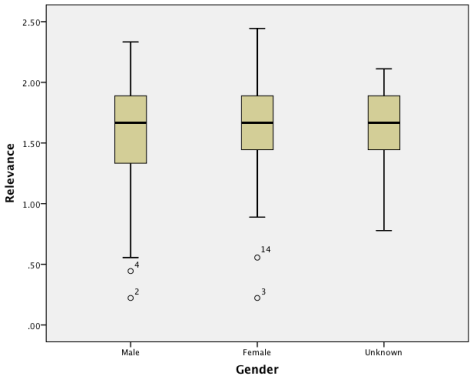


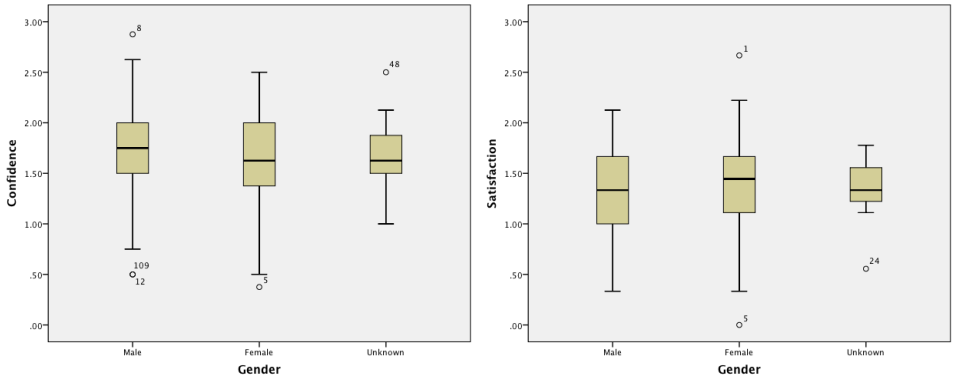




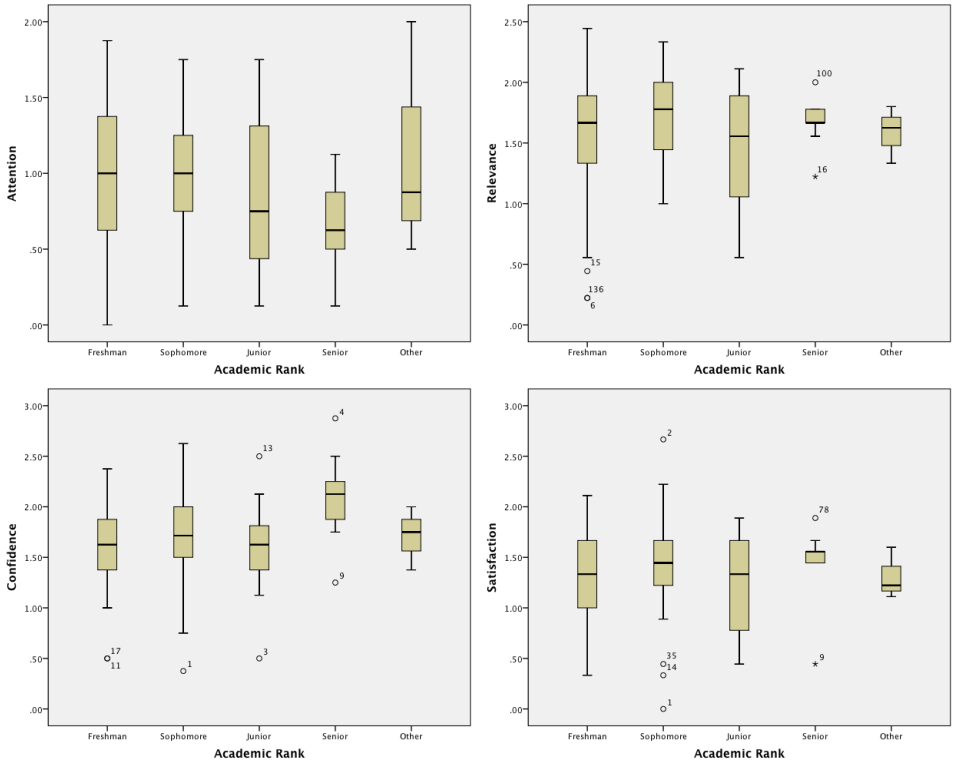
Gender:



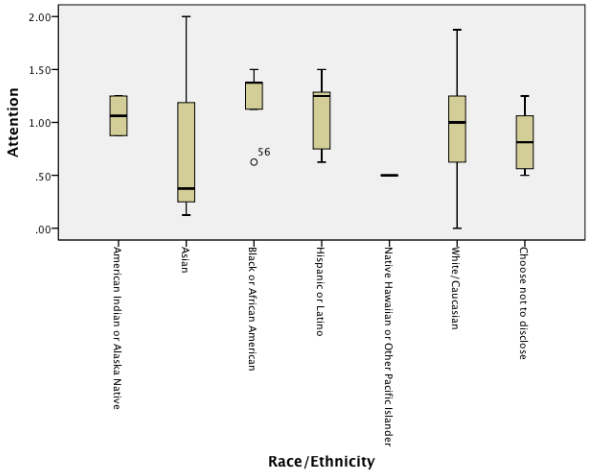


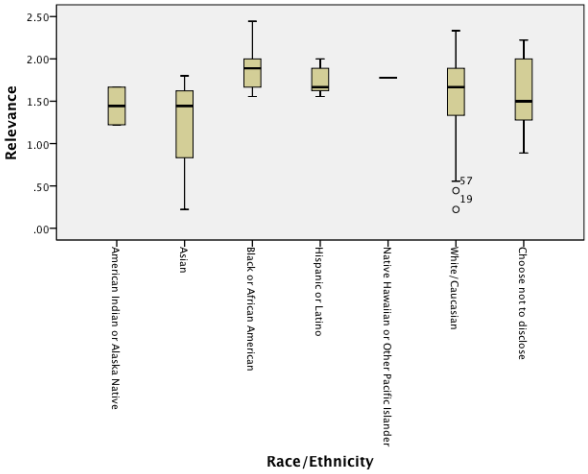


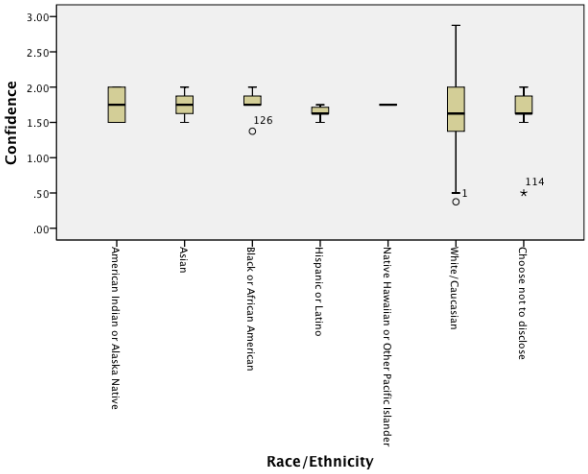
Academic Rank:

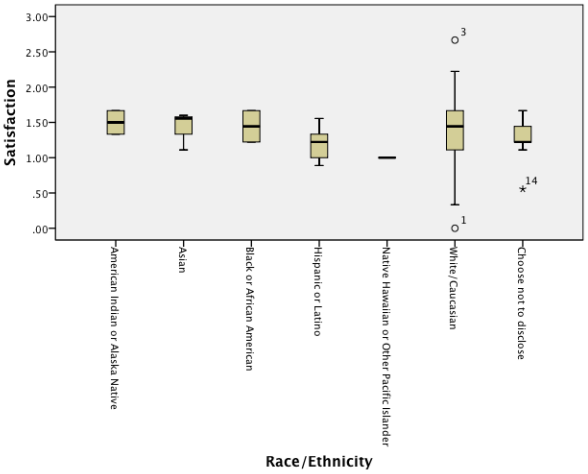


Race / Ethnicity

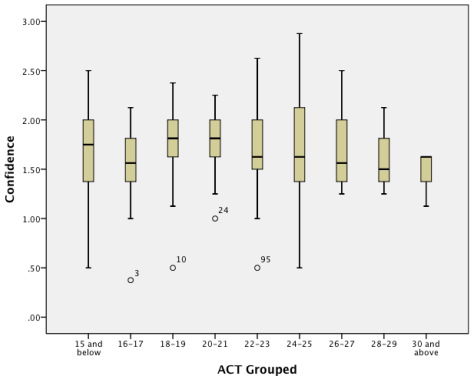


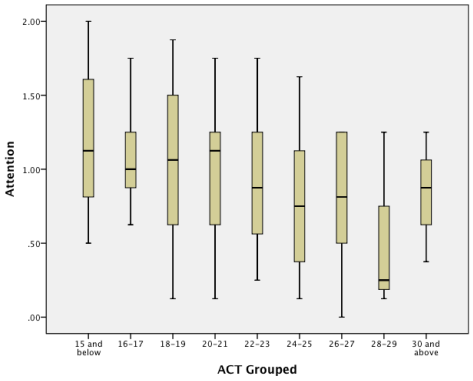


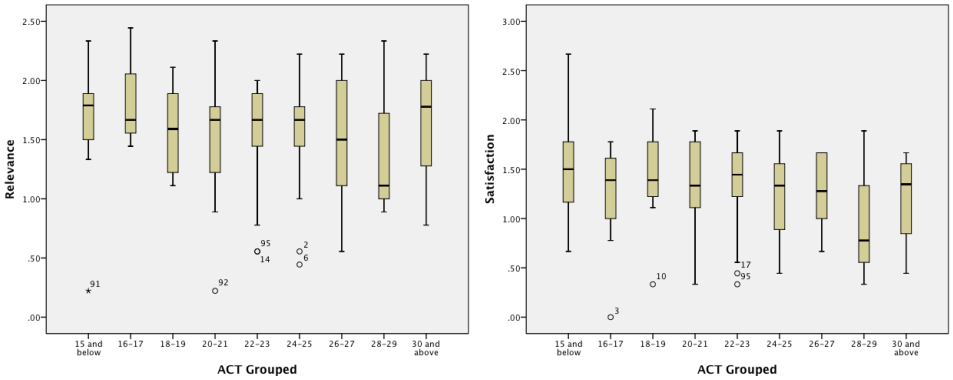




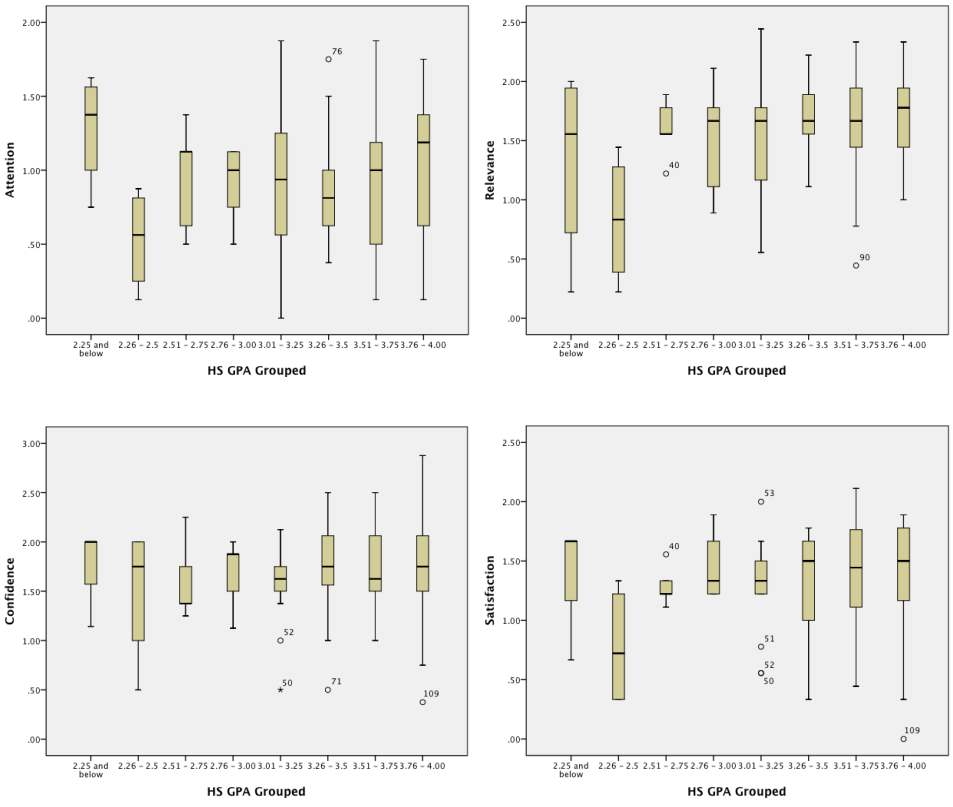
ACT:



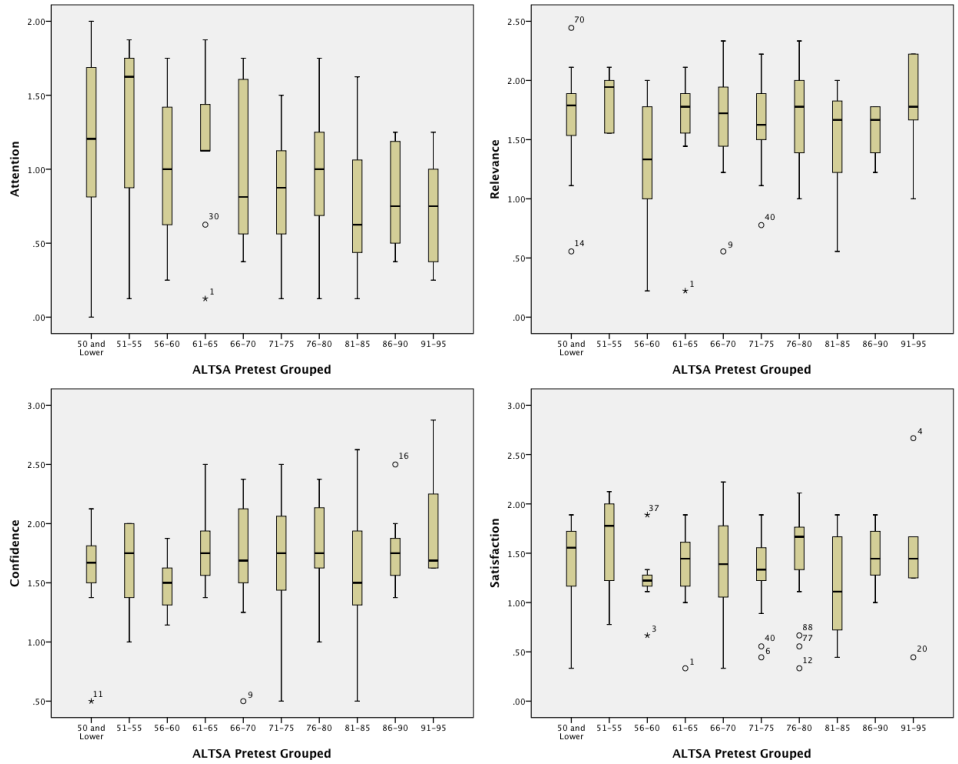




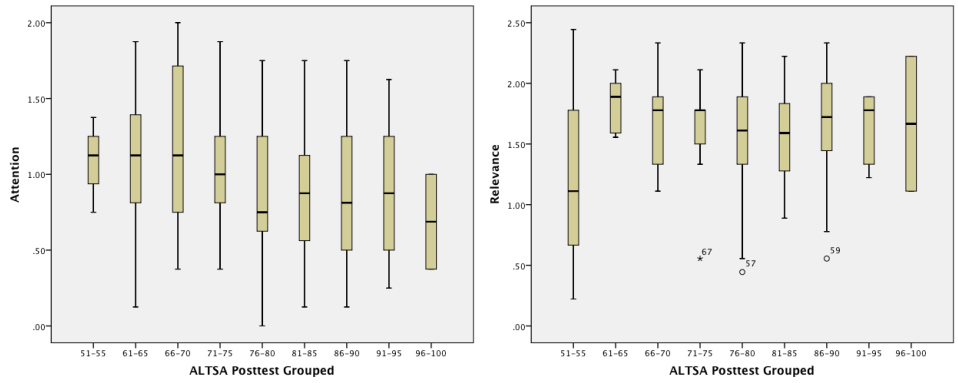
High School GPA:

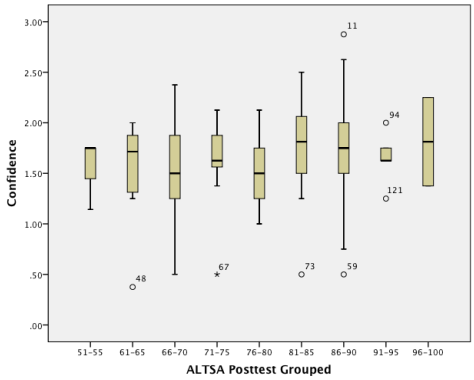


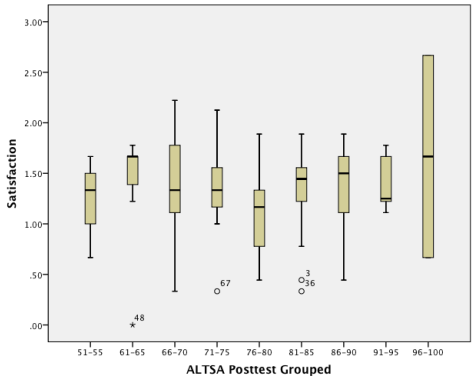
ALTSA Pretest:



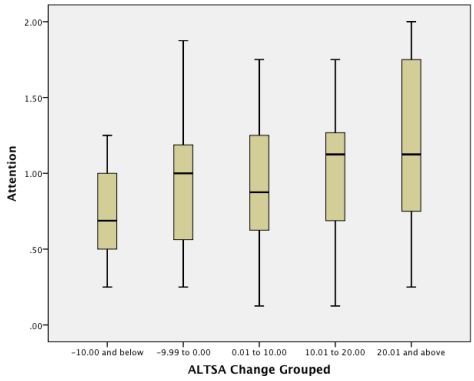
ALTSA Posttest:

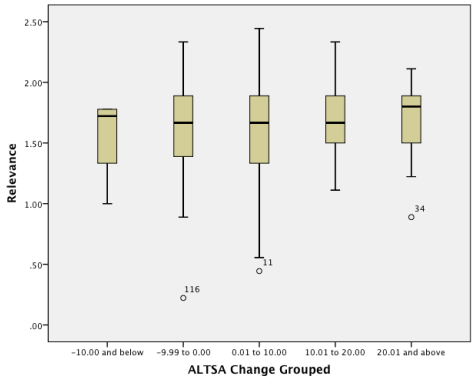


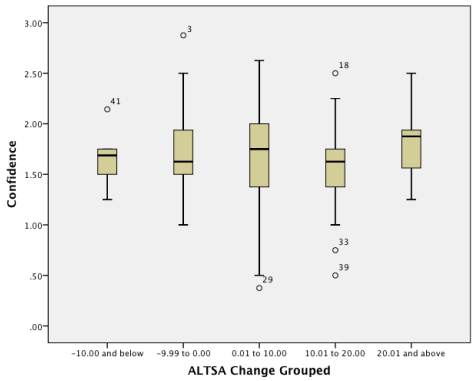


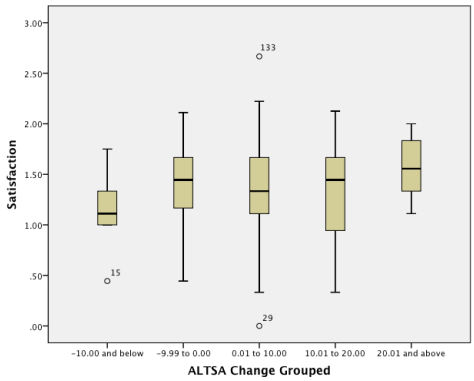


Change in Digital Literacy:



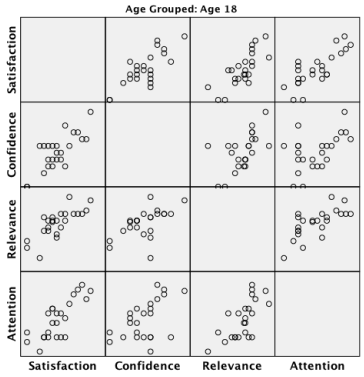


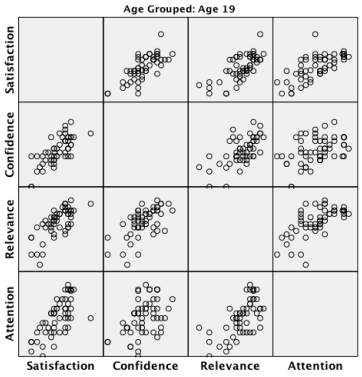


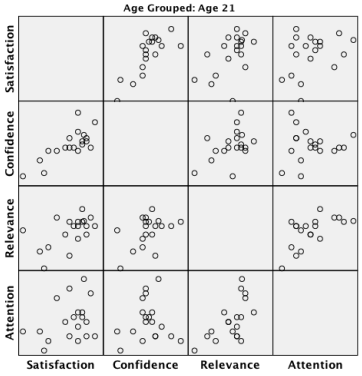


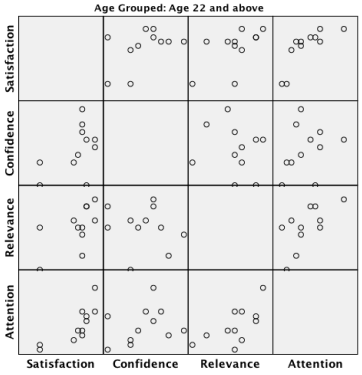
Appendix N - Scatterplots of Variables

Age:

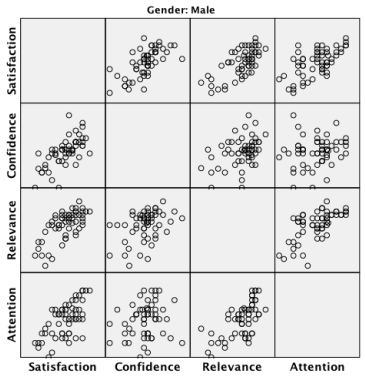


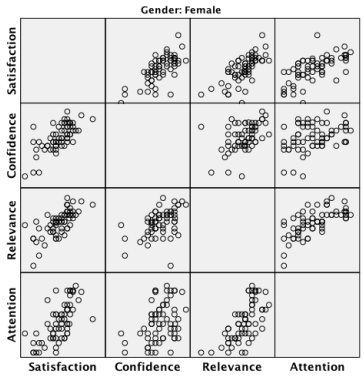


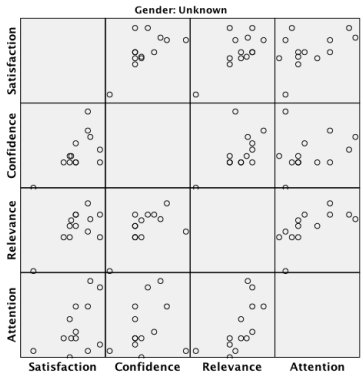




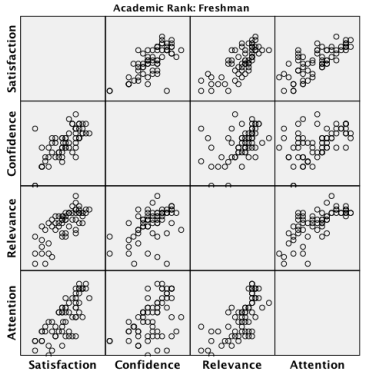
Gender:

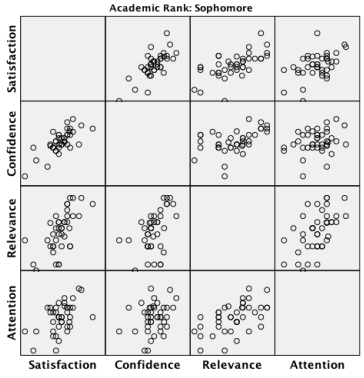


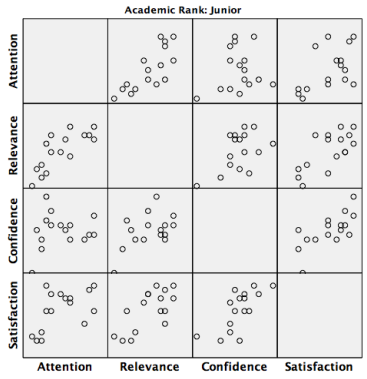


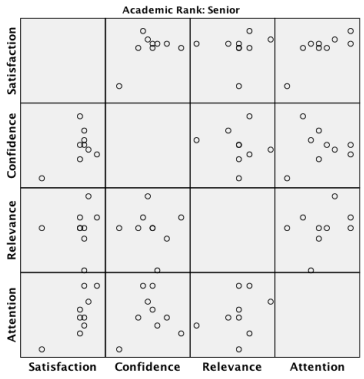


Academic Rank:

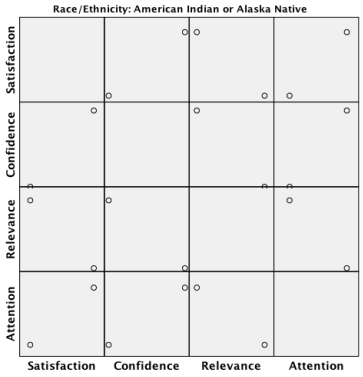


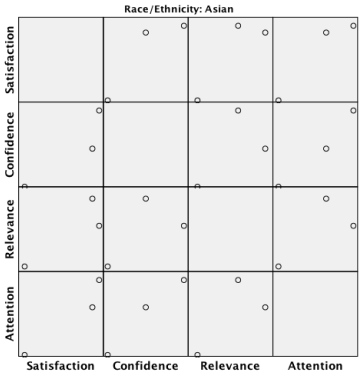


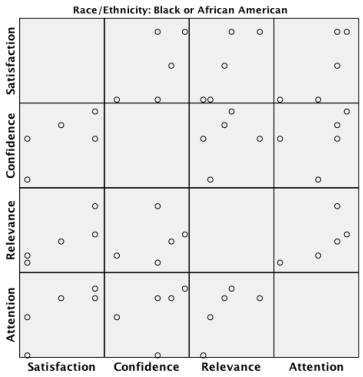


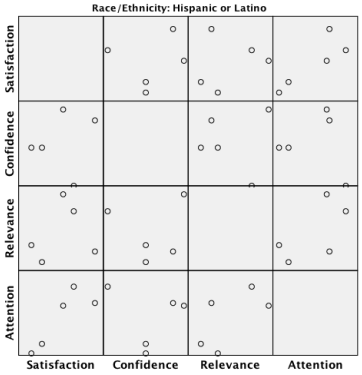


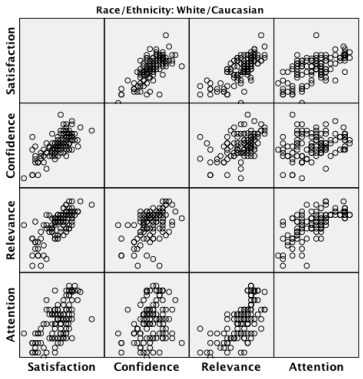
Race / Ethnicity:

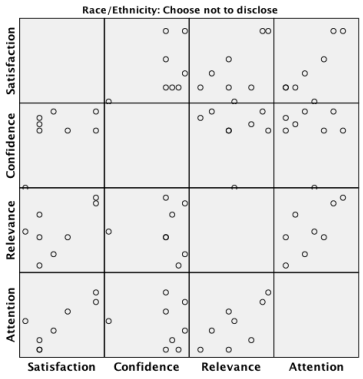




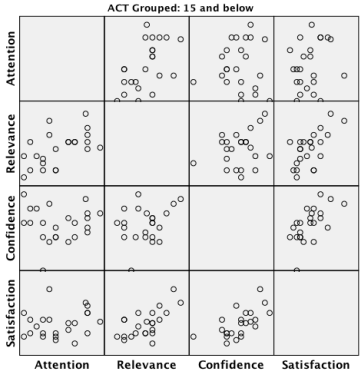


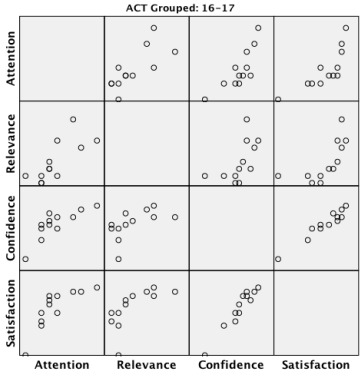


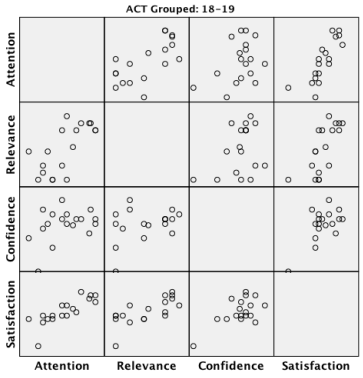

Race/Ethnicity: White/Caucasian
Satisfaction
Confidence
Relevance
Attention

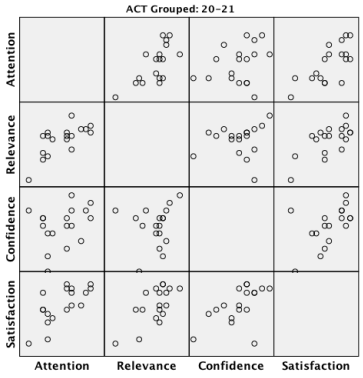

Race/Ethnicity: Choose not to disclose
Satisfaction
Confidence
Relevance
Attention

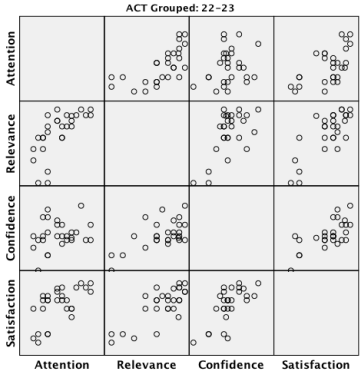
ACT:

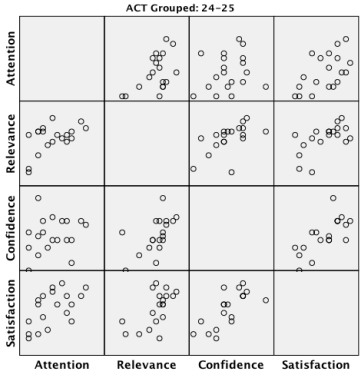

ACT Grouped: 15 and below
Attention
Relevance
Confidence
Satisfaction

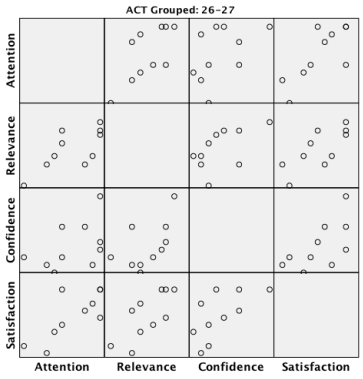

ACT Grouped: 16-17
Attention
Relevance
Confidence
Satisfaction

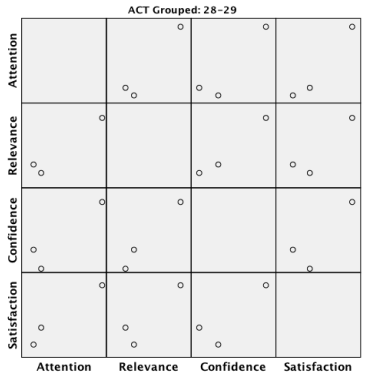

ACT Grouped: 18-19
Attention
Relevance
Confidence
Satisfaction

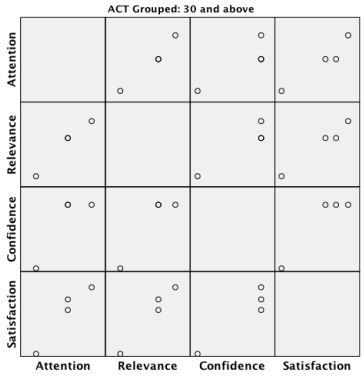

ACT Grouped: 20-21
Attention
Relevance
Confidence
Satisfaction


ACT Grouped: 22-23
Attention
Relevance
Confidence
Satisfaction

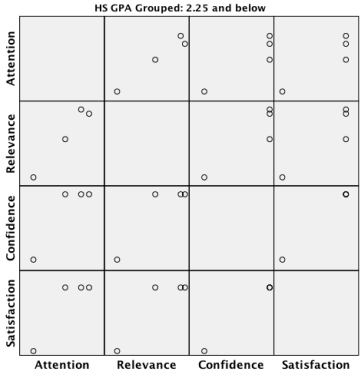

ACT Grouped: 24-25
Attention
Relevance
Confidence
Satisfaction

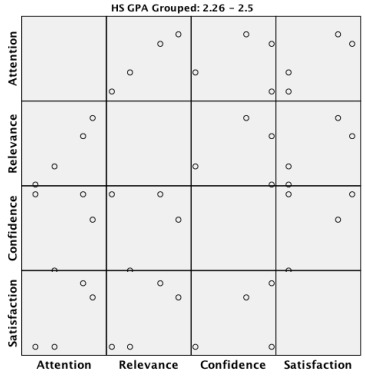


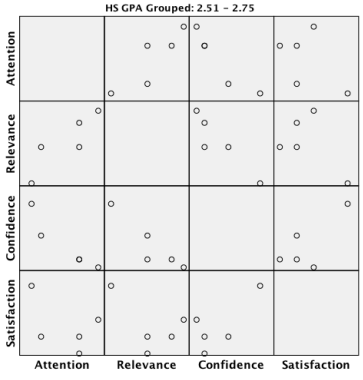


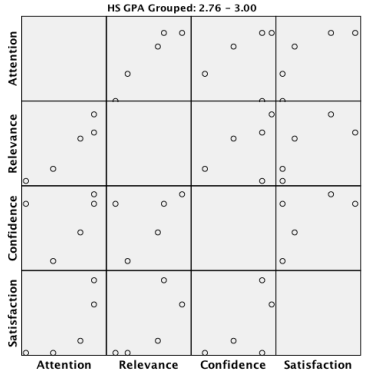


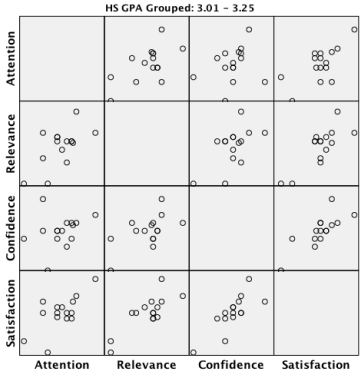
High School GPA:

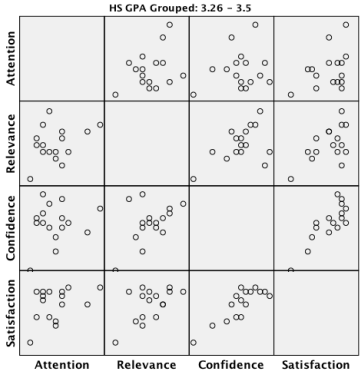


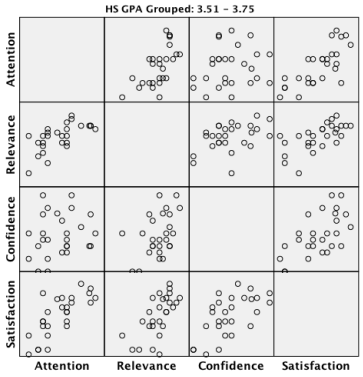


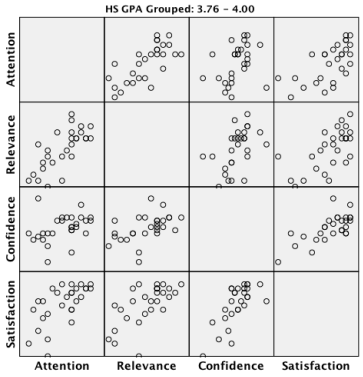




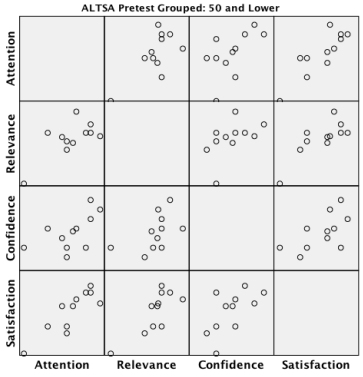


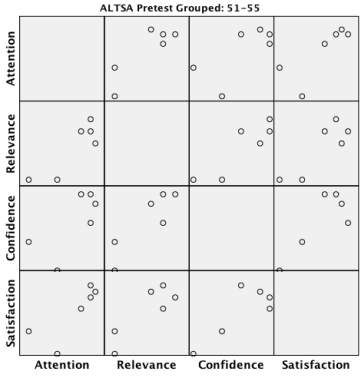


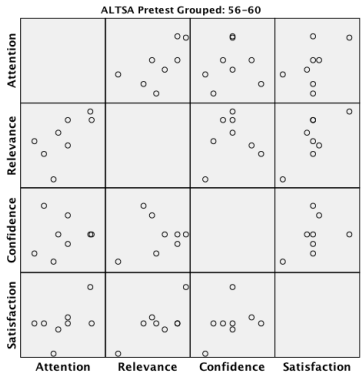


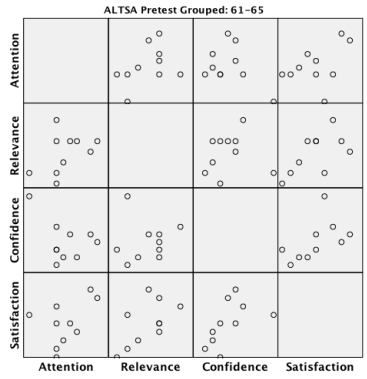


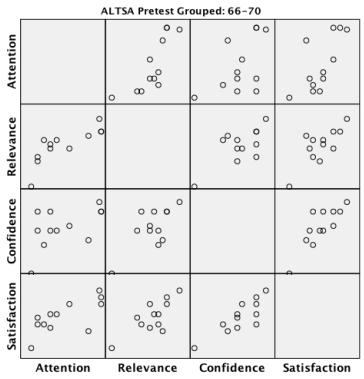
ALTSA Pretest:

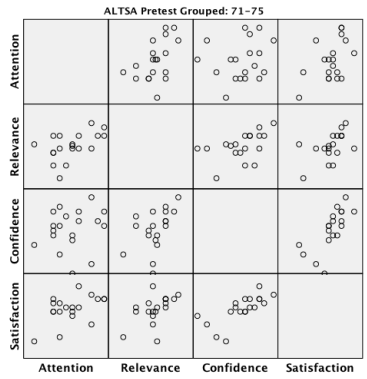


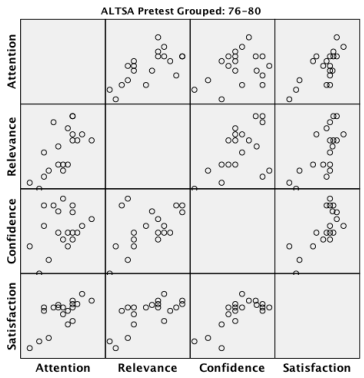


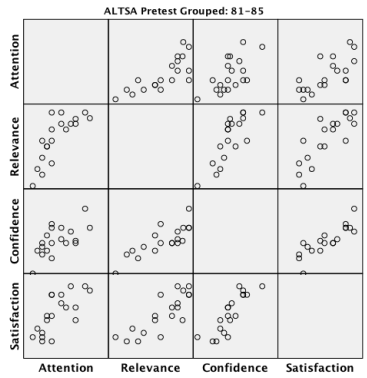

ALTSA Pretest Grouped: 56-60
Attention
Relevance
Confidence
Satisfaction

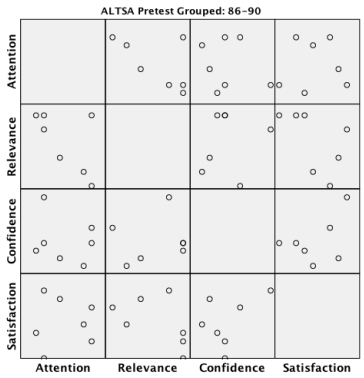

ALTSA Pretest Grouped: 61-65
Attention
Relevance
Confidence
Satisfaction

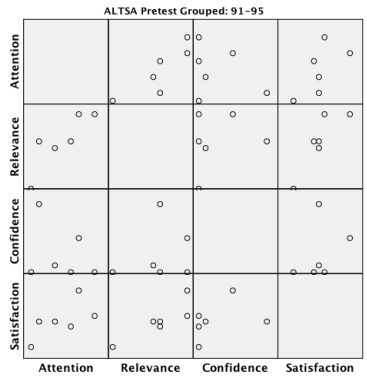

ALTSA Pretest Grouped: 66-70
Attention
Relevance
Confidence
Satisfaction


ALTSA Pretest Grouped: 71-75
Attention
Relevance
Confidence
Satisfaction

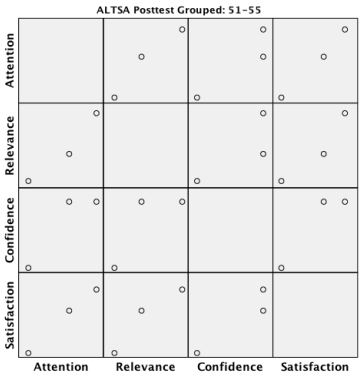

ALTSA Pretest Grouped: 76-80
Attention
Relevance
Confidence
Satisfaction

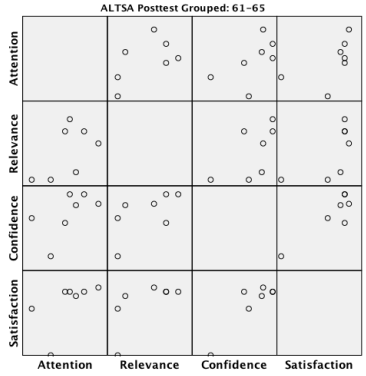

ALTSA Pretest Grouped: 81-85
Attention
Relevance
Confidence
Satisfaction

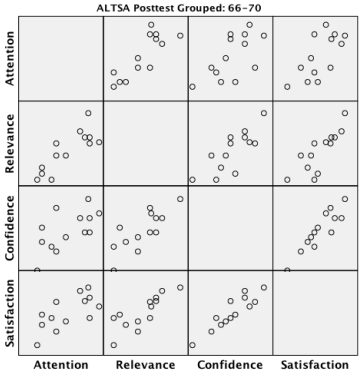

ALTSA Pretest Grouped: 86-90
Attention
Relevance
Confidence
Satisfaction

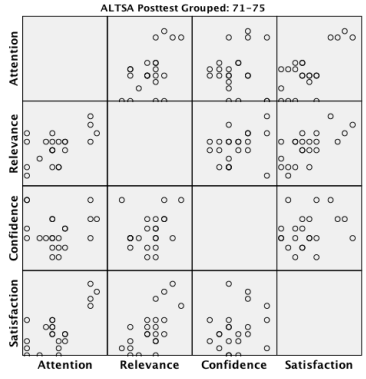

ALTSA Pretest Grouped: 91-95
Attention
Relevance
Confidence
Satisfaction

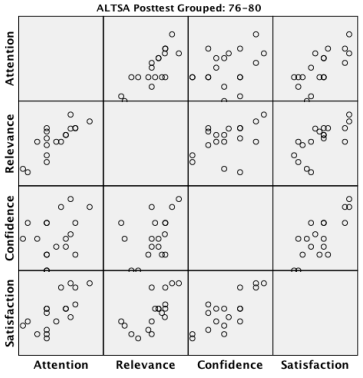
ALTSA Posttest:

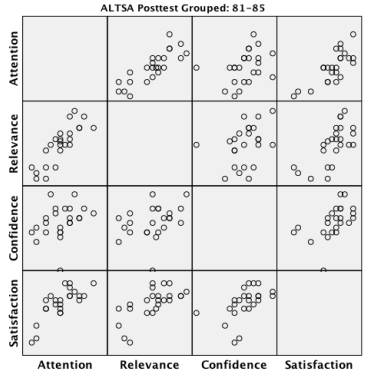


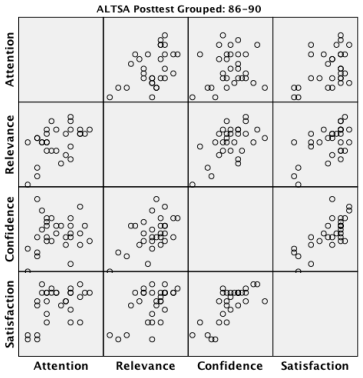


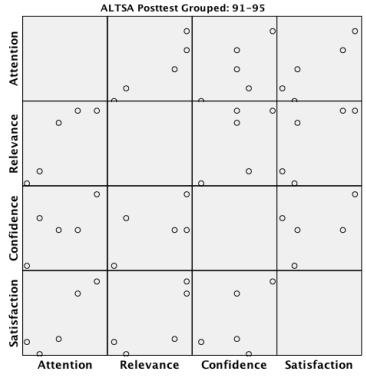


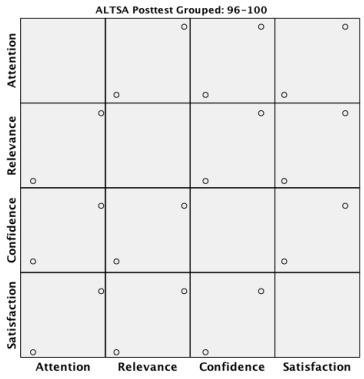












Change in Digital Literacy: