Perceptions of Technology-mediated Instruction at a Southeastern Community College

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Sheri

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Abstract

This qualitative dominant, mixed methods research study examined student and instructor perceptions of technology used to mediate learning in a community college environment. Methods of data collection for this study included a questionnaire with Likert scale and open response items, student and instructor interviews, and an analysis of a random sample of archival data from course syllabi. All instructor participants reported moderate (51.42%) or high (48.57%) comfort with technology use. Qualitative data revealed the primary uses of technology-mediated learning (TML) to deliver instructional content, to communicate, and required to complete course assignments. It was also used to describe the ways instructors acquire the skills needed for TML. The majority of instructors acquired technology skills through self-study (51.42%) or a combination of institutional support and self-study (37.14%). The study revealed student and instructor perceptions of the impact of TML on student engagement and achievement. Both students and instructors generally agreed that technology has a positive impact on engagement and achievement. Interview responses revealed mixed perceptions of TML's impact on student engagement and achievement. The quantitative analysis revealed that there were no statistically significant differences in the frequency or perceptions of usefulness between instructional divisions or the perceptions of the impact of course delivery models on student engagement or student achievement.

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Chapter 1: Introduction

Background

Technology use and community colleges are both growing in importance and capacity. In 2016, President Obama challenged community colleges to increase the number of students receiving degrees, certificates or credentials from community colleges by 5 million students by the year 2020 in an effort to support the growing economy and deliver qualified employees to American jobs, according to the American Association of Community Colleges (AACC), (AACC, 2016a). The AACC responded to this challenge with the 21st Century Initiative. Many states have also responded to the challenge by providing funding and student tuition assistance programs. Smith (2015) attributed the Tennessee Promise Program as being a reason for a significant increase in student enrollment in Tennessee community colleges. The program was designed to increase the percentage of Tennesseans with college degrees to 55%. Student enrollment in Tennessee community colleges increased 24.7% in 2015, and is expected to continue to grow. According to Kenning (2017), Tennessee is also thinking ahead with expanding community college access, making it the first state to provide tuition-free community college opportunities to first-time degree seeking adults.

This rapid growth in enrollment has been supported by the increasing implementation of programs that extend postsecondary and career training opportunities to students. Semuels (2015), noted the need for community colleges to consider student needs as they adjust to the increase in student enrollment. Schools must take into account the role of the use of technology in meeting student needs and increasing student achievement. While research suggests that technology alone does not address the issues that students face (Doss, 2014; Green & Hannon, 2007; Henrickson, 2007; Moseley, 2010), knowledge of its impact is key to implementation efforts. As the presence and use of technology in college classrooms continue to grow, there is a need for research to describe current trends, uses, and implications of those uses on student engagement and student achievement. While prior studies like Moseley (2010) and Doss (2014) found that there were differences in this generation's perceptions of the use of technology versus instructors' perceptions, knowing the perceptions of both are helpful in ensuring that technology use is more carefully considered. Green and Hannon (2007) recognized the generational differences that have emerged with the arrival of the digital age. Nazar (2013) suggested that there is a greater need for interactions with technology in this digital age. In a world where technology permeates the lives of many—young and old, student and professional—many organizations find interest in its use. Educational institutions are no exception.

As community colleges in Tennessee prepare to meet the instructional needs and learning styles of the growing number of enrolled students, it is important to understand the implications of the use of technology in instruction on student engagement and achievement. Understanding these implications helps to target technology's effectiveness. Institutions of higher learning must be careful with their spending budgets, particularly in light of ever-evolving technological advancements.

Understanding the role that technology plays in the classrooms can be complicated as the technologies and its uses are ever evolving. Technology-mediated learning (TML) is the utilization of technologies that help engage students in the task and help them to communicate their learning. Using TML as a tool to impact student outcomes of engagement and achievement deserves a deeper understanding as institutions think about increased enrollment and interactions with students.

Prior studies confirm the link between increased engagement and student achievement. Research by Finn and Rock (1997), Astin (1999), and McClenney, Marti, and Adkins (2006) have supported that there is a strong positive relationship between student engagement and student achievement. McClenney et al. (2006) found that higher levels of student persistence and academic performance were related to higher levels of student engagement, "with college faculty and staff, with other students, and with the subject matter they study" (p. 1). Learning institutions, therefore, seek to provide student experiences and opportunities that will increase student engagement and ultimately improve student achievement.

Research Problem

A recent study from Gallup and Inside Higher Ed (Jaschik & Lederman, 2016) revealed that the increased presence of technology has moderately influenced current faculty members and technology administrators. As usage of educational technology becomes more accepted in the educational community, stakeholders need resources that evaluate the evolving pedagogies of educational technology to inform practices that impact student outcomes.

While student success and student outcomes are the chief concerns for institutions of learning, the use and delivery of educational technology also has to be considered in respect to institutional budgets and best teaching practices. Moving forward with the use of technology in an institution without proper feedback from instructors and students can be problematic. It is the goal of the client and this study to understand the potential impact TML may have in practice.

Purpose of the Study

In light of the growing importance of technology in education, administrators at a Southeastern community college desired comprehensive data on student and instructor use of technology, as well as a deeper understanding of how it is perceived to impact student engagement and achievement. This study attempted to gain insight into six areas: (a) frequency of technology use; (b) the ways in which different technologies are being used across the institution's five instructional divisions; (c) the instructor's perceptions of technology usefulness; (d) the ways in which the instructors are receiving training or professional development for technology use; (e) the student and instructor perceptions of how technology use impacts student engagement and achievement; and (f) the student perceptions of various course delivery platforms and instructional models. The instructional models represented in this research include traditional lecture-based courses, hybrid courses (a model of instruction that combines online and traditional course structures which allow for interaction with course content, resources, and community boards), and flipped classroom models (students receive the lecture or instruction outside of the classroom setting and return to the classroom setting to apply the new knowledge and skills).

The study described ways in which technology is being used to mediate learning, the frequency of use of technology, and the perceptions based on comfort and perceived usefulness of technology. The study also analyzed and described the instructor and student perceptions of technology, as well as the perceptions of TML's impact on student engagement and achievement. The researchers considered the following variables as key factors in the research: (a) instructional divisions; (b) types of technology use; (c) instructor comfort with technology-mediated engagement; (d) instructor acquisition of TML skills; and (e) student perceptions of TML and instructional models.

Conceptual Framework

The conceptual framework for community college perceptions on technology was guided by the previous research of Moseley (2010). This research addressed the perceptions of the usefulness of technology in instruction and the ways in which these technology uses are perceived to translate into student engagement and student achievement. For a framework on mediation of technology, this research was also guided by Bandura's theory of self-efficacy and Vygotsky's theories of cultural-historical usage of tools, and the zone of proximal development.

Moseley (2010) examined two aspects of technology use in the classroom: the perceptions of usefulness and the frequency of use. He evaluated both instructors' and students' perception of usefulness and their frequency of use in an effort to gain a better understanding of the current use and proficiency of technology. In his study, research regarding the perceptions of technology use in the mediation of instruction was conducted in a community college setting. According to Moseley, this generation of students is more prone to using technology as a tool to assist their learning, even in the absence of TML in the classroom (p. 33). The work Moseley conducted served as the conceptual framework with respect to analyzing the uses and perceptions of TML in a community college setting. Using student perceptions as another measure of the effectiveness of technology use is critical to this current study. Student perceptions are important because of the increasing levels of efficacy in technology skills that the majority of students may already possess.

Self-efficacy theory. Bandura's (1977; 1997) theory of self-efficacy provided a framework to understand the ways in which perceptions impact behavior and the predicted effects of the instructors' and students' perceptions of technology on their overall use of technology-mediated instruction. Bandura (1977) defined outcome expectancy as "a person's estimate that a given behavior will lead to certain outcomes" (p. 193). He defined efficacy expectation as "the conviction that one can successfully execute the behavior required to produce outcomes" (p. 193). The efficacy expectation influences whether an individual will engage in a specific behavior. The overall level of use of technology in instructional practices will be affected by the instructors' perceptions and level of self-efficacy.

Urdan and Pajares (2006) explained the impact that self-efficacy has on a person's overall development and adaptive functioning. A person's beliefs and levels of self-efficacy impact their cognitive functioning, motivation, perceptions, and decision-making processes (p. 4). They described the three main ways in which self-efficacy can impact students and their learning: students' beliefs about how they learn, teachers' beliefs about their role in facilitating learning, and the collective faculty's belief in the school's ability to "accomplish academic progress" (p. 10). They identified the need for students to believe they can control and advocate for their own learning in order to move toward self-regulated learning, and employ strategies and tools to support that learning.

In the 21st century, global educational institutions are challenged to evolve from low-level skills training, to educating students with the skills needed for greater cognitive functioning and competencies. According to Care, Kim, Anderson, and Gustafsson-Wright (2017), this is an arduous and urgent task (pp. 64-65). It is critical for students to possess more complex cognitive, social, and executive skills as society continues to advance. These skills enhance a student's ability and motivation to persevere through difficult and challenging situations. Instructor beliefs are equally important to instructional effectiveness. Urdan and Pajares stated, "Teachers' beliefs in their instructional efficacy partly determine how they structure academic activities in their classrooms" (p. 11).

Self-efficacy theory helps to explain the role that student and instructor perceptions of technology use play in their ability and motivation to engage with the technology. The growth of internet and informational technologies provide students and instructors access to vast amounts of information that can be used to facilitate learning. Both student and instructor self-efficacy and perceptions of technology may determine how often and how well it is used.

Vygotsky's Theories. Vygotsky's cultural-historical theory recognized the use of cultural tools including language, counting systems, and writing as a means of imparting knowledge and participating in learning (as cited in Van der Veer, 1991). The cultural-historical theory identified the specific cultural elements of communication, language, and speech and their role in human interaction through the transmission and mediation of thought. Vygotsky's theory also served as a theoretical framework, in addition to Bandura's theory of self-efficacy. This current study considers technology use as a cultural tool used as a mediating element. According to Vygotsky's (1930) concept of the zone of proximal development, cultural tools are used to advance the learner, asserting, "the developmental process lags behind the learning process" (ch. 6, p. 14). This provides rationale for instructors to develop thoughtful processes to engage and challenge students just beyond their comfort level.

Van der Veer (1991) also noted the amount of knowledge students are able to receive could be limited by the lack of fluency with one of the cultural tools. Educational pedagogy has traditionally had its own set of accepted cultural tools for the delivery of knowledge and information. These cultural tools serve different roles and are utilized in various ways. The use of technology as a cultural tool in the classroom is also considered in the various methods of content delivery or instructional models of education. The perceptions of hybrid, flipped classroom, and traditional models of instruction were also analyzed in the context of this study. Students entering college are generally part of a culture that embraces the use of computers and technology, and consequently may not be as engaged by traditional teaching methods. Understanding how instructional divisions and instructional models utilize TML, based on user perceptions, was one of the goals of this study.

Technology is a tool widely used in the classroom to guide learning. According to Vygotsky (1930), the ability to use cultural and language tools in classroom settings to enhance learning is part of psychological development in the learning process. The ability for students to engage in tasks which are slightly higher than their comfort levels, and to use existing knowledge of specific tools in ways that are natural to them all connect with Vygotsky's theory of *zone of proximal development*. This theory posits that communication and connecting with resources are essential to learning new skills. Technology has become a cultural tool that helps instructors and students address and mediate learning tasks, and influence student outcomes. The technology-mediated outcomes specifically addressed in this study are student engagement and student achievement.

Research Questions

The purpose of the questions below is to help the research team provide feedback to a community college regarding their approach to technology implementation. The first three were analyzed qualitatively, and the final four were analyzed quantitatively.

1. What is the perception of instructors regarding how they utilize technology in the classroom, and how they acquire skills used in technology-mediated learning (TML)?
2. What is the perception of students regarding their experience with technology in the classroom?
3. What is the perception of instructors regarding the impact of TML on student engagement in their classes?

4. Are there differences between instructional divisions in respect to how instructors perceive the usefulness of TML instruction?
5. Are there differences between instructional divisions in respect to the frequency of instructors' use of TML instruction?
6. Is there a difference in the perceptions of the use of TML on engagement between students' preferred instructional model (hybrid, flipped, and traditional)?
7. Is there a difference in the perceptions of the use of TML on achievement between students' preferred instructional model (hybrid, flipped, and traditional)?

Delimitations

The study was a mixed methods case study of a community college in Southeastern United States, analyzing perceptions of technology on the school's main campus. The population for this study included instructors and students from the school's five instructional divisions: Health Sciences, Business and Technology, Humanities, Math and Science, and Social Science and Education. The questionnaires used in this study were created by the research team, modified from the work of Moseley (2010) to fulfill the goals of this study. The interview questions were kept the same, for the purpose of guiding the discussion of perceptions of technology-mediated-instruction. Also, interviewees were limited to a self-selected number of participants; not all students and faculty were involved. The study captured a description and perceptions within a limited time frame, specifically, in the 2016-2017 academic year.

Significance of the Study

The goal of the client was to understand the faculty's use of technology and learn how technology use impacts student outcomes. This research provides the client with a description of the ways in which technology is being used in instruction at the institution and the ways in which instructors are acquiring those technology skills. The research provides descriptions of: student and instructor perceptions of the frequency of technology use and usefulness, the uses of technology based on the instructional divisions, and the impact of instructional models on student engagement and achievement.

This study potentially benefits community colleges as they make decisions about the use of technology, institutions of higher education that seek to connect pedagogy with real world technology usage, institutions in k-12 education who seek to prepare students with increased technological and 21st century skills awareness, teacher education programs, and professional development. By gaining a better understanding of technology use in the classroom, institutions can more sensitively target professional development initiatives with respect to increased student outcomes.

The research stands to yield a comprehensive assessment of a community college's faculty skills, perceptions, and use of technology to support the school's initiatives in technology-mediated instruction. It builds on the knowledge from previous studies. Hargreaves and Shirley (2012) described opposing beliefs and perceptions about the use of technology in instruction. Some believe in the ability of technology to engage students at a deeper level, yet others adamantly oppose its use and, "...fear loss of classroom control and professional authority" (p. 79). Hargreaves and Shirley (2012) reported that there is not enough evidence to connect the increase in learning outcomes to the use of technology in the classroom. The opposing beliefs and limited research support the need for additional studies to add to this body of knowledge that will guide institutional spending and instructional planning.

Metlitzky (1999) recognized the need for institutions to better understand the cost/benefits ratios to maintain fiscal accountability. Additional research is needed to help eliminate ineffective purchases and prevent the waste of time and resources on ineffective technology use. This research seeks to inform the client and others of potential strategies that may maximize benefits as well as avoid unnecessary and costly investments.

Definitions

Definitions are provided to better understand how each term is understood in the context of this study. The terms are listed in alphabetical order:

- **Academic Challenge**- the rigor that an academic course is perceived to possess.
- **Active Learning-** students are engaged in the learning process, not just listening to a lecture (Matthews, 2009).
- **Affective Engagement-** "students' social, emotional, and psychological attachments to school" (Lawson & Lawson, 2013, p. 435).
- **Barrier-** some factor that is making it more difficult for teachers to use technology within their curriculum, i.e., lack of time, lack of training (Rogers, 2007, p. 16).
- **Collaborative Learning-** groups of students working together to complete a common academic goal (Matthews, 2009).
- **Community College**- an institution of higher learning that affords associate degrees and certificates in various fields of study.
- **Compatibility-** "The degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 1962, p. 223).
- **Complexity-** "The degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 1962, p. 231).
- **Course Completion**- students receiving a passing grade at the end of the course.

- **Cultural Tool**- a tool used to enhance the process of learning and development, influenced by the social-cultural contexts of students. Technology is defined in this study as a cultural tool.
- **Diffusion-** "is the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 1962, p. 6).
- **Digital Native-** term referenced in Marc Prensky's (2001a, 2001b) works, meaning one who was born into the culture of technology and is digitally literate; usually reflecting today's student.
- **Digital Immigrant-** term referenced in Prensky's (2001a, 2001b) works, meaning one who was born prior to the culture of technology and may not be digitally literate; usually reflecting today's instructor.
- **Early Adopter-** term referenced by sociologist Everett Rogers (1962), in the field of agriculture, to signify those who accept the use of new ideas and practices.
- **Flipped Classroom**- a TML model that structures a teaching model with pre-recorded instruction for students during out of class instruction allowing for instructors and students to practice material while in class.
- **Hybrid Classroom**- a model of instruction that combines online and traditional course structures, which allow for interaction with course content, resources, and community boards.
- **Instructional Division**- the major academic departments that house specific programs of study.
- **Managed Learning Environments**- a platform for managing course content delivery and interactions.

- **Multimedia-** "a computer-controlled system that creates, stores, retrieves, and transmits text, audio, and visual information" (Metlitzky, 1999).
- **Observability-** "The degree to which the results of an innovation are visible to others" (Rogers, 1962, p. 232).
- **Online Social Networking**- online websites and applications used for social interaction.
- **Perceived Attributes-** "Those features that have been found to be important when an individual is making the decision whether or not to adopt a new innovation… the five most important ones are relative advantage, observability, complexity, trialability, and compatibility" (Rogers, 2007, p. 17).
- **Program Completion**- students graduating from their respective programs receiving a certificate or degree.
- **Rate of Adoption-** "the relative speed with which an innovation is adopted by members of a social system. It is generally measured as the number of individuals who adopt a new idea in a specified period" (Rogers, 1962, p. 232).
- **Relative Advantage**- "The degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 1962, p. 213).
- **Student Achievement**- student outcomes of a course via course grades.
- **Student Engagement**- perceptions of a student's behavioral engagement (class participation and on task behaviors), cognitive engagement (problem solving and decision making), and emotional engagement (anxiety, interest, and excitement) (Fredricks, Blumenfeld, & Paris, 2004).
- **Student-Faculty Interaction-** student and faculty communication inside and outside of the learning environment**.**

- **Support for Student Learners-** these supports include, but are not limited to tutoring, counseling, academic advising, financial aid, health services, etc.
- **Technology-Mediated Learning/Instruction (TML)-** a term in which technology is used to facilitate and support the delivery of course content and/or engage students in learning.
- **Trialability**- “The degree to which an innovation may be experimented with on a limited basis” (Rogers, 1962, p. 231).

Summary

In this case study, the researchers approached the client’s problem of practice with a mixed-methods research design. The researchers examined the response and predictor variables of student outcomes and technology, respectively, in order to provide a local community college in the Southeastern United States with a comprehensive assessment of their instructors’ use of technology. The institution seeks to develop a deeper understanding of the interplay of various factors that may influence student engagement through technology-mediated instruction (TML) and learning environments. This study evaluated the use of technology and its effect on student engagement, and compared findings with previous studies and literature. The research described the frequency of technology use and the instructor and student perceptions of technology usefulness. It provided an analysis of the perceptions of student engagement and student achievement between instructional divisions and instructional models. This research was completed for the purpose of providing meaningful results and feedback to help the client make informed decisions about professional development and purchasing to align with the institution’s goals. This research adds to a growing body of knowledge on the topic of technology use as it relates to instruction, student engagement, and student achievement.

Chapter 2: Literature Review

Previous studies and existing literature served to guide this research on the topics of technology-mediated learning, student engagement, and student achievement. The literature review is organized to provide a description of institutions and populations similar to those in this research study. The topics described in this literature review include community colleges and their current growth in enrollment, evolution and descriptions of various uses of technology, student and instructor perceptions of use, the theoretical frameworks for current research, prior research on student engagement and achievement, as well as previous works that were used to develop this study.

Community College

There is a vast array of options spanning from four-year universities and colleges to two-year community colleges and certification programs. These programs generate numerous opportunities for students. While many students opt for traditional four-year universities, there are a number of students who gravitate toward two-year community colleges (Ma & Baum, 2016).

Zeidenberg (2008) found that although education is in high demand in the workforce, tuition rates are becoming more and more costly, especially among four-year colleges and universities. Students seeking an alternative to four-year universities find community college programs to be more convenient. According to Nakajima (2008) and Ma and Baum (2016), not only do community colleges offer shorter programs, they also offer cheaper tuition compared to most four-year colleges and universities. The American Association of Community Colleges website (AACC, 2016b) reported that the average annual tuition and fees for public in-district community colleges was $3,430 compared to $9,410 at a public in-state 4-year college, during the 2015-2016 school year. According to Nakajima (2008), “most community colleges have low tuition, flexible scheduling, convenient location, and programs and services that are intended to support at-risk students who have social and academic barriers to college education” (p. 2). As a result, many students who would not be able or eligible to attend four-year colleges and universities now have the opportunity to further their education. Community colleges “provide entry to the postsecondary education system for low-income students, first-generation students, minority students, and students who had poor academic performance in high school. These students have become the majority of the community college student population” (Nakajima 2008, p. 2). Community colleges have become a bridge to higher learning making it more accessible to disenfranchised communities. Zeidenberg (2008) asserted that, “there is a core mission shared by virtually all community colleges of enabling low-income students and those with relatively weak academic achievement to continue their education and acquire useful skills” (p. 53).

The American Association of Community Colleges fact sheet (2016b) described the demographic information for the 1,108 community colleges across the United States. In the fall of 2014, 60% of the 12.3 million students enrolled in community colleges were enrolled in courses for credit. Students enrolled for credit consisted of 2.8 million full-time students and 4.5 million part-time students. The average age of students enrolled for credit was 28 and the median was 24. The students who were 21 or younger made up 37% of the population, 49% were 22-39, and 14% were 40 or over. The ethnicity was reported to be 49% White, 22% Hispanic, 14% Black, 6% Asian/Pacific Islander, 1% Native American, 2 or more races 3%, other 4%, and non-resident alien 1%. Students reporting that they were the first generation of their family to attend college made up 36%, single parents made up 17%, and students with disabilities made up 12% of the community college students enrolled for credit. The employment status of students in 2011-2012 included full-time students who were also employed full-time (22%), full-time students who were employed part-time (40%), part-time students who were employed full-time (41%), and part-time students who were employed part-time (32%).

Rowh (2010) noted the demographics of community college students can be very different than the stereotypical straight out of high school graduate. He described the diversity of students choosing to attend community colleges. In addition to the traditional recent high school graduates, community college classrooms have students of all ages seeking training and education for a variety of reasons. The student populations include those training for new careers, students searching for opportunities to improve their employment situation, and students taking courses for “personal enrichment” (p. 5).

Rowh explained the admissions and application process for most community colleges. It is traditionally free and acceptance into the college is not competitive. Students are not generally required to submit Scholastic Aptitude Test (SAT) or American College Test (ACT) scores. Most community colleges do not require an interview or a written essay prior to admission. The admission process requires students to complete an application with general information and submit their high school transcripts. There are not generally strict admission requirements into most community colleges, however some special programs in the schools do have limited space. Some community colleges administer placement tests to help put students in courses where they can be the most successful.

According to Rowh (2010) the degrees, certifications, and course offerings vary between community colleges. Rowh described the range of coursework, programs, and degrees to include those that allow students to immediately enter the workforce, those that prepare students to transfer to four-year colleges, and those that provide training for personal development or continuing education (p. 24).

The AACC fact book (2016) reported that 26% of the 982 public community colleges have on-campus housing. This leaves the majority of students attending public community colleges commuting to and from school. Rowh (2010) pointed out that:

> A big part of the community college experience, unless you are a student who studies entirely through a distance-learning format, is spending time on campus, where you interact with faculty, staff, and fellow students. So striking a balance between limiting commuting time and giving yourself enough "face time" with other people who make up the college community is extremely important (p. 41).

Wood (2016) described the programs provided in community college settings that were customized to meet the workforce needs of specific communities. These community colleges offer non-degree training programs where students receive the training, certifications, and credentials needed to be successful in their respective fields of study. Wood noted that these programs "make employees more valuable and job seekers more competitive" (p. 48). Some of the non-degree training programs offered at these community colleges take less than one year to complete.

Rowh (2010) outlined the various credentials, roles, and titles held by instructors in a community college setting. These titles and academic rank include full professor, associate professor, assistant professor, instructor, and adjunct. Rowh noted that some community colleges do not emphasize or place importance on the academic rank of the instructors. Most instructors in community college settings have master's degrees and doctorates. Some instructors have a bachelor's degree with additional certifications and/or professional experience. An adjunct faculty member is a part-time instructor at the institution and may not be as available to students as full-time faculty, yet they tend to have up to date real-world experiences that help their students understand how to apply what they are learning.

Technology Use in Education

The ways in which technology can be used to enhance instructional practices and improve student engagement and achievement continue to increase as new hardware and software become available for use. The uses of technology integration into instructional practices can be classified into three main categories: (a) instructional uses, (b) collaboration and communication, and (c) engagement uses. Instructional technologies are programs used in the presentation and delivery of content. Technology tools can be used to collaborate and communicate between students and their instructors as well as engage students in learning tasks. Behavioral engagement, as described by Fredricks et al. (2004), includes student participation and involvement in activities. Instructor use of TML could include technology that fits into any of these categories to aide in the instruction and success of students enrolled in their course.

Access to technology. The OECD (2015) reported an increase in student access to computer technology in the United States between 2009 and 2012. The ratio of students to computers went from one computer for every two and half students to one computer for every one and three fourths students. It was reported that student access to the technology affected the willingness of instructors to use technology in instruction (p. 67).

Generational differences in use. Marc Prensky (2001a) introduced the term *digital natives* and *digital immigrants* to explain the types of technology users, differentiating from those who were born in the technological era (ca. 1980-present) and those who were born prior. His writings asserted that there is in fact a neurological difference between current instructors and students in how they utilize technology as a tool for learning and interacting with their environments. In an argument for technology as a mediator of self-efficacy, he stated the success of a program designed to help students with medical needs:

> Click Health, which makes games to help kids self-manage their health issues, did clinical trials funded by the National Institutes of Health. They found, in the case of diabetes, that kids playing their games (as compared to a control group playing a pinball game) showed measurable gains in self-efficacy, communication with parents and diabetes self-care (Prensky, 2001b, p. 6, para. 2).

According to Prensky, the technology era is changing the culture of the digital native, but also the culture of the classroom. It is the students' mental abilities which adapt to various phenomena, the concept of neuroplasticity, encouraging the use of technology as a learning tool, according to Prensky (2001b). This ability to fill the gap that exists between the natives and the immigrants relies on the use of technology as a learning tool.

There are criticisms, however, to the urgency that surrounds the perceived gap between the terms, as Helsper and Eynon (2009) pointed out. They assert that while this theory has become popular, there is little research and evidence on this gap (p. 3). The work that Dutton, Helsper and Gerber (2009) did with Britain's perceptions of internet use, using the Oxford Internet Survey (OxIS), also added to the criticism, pointing out that there are many inconsistencies holistically between the immigrants and the natives (Helsper & Eynon, 2009). Their methodology included age, experience (loosely defined as frequency) and breadth (defined as technology integration) as variables, concluding that while there appeared to be differences with the variables, independently, there was no significant correlation between the variables in linear regression analyses (pp. 12-14). Generational difference, alone, was inconsistent, in other words. Aspects of use, then, become more advantageous to examine. Thinking about how technology is used and how it is perceived as useful by instructors and students adds to the limited, and varied, research that currently exists.

Instructional tools. Moseley (2010) surveyed a faculty's use of technology. The faculty reported using 18 different types of technologies in the course delivery. The responses included (a) video technology (71%), (b) class websites (63%), (c) PowerPoint (60%), (d) in-class internet use (21%), (e) computer use in class (16%), (f) specialized software (16%), (g) document camera (14%), (h) online discussions (12%), (i) audio (12%), (j) online quizzes (9%), (k) email (9%), (l) library database (7%), (m) simulation software (7%), (n) Microsoft Office (5%), (o) digital images (2%), (p) calculator (2%), (q) blogs (2%), and (r) Facebook (2%) (p. 57). The instructors identified the use of video, in-class Internet use, class website, and PowerPoint as having the highest perceived usefulness.

Doss (2014) studied the perceived usefulness of technology as it applies to instruction in a community college setting. The instructors and students reported using Blackboard, collaborative editing software, E-textbooks, library databases, Microsoft Office, mobile devices, personal computers, personal response systems (clickers), smart boards, social networking, videos, websites, and software for the course (pp. 82-84). This study provided feedback for surveying the specific uses and perceptions of instructional technology.

Analyzing instructor and student perceptions of instructional technology in general education courses in a community college setting, Doss replicated Moseley's (2010) study. Doss's (2014) work extended Moseley's work by looking at the age of faculty members (p. 109). The results of Doss's primarily quantitative study were as follows: There was no statistically significant variance in frequency and usefulness of instructional technology in students by age group. There was no statistically significant variance in frequency and usefulness in instructors, based on age group. There was statistically significant variance in the perceptions of frequency of instructional technology between students and instructors, with a p-value of 0.003 (p. 86). There was statistically significant variance in the perceptions of usefulness of instructional technology between students and instructors, with a p-value of 0.000 (ibid). In comparing perceptions of frequency with perceptions of usefulness, Doss saw a statistically significant relationship with the student sample, but did not see a difference between the students' perceptions of frequency or usefulness based on gender. With the instructor sample, Doss did find a statistically significant difference between the usefulness perceptions based on gender, but not with the perceptions of frequency. The qualitative results of the study were mostly descriptive, giving readers an opportunity to see how the sample data described which kinds of technology would be preferred and suggestions for making instructional technology more useful.

Riedel (2014) reported on the trends and use of technology in education based on a survey conducted by Project Tomorrow that polled students, teachers, librarians, parents, district administrators, and community members. Riedel noted that the latest technology trends in education are using video for homework and mobile computing. He also mentioned that traditional computers used to connect to the Internet at home is on a decline. Mobile devices have become increasingly popular and provide students a wide range of access. The innovative technology of smartphones allows students to use them for almost the same tasks as a computer but with a hand-held device that can be carried with them at all times. As stated in Riedel (2014), "sixty percent of students are using mobile devices for anytime research, 43 percent for educational games and 40 percent for collaboration with their peers" (p. 2). These devices are allowing students to be more efficient in their daily activities and take initiative in the learning process. The research also noted that mobile devices were used for academic reminders and alerts by 33% of students surveyed, 24% reported taking photos of their assignments, and 18% used mobile devices for in-class polling (p. 2).

Another phenomenon among students is the use of social media. The use of social media has become more ingrained into the daily lives of students than ever before. Riedel (2014), stated that "when showing the data for text messaging, networking sites (Twitter, Facebook, Instagram, etc.) and chat rooms, it was clear that the student expectations for the use of these technologies far outpaced those of administrators, teachers, and parents" (p. 3). Students have adopted social media as a way of life. It has truly become a part of their day-to-day lives. "Today's students are looking at social media not as a separate thing that you do occasionally, but as a pervasive part of the way they are living their lives outside of school—one they want to connect with their lives inside the classroom" (Riedel, 2014, p. 3). Using social media in the classroom could serve as a way to engage students both socially and academically. According to Donley (2012), social networking allows more introverted students a platform to express themselves in a less direct manner, which may help them to connect more with other students and faculty without fear or intimidation. Social media would allow yet another platform for differentiated instruction. As social media continues to connect millions of people across the globe, it has also had an impact on education. Facebook has been lauded as one of the most used social media tools in higher education (Donley, 2012). Moreover, it provides students with endless opportunities for collaboration and communication.

The use of learning platforms plays a significant role in teaching, learning and coaching technology-mediated practices. Learning management platform Desire2Learn (D2L) and online training platform e-Learn Campus came together to provide technology integration and enhance their training and course management capabilities for clients worldwide (D2L, 2005). According to the article, D2L serves over 2 million clients worldwide.

Jaschik and Lederman (2016) reported on the use of learning management systems (LMS) as well as social media such as Twitter. Faculty reported always using LMS to share syllabus information with students (77%), record grades (60%), communicate with students (46%), provide e-textbook and related material (31%), track student attendance (28%), identify students who need extra help (20%), and integrate lecture capture (14%) (pp. 42-43). Less than 45% of faculty agreed or strongly agreed that “social media is a good way to communicate with the broader public” and 63% reported they were “concerned about attacks on scholars for their comments on social media” (p. 48).

Martirosyan, Kennon, Saxon, Edmonson and Skidmore (2017) reported the various technologies being used in instruction. They found that instructors integrated online learning tools and resources into instruction and assignments. Specific online tools and resources included video tools like YouTube, Blackboard, MyMathLab, interactive websites, ALEKS, and Faronics Insight (p. 14). Participants also reported the use of specific technology equipment including graphing calculators, document cameras and projectors, interactive whiteboards, clickers, eReaders, smart pens, regular calculators, and iPads (p. 15). This study also found that “15.6% of the respondents reported that they did not use technology” (p. 17).

Traditional classroom model of instruction. As with any model of instruction, the utilization of technology has to be appropriate for the environment and course objectives. In the model that least represents a nativity to technology, the traditional classroom setting provides insights to how technology-mediated instruction adds to the classroom experience. Technology integration specialist, Shaffner (2007), prepared a professional development guide that explained details of technology integration in the classroom. This guide addressed why technology integration was important, types of technology integration, as well as how to bolster student outcomes with strategies and resources of implementation. Game-based learning technologies, project-based learning initiatives, online and hybrid education models, mobile and handheld learning, interactive whiteboards, student response systems, web-based projects and research, student-created media platforms, collaborative and social media tools were different types of media referenced in the guide. Practical ways of implementation with respect to physical restrictions or access were addressed as well as models to properly integrate technology into the traditional classroom setting. Shaffner (2007) noted that the benefits from such integration included:

> Access to up-to-date, primary source material, provided methods of collecting/recording data and ways to collaborate with students, teachers, and experts around the world, as well as opportunities for expressing understanding via multimedia, learning that is relevant and assessment that is authentic, and training for publishing and presenting new knowledge (sec. 3, para. 5).

These benefits support technology as an important component in developing 21st century initiatives, which prepare students for current and future workforce expectations. Perceptions regarding TML do impact the success or viability of such technology implementation. Research from the Moseley (2010) study, for instance, found that perceptions of technology usefulness between students and instructors did not have a statistically significant relationship (p.

108). This suggested that the perceptions of the instructors alone did not influence the students' perceptions. According to the study, there is an agreement between students and instructors that TML is generally found to be useful in the classroom (p. 109). Understanding the degree to which TML adds to or takes away from the learning process requires a consideration of the ways in which various institutions and instructional divisions/majors perceive current technology usage in the classroom. The goal of TML in a traditional classroom setting is the unique opportunity to blend face-to-face instruction with the advantage of TML, thus changing the role of the instructor to more of a facilitator, while students make deeper meaning of their learning.

Martirosyan et al. (2017) reported traditional instructional models as a favored instructional practice by 24% of the respondents (p.13). He noted, "The notion of balance (between technology and lecture) in the classroom was the most prevalent general comment…" (p. 16). Instructors specifically identified the characteristics of collaborative hands on learning experiences available in traditional instructional models as beneficial to student learning.

Flipped classroom model of instruction. Bergmann and Sams (2012) described their original ideas and experiences with flipping their classrooms. They designed the instructional model in response to the amount of time needed to reteach lessons when their students had missed instruction. Students were able to visit a class website to view instructional lectures. These instructional resources began to be used across the country to assist teachers and substitutes in the delivery of course content in the area of chemistry. They began pre-recording class lectures so students could watch the lectures and take notes prior to attending class. The instructors reported having more time to complete labs and help students with problems. Bergmann and Sams characterized a flipped classroom experience as one that can personalize the learning experiences for students (p. 28). Students are given opportunities to build background and prerequisite skills prior to attending class. The flipped classroom model evolved into the flipped mastery model where students progressed through the course content at their own pace in an effort to support mastery of that content. Bergmann and Sams noted that flipped classrooms do not include a specific methodology, but are designed to focus on the learner. Students are explicitly taught to effectively view the instructional videos to maximize learning. Teachers use the class time to clarify misconceptions and assist students in understanding the learning concepts.

Hybrid model of instruction. Although hybrid courses have become increasingly popular, there are not many studies that speak explicitly to hybrid courses outside of online course studies. Hybrid courses are defined as a model of instruction that combines online and traditional course structures, which allow for interaction with course content, resources, and community boards. Many learning institutions offer a variety of course delivery options in an effort to meet various learning needs. Jaggars (2011) pointed out that hybrid and online modalities provide freedom from the constraint of physical classroom space and allow administrators to lower the availability barrier (pp. 24-25). Agostini (2013) determined that students prefer having a choice in the modalities of coursework.

While different and convenient, hybrid and online courses present their own set of challenges for students. In comparing the hybrid, online, and traditional course modalities, Sewell (2016) found that students were more likely to fail or withdraw from online and hybrid courses more so than traditional courses. According to Xu and Jaggars (2011), not only are the rates of completion lower for online classes, but "students who took more online courses were less likely to successfully graduate or transfer to a four-year school" (pp. 14-15). Online and hybrid courses seem do more harm than good for particular subgroups of students. Jaggars

(2011) explained that hybrid courses require students to spend a substantial proportion of time on campus; which could be inconvenient for the low-income students who have work, family, or transportation barriers to attending class in a physical classroom at specified times (p. 2). While students enjoyed the autonomy that online and hybrid modalities offer, they were not prepared for the different format and expectations that come along with hybrid courses. Sewell (2016) revealed that, “students in online and hybrid courses required more discipline, better time management, and a knowledge of technology that many students did not possess” (p. 84). Some studies suggest that the flexibility of online and hybrid courses creates a lack of structure for students. According to Jaggars (2011), “there is also suggestive evidence that the relative lack of structure in online courses leads some to procrastinate or fall behind on assignments” (p. 21).

Student misuse of technology. In today’s 21st century classroom students and instructors have access to a number of technological devices such as laptop computers, smartphones, and tablets. These devices offer an endless supply of resources that can be accessed in a matter of seconds. Lenhart (2015) analyzed the work of Pew Research Center, a nonpartisan fact tank. The Pew Research Center conducted research and published a study regarding teenagers’ access to, and uses of, different technology platforms. The study polled about 1,000 students, ages 13-17, on various personal uses of technology and tech platforms such as Facebook, Instagram, Internet, gaming, and discussion boards. While stating that 92% of teens who report to access the Internet on a daily basis, the data show greater usage of cellphones than 87% of those who have desktops (pp. 2-10). The data show that one in six teens respond to discussion boards on their own volition (p. 20). The results also showed that over 80% of American teen students have access to desktops, and over 70% of them have access to a smartphone with over 90% of students using the Internet on a mobile device (pp. 9-15).

According to Currie (2015), distracted learners lag in engagement causing in class materials and activities to be less beneficial to learning (p. 2). Given the lure of the internet, social media, and text messaging instructors are forced to vie for the students' attention. These technological devices are usually within an arm's reach for most students resulting in increased probability of off task behavior. This constant access to digital connectivity has become so pervasive that it has redefined communication and human behavior for many college students.

Perceptions of Technology Use

This section examines prior research on topics related to student and instructor perceptions of technology-mediated learning (TML). As technology continues to expand over time, it can present both challenges and rewards. For some the challenges are too steep, yet others feel the reward is worth the challenge. Perceptions of technology can vary depending on a number of factors such as age, race, and socioeconomic status.

Comparison of faculty and student perceptions. Moseley (2010) primarily sought to compare faculty perception of instructional technology (TML) to student perceptions to evaluate technology most used and most considered useful in the classroom. A positive correlation between the faculty who considered technology useful and their frequency of use was found. There was, however, no statistically significant relationship between the instructors' perceptions and the students' perceptions to suggest that one might influence the other (Moseley, 2010, p. 96).

Moseley, whose research added to this body of work, developed instruments that were tested for validity and reliability by a panel of experts. The instruments from Moseley's study measured the frequency of use in the classroom and the perceived level of usefulness of technology in the learning process in general education courses at a community college. Moseley also included age, gender, and student perceptions of effectiveness as extraneous variables (p. 30). While replicating a gender or age study did not fit the purposes of this research, the researchers acknowledged these variables as valuable to understanding the differences of perceptions between groups. The instrument was used to measure the differences in the perceptions and use of TML between instructional divisions. Doss (2014) employed the use of the same instruments as Moseley, with slight modifications. This study found generational differences between the perceptions of students and instructors on the usefulness of technology. Doss's research supported Moseley's finding that age was not a significant factor in the perceptions of usefulness (p. 123). His findings indicated that there were misconceptions about how the current generation of students perceived technology. Martirosyan et al. (2017) reported that 6.4% of the participants in their study indicated nonuse or a negative view of technology use (p.15). Various reasons were identified for not using technology including personal lack of knowledge, discomfort, efficacy beliefs, and the unavailability of technology. These findings also supported the need for differentiation when professional development is approached in an institutional setting.

Rogers' diffusion of innovation theory. The introduction of new technology can be intimidating as it creates a level of uncertainty and insecurity amongst new users. Rogers (1962) examined the process by which new innovations are integrated into societal practices. He characterized diffusion as the process by which new innovations are communicated and introduced through certain channels over time. He also asserted that during this process there are five essential elements an individual must analyze before adopting any new innovation. Rogers (1962) termed these elements as "perceived attributes of innovation" (p. 15). These attributes are trialability, observability, relative advantage, complexity, and compatibility.

These attributes are well-defined stages of the diffusion process. The initial stage of this process begins with experimentation. Rogers described this experimentation as trialability, which he explained is “the degree to which an innovation may be experimented with on a limited basis” (p. 231). An individual must be able to experiment with an innovation in order to gain an understanding. The second stage is observability, “the degree to which the results of an innovation are visible to others” (Rogers, 1962, p. 232). The workings of an innovation must be observable and the results produced must be measurable. These results lead into the third stage of relative advantage. These results ought to show a relative advantage where the innovation supersedes another idea (p. 214). The fourth stage is complexity that Rogers described as “the degree to which an innovation is perceived as relatively difficult to understand and use” (p. 231). The level of complexity weighs heavily on the final stage of the process which is compatibility. The compatibility stage is where an innovation is analyzed for consistency in regards to “existing values, past experiences, and needs of potential adopters” (p. 223).

At the end of this diffusion process, innovations are either adopted or rejected based on the culmination of all five attributes. Some innovations may be adopted at a higher rate than others. Rogers (1962) asserted that it is the individual's perceptions of these characteristics that are predictive of the rate of adoption (p. 239). He also outlined that relative advantage, compatibility, observability, and trialability are all positively related to the rate of adoption. However, complexity was found to be negatively related to the rate of adoption. As with any innovation, the rate of adoption can vary amongst individuals, technology is no exception.

Acquisition of technology skills. Georgina and Olson (2007) revealed that faculty who received small group instruction with a trainer had greater technology literacy than those who attended training in a large group with a trainer, one-on-one with a trainer, through independent self-study, or through the help of colleagues. The study also found that greater than 70% of the faculty in the study attended university sponsored technology trainings between the ratings of "to some extent" and "to a very great extent" (p. 4).

Barriers to acquisition. Martirosyan et al. (2017) reported, "Although a majority of respondents did report using technology, 15.6% of the respondents reported that they did not use technology" (p. 17). They also identified instructor perceptions of barriers to classroom technology use. Some of the barriers reported were, "technology is not available, equipment is out of date, technology is not preferred or required, lack of training, a minimal use of technology, and lack of student competency in relation to technology" (pp. 11-12). Instructors also reported a lack of training and technology support. In addition to these findings, they noted instructors did not perceive the benefit of technology to be greater than the benefits of their current instructional practices. Other barriers identified in this research included affordability and the lack of user-friendly software. Some instructors reported the use of technology in the classroom caused distractions (p. 13).

Technology adoption. Student and instructor perceptions are critical to the process of acceptance and adoption of technology. Davis (1989) concluded perceived usefulness and perceived ease of use correlated with the use of technology (p. 333). Perceived usefulness was the strongest indicator for technology use (ibid). The study resulted in the development of the Technology Acceptance Model (TAM). According to this model, the failure to adopt technology could be explained by low perceptions of usefulness and low perceptions of ease of use. Chuttur (2009) described the TAM as "a very popular model for explaining and predicting system use" (p. 17). He explained the evolution of the model and the variables included in the TAM that influence actual system use.

Doss (2014) used the assumptions in the TAM to research the relationship between the perceived frequency of use and perceived usefulness reported by faculty and students. A statistically significant relationship was not found in the perceived frequency of use and perceived usefulness of instructors. There was a moderately statistically significant relationship (r= .314) found in the perceived frequency of use and perceived usefulness of students (p. 93).

With regards to technology integration, Geoghegan (1994) categorized instructors in higher education based on their perceptions and willingness to integrate technology into their instructional practices. His study identified 3% of the instructors as *innovators*, employing new technologies as they became available (para. 23). *Early adopters* made up 12% of the instructors in the study (para. 24). They were willing to experiment with new technologies. The *early majority* group, 35% of the instructors, was characterized by their desire to make research based decisions (para. 25). An additional 35% of the instructors were classified as *late majority* (para. 26). This group was more reluctant and uncomfortable with the implementation of technology into instructional practices. The *laggards,* about 15% of the instructors, opposed the use of technology (para 27).

Perceptions of technology in learning platforms. Zhao, Alexander, Perreault, Waldman and Truell (2009) also spoke to the need for technology to be used as a medium for interaction between instructors and students, asserting, "Research also found that the student-centered Internet online courses require instructors to be role models, facilitators, coaches, supervisors, organizers, problem solvers, and liaisons" (p. 206). Considering the use of technology-mediated instruction from completely online classes, Zhao et al. highlighted the frustration with usability and communication being essential with online learning (p. 207). According to the study, a majority of faculty also reported "heavy use of Internet lecture notes (64%) and email (60%), whereas only 48% of students reported heavy use" (p. 208). These finding reinforced much of what has been revealed in the prior literature reported in this study. This observation provided evidence to one of the research questions analyzing the difference in student and instructor responses.

Hao (2016) researched the student perceptions of a flipped classroom model of instruction. Students participating in a flipped classroom model reported a positive learning experience (59%), that it met their learning needs (39.3%), they agreed with the idea of the flipped classroom model (59.5%), and would take a flipped course (44%). Hao reported students who favored the flipped classroom model felt as if it were a more student-centered approach; it allowed instructors to spend more time with their students, and provided enriched instructional materials. They also believed it was a more effective use of class time. The students that did not like the flipped classroom experience reported the instructional model required self-discipline and they either did not like completing the lesson previews outside of class or did not feel the lessons were beneficial when classmates had not completed the lesson previews. They also felt as if the model allowed for less learner control. The features of the flipped classroom model most liked by students were the bring-your-own-device feature (63.1%) and the use of instant response systems (57.1%). The quiz component was the most disliked feature (47.6%) of the flipped classroom. Juniors showed a higher preference for most of the features in a flipped classroom than the freshmen. Most of the freshmen did not like having control of their learning and were more comfortable with teacher-centered instruction.

Bergmann and Sams (2012) described the ways in which the flipped instructional model has been perceived by students and instructors. They stated, "...students understand digital learning. To them, all we are doing is speaking their language" (p. 20). The flipped model provided the opportunity for busy students to work ahead during times they were not going to be present for class. The instructors perceived that the flipped classroom model benefitted struggling students. Instructors were able to give struggling students more time and the students are able to watch the instruction as many times as they need to in order to master the course material (p. 23). Teachers also report that they are able to interact with their students more often (p. 25). This interaction helps to foster student-instructor relationships. Students are also given more opportunities to interact and develop relationships with one another. The instructors also noted students participating in a flipped instructional model were not as likely to cause distractions in class. Bergmann and Sams (2012) stated, "They either did not have an audience or they were no longer bored and were willing to dive into the learning" (p. 29). Instructors can also perceive the preparation and video production needed for the flipped classroom to be a "daunting task" (p. 36). The model can also be perceived as tiring due to the many different activities and levels of interaction the instructors have on a daily basis.

Faculty attitudes. Jaschik and Lederman (2016) reported the attitudes of faculty on the use of technology in a study by Gallup and Insider Higher Ed. The survey asked respondents to rank statements on a five-point Likert scale to indicate their agreement. These statements were grouped into specific categories related to technology. The responses to the portion of the survey concerned with measuring the perceptions of the uses of technology tools in "assessment and accountability efforts" (p. 12) showed an overall unfavorable response. Faculty members (54%) disagreed or strongly disagreed with the statement, "these assessments have improved the quality of teaching and learning at my institution" (p. 11). The majority of the faculty perceptions on the topic of cyber-security were positive. Faculty reported they were confident that personal information and student data were secure (58%) and the measures taken in an effort to maintain cyber-security did not infringe on privacy (64%).

The responses to questions concerned with measuring the perceptions of the quality of online education varied greatly between faculty members that have taught online courses, faculty members that have not taught online courses and academic technology administrators (p. 19). When comparing the potential for online courses to achieve student learning outcomes with in-person courses at an institution, academic technology leaders (63%) responded they strongly agree or agree that "online courses can achieve student learning outcomes equivalent to those of in-person courses…" (p. 19) and faculty members (55%) responded that they strongly disagree or disagree with this statement. The academic tech administrators (87%) had greater confidence this statement was true in their own institutions compared to faculty members (52%). Faculty that had taught online courses were more likely to report the outcomes of these courses could be equivalent to those of courses taught in person. The course tasks reported by faculty as superior with in-person courses are in class interaction with students (83%), instructing at-risk student populations (78%), rigorously engaging students in the course material (64%), and maintaining academic integrity (64%) (p. 21). Online courses were perceived as superior by 54% of the respondents in the area of "interacting with students outside of class" (p. 21).

The online education quality portion of the Faculty Attitudes on Technology survey also revealed faculty and academic technology administrator opinions as they relate to indicators of a quality online education program. The indicators scored as "very important" or "somewhat important" by both groups included: meaningful training prior to teaching an online course and the institution that offers the course also offers in-person instruction (p. 26). Faculty members

(78%) reported “meaningful interaction between students and instructors” (p. 26) as a “very important” factor compared to the group of academic technology administrators (100%).

The faculty also rated reasons for offering blended or hybrid courses. The ability of hybrid and online courses to serve more diverse students (86%), introduce more active learning (77%), and improve educational experiences (72%) were rated as “very important” or “important” (p. 32).

Faculty members who had taught online courses were asked if the experiences helped them improve their teaching practices by developing pedagogical skills. Of those who responded, 79 percent reported the experiences helped them. Specific ways in which teaching online courses helped to develop these skills were identified. Thinking critically about ways to engage students (86%), better use of multimedia (80%), better use of the institution’s Learning Management System (76%), increased comfort with using active learning or project-based learning techniques (57%), better communication with students out-of-class (57%) were reported as ways online course delivery has helped improve pedagogical practices.

Jaschik and Lederman (2016) reported that the perspectives of faculty members were less positive than those of academic technology administrators on the topic of institutional support for online learning. Close to half of the faculty members who responded agreed or strongly agreed that there was adequate technical support for creating and teaching online courses. Academic technology administrator responses were more favorable with greater than 72% agreeing or strongly agreeing that the technical support for creating and teaching online courses was adequate. Similarly, more administrators agreed or strongly agreed that support factors like compensation (59%), rewards (50%), policies to protect intellectual property (51%), and provides incentives for teaching online (47%) were used in their institution than were reported by the faculty members. Fewer faculty members agreed or strongly agreed that compensation (40%), rewards (32%), policies to protect intellectual property (31%), and incentives for teaching online courses (20%) were put in place by the institution to support online learning.

Faculty and academic technology administrators evaluated the investments made in educational technology based on the improvements to student outcomes. Instructors reported student outcomes were significantly improved (18%), somewhat improved (52%), and not improved (30%). Academic technology administrators reported student outcomes were significantly improved (15%), somewhat improved (72%), and not improved (13%). Both groups reported the gains justified spending however, academic technology administrators (84%) were more likely to report the gains justified spending than faculty (57%).

Palak and Walls (2009) studied the relationship technology use and instructor beliefs have with student-centered or teacher-centered instructional practices. The researchers reported mixed results when studying the impact teacher attitudes have on technology use. The quantitative portion of their study revealed:

> ...neither student-centered nor teacher-centered beliefs are powerful predictors of teachers' practices, and that teachers' attitudes toward technology are the most significant predictor for teacher and student technology use and teacher use of a variety of instructional strategies (p. 436).

The qualitative portion however, did not support these findings. There was not an increase in the student-centered instructional strategies among instructors with a strong teacher-centered instructional approach. Instructors reported using technology to support instruction and manage instructional needs more frequently than to facilitate student-centered practices like project based learning, student collaboration and problem solving. The study also revealed that technology rich environments do not necessarily "transform teaching into more student-centered practice" (p. 436). This was believed to have been influenced by the lack of training to use technology to facilitate student-centered learning and by other factors like class size and the abilities of students in their class (p. 437). Professional development on technology used for student-centered instructional practices was recommended to better align technology use with student needs rather than teacher-centered practices.

Perceptions of learning management systems. Walker, Lindner, Murphrey, and Dooley (2016) studied university instructors' perspectives of Learning Management Systems (LMS). The instructors reported features of the LMS that both benefited and hindered online teaching and learning. Each feature reported by instructors as positive was also reported as a hindrance. The issues were put into categories that included gradebook, assessment tools, course materials, communication tools, interface, and administration of classes. The lack of student engagement and technical problems were both noted as problems with the use of LMS. The researchers concluded that the overall instructor perceptions of LMS were positive and "giving them a voice in the opportunities and challenges associated with a particular LMS can help universities overcome barriers to adoption and speed acceptance of a new LMS" (p. 48).

The gradebook feature was found to help manage assignments yet was reported by instructors to be difficult to use (p. 44). Instructors reported that the teaching process benefited from the use of LMS assessment tools including quizzes, tests, rubrics and TurnItIn. An instructor specifically noted the ability to assign quizzes to multiple sections of a course. Instructors reported problems with reusing previously posted materials and organizing items for analysis. They reported the need for improvements to be made in the system's search functions and gradebook calculations. The LMS were recognized for the benefit of having the, “ability to post course material for student access” (p. 45). Instructors reported posting course materials like video links, slides, and content supplemental to class lectures. Other benefits of posting course materials to LMS included the reduction of the use of paper resources and the ability of students to access course materials whenever they need them (p. 45). Difficulty in adding course materials to LMS were reported as a disadvantage. Communication tools including discussion boards, blogs, emails, and wikis in the LMS were identified as useful for building learning communities and collaboration between students as well as serve to send messages to students including feedback on assignments. The limitations reported by instructors included student confusion with using separate communication tools within the LMS and the inability for students to share presentations within the system. Mixed responses were reported by instructors on usability and the interface of LMS. Some instructors reported ease of use with learning LMS while others reported that they are difficult to use. Instructors suggested trainings should include hands-on experiences with setting up the LMS, for student view features to be made available in the system, and changes to the system to simplify the use of the gradebook feature.

Gender. One factor that is highly studied is that of gender, and the research is varied on the ways men and women engage technology. Many researchers have tried to find a link between gender and technology use. According to Cai, Fan, & Du (2017), “males showed a more affirmative attitude towards technology based on their perceived usefulness and self-efficacy in their ability to use technology” (p. 9). These researchers found that males exhibited a sense confidence in approaching technology, and they viewed technology as an advantageous tool. Women, on the other hand, were not as confident with technology. Cai et al. (2017) went on to explain, “while women’s attitudes toward technology are still positive it is at a lower level than their male counterparts” (p. 9). Thus, women viewed technology and its usefulness positively, but their confidence level towards it remained slightly lower than their male counterparts. The researchers speculated that societal and cultural norms and education levels might have had some influence on the findings.

Metlitzky (1999) performed regression analyses for the perceptions of the use of technology on relationships with students. The regressions indicated that female instructors had more positive perceptions of the use of technology on their relationships with students than the male instructors (p. 193). Female instructors also reported greater frequency of use as compared to their male counterparts (p. 202-203).

Race. According to Zeidenberg (2008), given the rise in tuition costs for four-year colleges and universities, more individuals are applying to community colleges. He goes on to reveal that community colleges “now enroll almost half of all college students, including disproportionate amounts of minority and immigrant students” (p. 53). Some minority populations seem to be more heavily represented than others on community college campuses. As stated by Nguyen et al. (2015) “African American, Asian American, Pacific Islander, Latina/o, and American Indian students are all more likely to attend community colleges than four-year institutions” (p. 3). This information sheds light on the demographic makeup of community colleges. Thus, in researching technology perceptions and usage amongst community college students, researchers must consider the many factors that may influence the use of technology. Race is undoubtedly an influencing factor as culture plays a vital role in shaping perceptions and cultural norms. According to Clifford (2007), “Caucasian and Asian Americans led the way when it comes to computer ownership and Internet use, while African and Hispanic Americans fell short of their counterparts" (p. 4). Jaggars (2014) stated, "a recent federal study found that only 55 percent of African American households (compared with 74 percent of white households and 81 percent of Asian American households) and 58 percent of rural households (compared with 72 percent of urban households) had broadband Internet at home" (Online Education and Postsecondary Access section, para. 2). This accessibility provides greater learning opportunities, more exposure, and a better technological proficiency. Clifford (2007) found that self-efficacy and computer access amongst racial groups were not statistically different. Thus, race alone may not be the true cause of the digital divide. Factors such as education level and socioeconomic status could be potential risk factors. Nguyen et al. (2015) found that "many low-income and minority populations live in communities with under-resourced primary and secondary schools, leaving a significant number of students underprepared for college-level work" (p. 9).

Low socioeconomic status. Though not initially considered as an extraneous variable due to the nature of this study, the insight of students' socioeconomic status can prove valuable. According to Jaggars (2011), "community colleges disproportionately serve low-income and academically-underprepared students" (p. 8). As tuition prices continue to rise, access to postsecondary education seems to get more challenging each year. As stated in Jaggars (2011), the costs of tuition and fees are a particularly substantial barrier for lower-income working adults, who often cannot qualify for financial aid (p. 30). For many students their financial status can pose a major hindrance even before they are enrolled. According to Nakajima (2008) it is even more of an issue after enrollment: "The most prominent demographic risk factor that seems to influence student retention is a student's financial status" (p. 10). Most students cannot afford to pay tuition out of pocket, as a result students find themselves left with limited options. As stated by Nakajima (2008), "Since many community college students come from a low SES status, tuition has a significant negative impact on student retention" (p. 10).

Radovcic (2010) stated, "Community college students with a low socioeconomic status are generally students of color, first-generation students, immigrants, and special needs students" (p. 41). These demographics of students seem to enter the postsecondary education pursuit with several barriers to overcome. These barriers could range from social justice issues, lack of support, limited language skills, and mental or physical impairment.

While all of these barriers present a unique challenge, financial status is still the greatest challenge of them all. Radovcic (2010) revealed that, "college students from families with incomes ranging between $20,000 and $34,999 were 72% more likely not to persist than college students from families with incomes of $50,000 or more" (p. 41). Low socioeconomic status limits an individual's access to resources, thus options are limited as well. Many low SES students have to work part-time, and even full-time jobs to sustain other obligations and responsibilities that can also negatively impact student retention and engagement.

Aragon and Johnson (2008) studied the differences between completers and non-completers of online courses at a community college. The researchers used financial aid eligibility to report a student's socioeconomic status. They reported that there was no significant relationship between a student's financial aid eligibility and the completion of online courses.

Self-efficacy

Bandura (1977) noted that the likelihood of a student to invest time or participate in practices that increase engagement and achievement, or an instructor to design learning opportunities that use technology-mediated learning, is based on the student's or instructor's perceived level of self-efficacy for those tasks. People with high levels of self-efficacy will give more effort and persist longer when faced with obstacles and challenging situations. He also recognized that the product of a desired performance requires more than just expectation. It requires motivation as well. Together, skill, motivation, and self-efficacy work to employ successful practice.

Bandura (1997) explained that a person's overall efficacy beliefs affect behavior and the outcome expectancies affect the outcome. A causal relationship between efficacy belief and human accomplishment and competencies was described in the theories of self-efficacy. He described this function as "generative" (p. 37). The identified causal relationship suggested a person with greater self-efficacy could accomplish more than another despite having the same skill level.

Yesilyurt, Ulas, and Akan (2016) studied various types of self-efficacy in the context of computer use in learning environments. Their research studied the "correlation among the effects of teacher self-efficacy, academic self-efficacy, computer self-efficacy, and attitude toward applying computer supported education" (p. 591). The study found that each of these efficacy categories influenced the attitudes of prospective teachers about the use of computer-supported education. They reported that the three efficacy categories combined could explain approximately 46% of the variation in instructor attitude toward applying computer-supported education (p. 598). Yesilyurt et al. recommended pre-service teachers receive coursework and professional development on computer use and instructional technologies.

Tschannen-Moran and Hoy (2001) described the implications of efficacy beliefs as they relate to teacher efficacy. The researchers critically analyzed, compared, and evaluated various measures of efficacy and proposed ways to measure efficacy as it relates to teacher self efficacy. This evaluation resulted in the recommendation for measurements to include measures of teachers' "competence across the wide range of activities and tasks they are asked to perform" (p. 795). The analysis of the responses to individual items in the second study resulted in the identification of three efficacy factors that represent various instructional tasks: efficacy for student engagement, efficacy for instructional strategies, and efficacy for classroom management (p. 797). These three factors were further developed in a third study and resulted in the Ohio State teacher efficacy scale (OSTES). The construct of instructional strategies included items relating to assessment and providing instruction appropriate to the needs and levels of their students. Efficacy for classroom management described beliefs in controlling student behavior, disruptions, and establishing routines and activities to support a learning environment. The construct of efficacy for student engagement include the instructor's beliefs about how they can motivate students to work creatively, think critically and value the learning process.

Cultural-historical Theory

Vygotsky, in his work *Mind and Society* (1930), asserted the theory that children develop within constructs in their environment. Earlier parts of this manuscript discussed the considerations of cultural tools and how humans derive meaning from them. The uses of these tools vary depending on how they were perceived socially. Psychology Professor McLeod (2014) suggested that Vygotsky considered the concept of tools, used in the way to solve physiological problems, in the same way that tools are used by humans to solve psychological challenges. These tools, as critical as the skills used to develop language and social context, helped children to learn. According to Vygotsky (1930), the theory of zone of proximal development came about as the role of instructor became facilitator of knowledge, cognizant that the task should always require imitation one step higher than what is comfortable (ch. 6, p. 12). The role that language played was critical in this theory because it was used as a metacognitive tool as well as a social tool, adding that communication produces the need for checking and confirming thoughts (ch. 6, p. 13). The need to communicate and be heard, as well as to learn from others is a powerful application that Vygotsky makes regarding these psychological tools and a facilitator of those tools in the learning process.

The need for theory regarding cultural-historical development centered on how humans make meaning of external observable phenomena in social situations. The need, then, for learning occurs because humans' developmental processes lag behind their learning process. In other words, as humans develop in their functionalities, albeit at various rates, the methodical teaching of certain concepts advances what is previously known relative to the learners' social experience. Vygotsky's argument was the reasoning behind the concept of zones of proximal development and attainment of new skills (ch. 6, p. 14). It is worth mentioning that the tool is used to communicate or relay information and does not replace the facilitator of the learning task. If the zone of proximal development is considered as an effective constructivist model of instruction, then, the tool itself does not maximize the learning outcomes of the learner. If scaffolding and teacher best practice is used in addition to TML, student efficacy and attainment of skills have potential to be positively impacted. Vygotsky (1930) also made a conclusion to this theory of cognitive development as it relates to written communication:

> A second conclusion, then, is that writing should be meaningful for children, that an intrinsic need should be aroused in them, and that writing should be incorporated into a task that is necessary and relevant for life. Only then can we be certain that it will develop not as a matter of hand and finger habits but as a really new and complex form of speech (ch. 8, p. 15).

The facilitation that modern day teachers encounter in teaching language and communication fits seamlessly in this paradigm. Vygotsky would argue that the learning process is not effective if there is not an authentic transfer of skills. This does not happen in a vacuum. It happens at the exchange of knowing the students and facilitating a rich learning environment that enables their curiosities and abilities to grow.

If technology is considered as a cultural tool in the 21st century, the theory applies in that the advantages of technologies increase communication, access to knowledge and resources, and give platforms for giving and receiving information and ideas created or encountered in a classroom environment. TML used as a tool by a skilled instructor would provide opportunities for the student to engage in the task by authentic means that allow for effective communication of material.

Student Engagement

Research has connected student retention rates to the engagement levels of students. Many of these have referenced the use and usefulness of technology in regards to specific variables that impact student success in the classroom including student engagement. Finn and Rock (1997) found that high levels of student engagement were connected with increased academic performance and course completion. Engagement can potentially be a strong indicator of student achievement. For the purposes of this study, engagement is defined as perceptions of a student's behavioral engagement (class participation and on task behaviors), cognitive engagement (problem solving and decision making), and emotional engagement (anxiety, interest, and excitement) according to Fredricks, Blumenfeld, and Paris (2004). Student achievement is defined as the anticipated course grade.

Fredricks et al. (2004) identified three components of engagement: behavioral, emotional, and cognitive engagement. Behavioral engagement considers a measurement of behaviors or activities in which the student takes part. Fredricks et al. noted behavior engagement activities include following rules, attendance, class participation through work and discussions, and participation in school related activities (p. 62). Emotional engagement was described as a student's overall affect toward the course, teacher, or work. Fredricks et al. described the need for students to feel personally connected to their learning. They recognized that motivation, interest, and novelty play a role in the emotional engagement of students. The research also recognized the need for students to perceive the work they are doing as having value and importance (p. 63). The researchers described cognitive engagement as the cognitive investment that students put into their learning. These investments include the student use of self-regulated learning activities. Examples of cognitive engagement activities include the employment of problem-solving techniques and working through difficult tasks toward understanding and mastery of course content (p. 64).

Laux, Luse, and Menecke (2016) stated, "As with most technological applications, how the technology is applied and used by both the instructor and the students will influence success" (p. 454). They recognized the need for technology-mediated learning to be more fully examined to inform practice and answer the call to provide "more robust pathways to a college degree" (p. 452). Their research focused on the influence of collaborative learning systems on building campus connectedness, sense of community, and affective organizational commitment of students.

Tinto (1993) explained that academic and social integration is a product of a student's institutional experiences. He asserted that the lack of integration could lead students to withdraw from school thus increasing the student attrition rate for the institution. The two systems are seen as interdependent and the integration of academic and social systems is considered necessary to enhance students' overall institutional experiences (pp. 108-109).

Matthews (2009) noted that although all higher education institutions are affected by student engagement, the fundamental differences between four-year colleges', universities' and two-year community colleges' student engagement are relative to each setting. Thus, community colleges cannot measure student engagement with the same measurement tool as four-year colleges and universities. The Community College Survey of Student Engagement (CCSSE) is the community college equivalent to the National Survey of Student Engagement (NSSE) tool used to measure student engagement. The CCSSE measures student engagement in five separate areas: active and collaborative learning, student effort, academic challenge, student-faculty interaction, and support for learners (as cited by Matthews, 2009). The CCSSE is administered to community college students to determine their level of student engagement and the factors that are having the greatest impact. Students with greater overall levels of student engagement, as measured by the CCSSE, were thought to have higher levels of student achievement. Matthews' research, however, did not yield inferential statistics that supported a strong correlation between student engagement and academic achievement. This is in contrast to prior research that has described a stronger correlation between student engagement and student achievement (McClenney et al., 2006).

Tinto (2012) asserted that despite the efforts of colleges and universities to invest in resources and implement programs to increase student retention, many of the investments have achieved little success. Tinto attributed the lack of the marked success of these programs and investments to the lack of use or full implementation inside of the classroom (para. 2). The programs and purchases, intended for use to boost student success and retention rates, are not always used in the classroom. When such programs and purchases are used, the implementation does not always fully align with the institution's intentions. Tinto stated, "most programs are not well conceived, are voluntary in nature, and/or attract a small segment of the teaching staff" (para. 16). He did, however, note some institutions are beginning to establish learning communities and training programs where academic staff "acquire pedagogical, curricular, and assessment skills appropriate to the needs of students, in particular those who require basic skills instruction" (para. 16). Tinto also emphasized that retention initiatives are particularly important in the student's first year and should include ways to set and communicate high expectations, provide support for the learner, assess and give feedback, and involve the student in the learning process. Tinto (2012) also noted the potential for new technologies to track achievement and provide academic feedback to students. These technologies have the capability of data analysis to identify at-risk students and alert both the instructor and the student.

Many researchers have studied learning styles that enhance student engagement. Matthews (2009) defined active learning as, "a term used to refer to teaching techniques that require students to do more than simply listen to the professor and instead are actively participating in their learning" (p. 26). One type of active learning is collaborative learning. Tinto (2012) described specific pedagogical practices that involve collaborative learning opportunities for students. He noted that these learning structures and practices shift the responsibility of learning from the instructor to the students. Collaborative learning and problem-based learning groups provide learning experiences that allow students to become engaged both socially and intellectually. Davis, in his 1993 study, defined collaborative learning as "a type of learning where groups of students work together for a common academic goal" (as cited in Matthews 2009, p. 26). Active learning gets students involved academically, and collaborative learning gives students the chance to connect socially with their peers. Tinto (1993) illustrated the impact of peer group interactions on social integration, institutional commitment, and eventually making a departure decision (p. 114). The research indicated that the likelihood students would persist to degree completion increased when students were given more opportunities for social and intellectual integration (p. 116).

Faculty-interaction is another practice the CCSSE found to be effective in bolstering student engagement by allowing students to feel connected to not only the course, but to the campus community as a whole. Tinto identified the reasons for student dropout and recognized these reasons could include the feeling of social isolation (as cited by Matthews, 2009, p. 9). Whether it is through the faculty or their peers, research indicates that students need to feel a sense of belonging throughout the campus in order for them to remain enrolled and persist.

Learning and Achievement

Astin (1999) connected the theory of involvement with academic achievement in the basic postulates of the theory. The fourth postulate stated, "The amount of student learning and personal development associated with any educational program is directly proportional to the quality and quantity of student involvement in that program" (p. 519). The implication from this part of the involvement theory is the need for institutions to be intentional in planning programs and putting mechanisms in place that will increase student engagement to maximize achievement.

Astin (1999) analyzed and contrasted prior research and theories of involvement with other pedagogical theories related to student achievement. The analysis asserted that content theory, or subject-matter theory*,* is characterized by a high degree of subject matter knowledge where students participate in learning lectures, reading assignments, and working in the library. These practices allow the student to be a passive learner and fail to engage students in the learning process. This approach limits the achievement of students who are not highly motivated or are not strong readers. Another approach, resource theory, recognizes the need for the learning environment to be conducive to learning by providing the resources deemed important. These resources could include learning spaces, materials, personnel, and even high achieving students. The theory operates under the assumption that making the tools and resources available to students will increase student achievement. The theory does not consider the need for the students to effectively use these resources and actively involve these resources in their learning processes. Finally, the *individualized theory* or *eclectic* approach focuses on the individual student needs. The individualized approach encourages flexible curricular requirements, differentiated instructional techniques, and self-paced instruction. This theory is limited by the time and financial investments needed to personalize learning. Astin (1999) summarized the link between involvement and achievement and stated, "...most of the evidence from research strongly supports the concept of involvement as a critical element in the learning process" (p. 526).

Astin (1999) described his developmental theory of student involvement. Involvement was defined by words and phrases to describe a student's actions or behaviors. He asserted that action and behavioral involvement are critical to development. Student involvement serves as what Astin described as a "mediating mechanism" (p. 520). The implications of this learning theory, as it applies to this research study, involve the development and use of instructional techniques, tools, and assignments that are designed to engage the learner. The use of these tools and techniques mediate learning and help to produce desired learning outcomes. Astin identified the resource of student time as the key investment needed to achieve these outcomes. It was noted that school administrators should consider this limited resource of time when institutions are planning policies and practices that affect the amount of time and energy students have to devote to learning experiences. Consideration for academic and non-academic issues affects the way students invest their limited resources. Academic issues include class schedules and faculty office hours. Non-academic issues deal with things like regulating extracurricular activities and financial aid procedures.

Metlitzky (1999) examined the use of the constructivist theory to "...guide the choice of teaching strategies and learning environments" (p. 63). These choices were particularly relevant to providing individualized student learning experiences designed to enhance student achievement through a learner-directed approach to instruction. This model employs a shift in the role of the instructor from presenter to facilitator. Students are given the opportunity to explore learning concepts through the application and use in a social context.

Hamilton, Rosenburg and Akcaoglu (2016) described a model suggesting ways of selecting, using and evaluation of technology for learning, involving a four-step modality—substitution, augmentation, modification, and redefinition. Developed by Puentedura (2006), this model seeks to determine how specific types of technology can be used to enhance learning. Like many of the theories on technology integration, there are criticisms that the SAMR model lacks context, structure, and sufficient criticisms from refereed journals (Hamilton et al., 2016). While this model applies specifically to the pedagogical K-12 setting, the outcome of this particular study's evaluation is that models like SAMR were recommended to be used to think about how technology applies to a particular setting, for particular instructors and students, as a tool and not a means to increase student outcomes. The same implications apply in the dynamic higher education setting, where the use of technology is reflected in particular settings that best represent the efficacy of the instructor and student (Doss, 2014; Hamilton et al., 2016; Moseley, 2010).

Community College Variables

Institutional divisions. Matthews (2009) identified statistically significant differences in the student engagement levels of students between academic and workforce programs (p. 51). Academic programs included programs like Agriculture, Communications, Education, History, and Math. Workforce programs included Allied Health, Construction Trades, Protective Services, and Vocational Home Economics. Matthews concluded academic programs were a "significant predictor of a higher GPA" (p. 55).

Metlitzky (1999) identified the differences in the uses of technology among instructional divisions. The faculty in the Political Science division was reported to use more different types of technology than the faculty in the Mathematics or English divisions. The research also reported differences between divisions in the specific types of technology used. Mathematics faculty reported the use of desktop computers and computer software materials most often while Political Science instructors reported a greater use of email and Internet technologies as well as conferencing. The use of the Internet, online discussion groups, and conferencing were more frequently reported by the faculty in the English department (p. 384).

In Henrickson's (2007) study, perceptions of technology integration were analyzed, in part, by academic divisions via a soft and hard categorization of various disciplines of study. Henrickson's work addressed the concerns of non- and low users of technology in a community college setting. Results of the study showed that a faculty member of the math and sciences division was likely to self-assess as a "non-user" or "low user", while faculty of liberal arts or technology divisions is more likely to identify as a technology “integrator” in the classroom (pp. 141-142). Henrickson gave the rationale that lack of instructor access to and availability of services could be a reason as to these findings (pp. 162-163). Another factor that Henrickson observed was the implication of false positives in technology integration responses. For instance, one faculty member of a soft discipline, identifying as an integrator, mentioned issues with an overhead projector (p. 144).

According to Adams (2002), the math and sciences division was considered a “hard” discipline, and liberal arts/humanities divisions were “soft” disciplines. Henrickson mentioned that his study differed from others, which generally found that faculty members of soft disciplines identified as non-users, whereas those of hard disciplines identified as either non- or low users. Adams (2002) found that faculty in soft disciplines presented higher-order concerns in the usage of technology, while faculty in hard disciplines displayed lower-order concerns, usually telling of their levels of technology integration (p. 297).

Class delivery platforms. Institutions of learning use instructional delivery platforms that are designed to assist students in the learning process. Each platform has characteristics that are unique to the delivery of instruction and the interactions between students and their instructors. The evolution of technology has not only provided opportunities to engage students and enhance learning in on-campus class delivery platforms, but has also created opportunities for students to be involved in online and hybrid class delivery models.

Metlitzky (1999) maintained that the use of technology in college and university settings has changed dramatically over the last 60 years. In the mid to late 1960s the use of technology to aide instruction was projected to help cure the woes of instructional pedagogy and promised to revolutionize instruction. Under its many names, including computer-assisted instruction (CAI) and computer-based instruction, it failed to deliver the results that many institutions and investors were hoping to achieve (p. 15). In the 1970s, the National Science Foundation remained optimistic of the potential contributions of technology to instructional practices and funded grants to develop and research a CAI system based on instructional theory. CAI was designed to give students the control of their learning. Previous research had found a statistically significant improvement in the posttest scores of students receiving instruction through a CAI system over those receiving a lecture-discussion instructional model (as cited by Metlitzky, 1999, p. 15). Despite these findings, other barriers stood in the way of the widespread use of technology as an instructional tool. Metlitzky described the developments that continued to be made to pave the way for instructional technologies to individualize instruction.

Distance learning was initially a one-way instructional delivery platform used by colleges for continuing education and course-credit programs (Metlitzky, 1999). It evolved to include video-conferencing and helped to facilitate communication and interaction between students and instructors. Computer networking systems along with the widespread use of the Internet and email added another dimension to the distance-learning platform.

Distance learning has now evolved into online and online/hybrid courses controlled through the use of course management systems like Blackboard and D2L. Dixson (2010) studied the engagement of students enrolled in online classes and found the student-to-student and student-to-instructor communication through online discussion forums increased student engagement. The study also reported there was no significant difference in the engagement of students based on the type of course activities. Both active and passive learning activities were found to engage students in online learning courses (pp. 6-7). Dixson recommended that online courses offer and require a strong social presence as well as provide multiple means of student-to-student and student-to-instructor communication (p. 8).

The student's ability to interact with the technology itself and others in virtual communities are strong indicators about students' persistence through their educational pursuits. Laux et al. (2016) tested student persistence in virtual communities. The areas supported in their research were collaborative environments, usability, connectedness to others and institution, sense of community, commitment, and turnover of students. These factors were tested in a qualitative model using structural equation modeling with data that showed connections between participants who scored categories high and those who responded with low Likert-scale scores. One factor that differentiated itself in the data was usability. Laux et al. stated that their results suggested:

> The level of usability that students perceive about an online educational system has a significant influence on their collaborative learning experience… an easy to use system not only encourages active learning, but also is likely to result in a convergence of knowledge among participants (p. 461).

While this study only analyzed student persistence in virtual community settings, the results of the study suggest that perceptions of human interaction, in and outside of the classroom, and frequency of technology use are positive factors that strongly impact persistence.

Aragon and Johnson (2008) conducted a comparative study of the characteristics of completers and non-completers of online courses at a community college. All students in the study were enrolled in online courses. The study found there were differences between completers and non-completers in the areas of gender, academic readiness, and students enrolled in additional online courses (pp. 149-150). Significantly more females completed online courses than males. A moderately positive correlation was found in the number of online courses a student was enrolled and the completion rates. Completers had higher academic readiness scores as indicated by grade point average (GPA) than non-completers.

Non-Completion students reported issues that contributed to not completing the online courses. Course design and communication was reported by eighteen (28%) of the students. These students cited low levels of communication with course instructors as reported the quality of the course design and delivery contributed to not completing the courses. Students also reported issues with technology and performing technical skills (18%) interfered with course completion. Learning preferences were reported by students (9%). The responses indicated the instructional format did not fit with the students' preferences for learning. The implications of these findings suggest student support services are needed to mitigate deficiencies in student readiness and technical proficiency. Aragon and Johnson recommended helpdesk staff and introductory computer classes should be put into place to support students. Recommendations for course design and instructional design included, "innovative ways to facilitate quality teaching and learning…" and "...instructors need to establish a mechanism for communicating with their students" (p. 155). E-mail, web boards, chatrooms and online office hours were suggested as ways to promote communication with students.

Chapter 3: Methodology

This chapter describes the qualitative and quantitative methodologies used in this research study and discusses the pilot testing of the instruments for validity and reliability. It also explains the purpose of the study, the research design, the variables considered in the study, the methods of data collection, the population and sampling procedures, the instrumentation, and the process for data analysis.

Purpose of the Study

The purpose of this study was to understand ways in which faculty uses TML, the ways faculty acquires the skills needed for TML, and the student and faculty perceptions concerning the usefulness and impact of TML practices on student engagement and achievement in a community college setting. Data collected in this study helped researchers provide the client with an analysis of the faculty's skills and perceptions surrounding TML at the institution. The analysis was specific to the institution's five different instructional divisions as well as an analysis of its uses within the various course delivery platforms to include traditional, hybrid, and flipped classroom instructional models. Instructor and student perceptions helped reveal further insight into the ways in which TML transfers into student engagement and student achievement.

Research Questions

1. What is the perception of instructors regarding how they utilize technology in the classroom, and how they acquire skills used in technology-mediated learning (TML)?
2. What is the perception of students regarding their experience with technology in the classroom?

3. What is the perception of instructors regarding the impact of TML on student engagement in their classes?
4. Are there differences between instructional divisions in respect to how instructors perceive the usefulness of TML instruction?
5. Are there differences between instructional divisions in respect to the frequency of instructors' use of TML instruction?
6. Is there a difference in the perceptions of the use of TML on engagement between students' preferred instructional models (hybrid, flipped, and traditional)?
7. Is there a difference in the perceptions of the use of TML on achievement between students' preferred instructional models (hybrid, flipped, and traditional)?

Research and Null Hypotheses

The research questions—4, 5, 6, and 7—are specifically the quantitative questions, represented in the following research hypotheses ($H_{\#}$) and their null equivalents ($Ho_{\#}$), below:

- H_1: There are differences in the perceptions of instructors from different instructional divisions within the institution regarding the usefulness of technology.
- Ho_1: There are no statistically significant differences in the perceptions of instructors from different instructional divisions within the institution regarding the usefulness of technology.
- H_2: There are differences in instructors' frequency of technology use by instructional division within the institution.
- Ho_2: There are no statistically significant differences in instructors' frequency of use of technology by instructional division within the institution.

- H_3: There is a difference in the perceptions of the use of TML on engagement between students' preferred instructional models (hybrid, flipped, and traditional).
- Ho_3: There is no statistically significant difference in the perceptions of the use of TML on engagement between students' preferred instructional models (hybrid, flipped, and traditional).
- H_4: There is a difference in the perceptions of the use of TML on achievement between students' preferred instructional models (hybrid, flipped, and traditional).
- Ho_4: There is no statistically significant difference in the perceptions of the use of TML on achievement between students' preferred instructional models (hybrid, flipped, and traditional).

Research Design

The research employed a qualitative dominant mixed methods research design to study the instructor and student perceptions of technology-mediated learning (TML) in a community college setting. A review of literature guided the development of the methodology incorporating both qualitative and quantitative methods of data collection and analysis. According to Gall, Gall and Borg (2007) the use of a mixed methods approach can yield qualitative and quantitative findings that complement each other and can, "provide richer insights" (p. 32) and could, "...enhance the validity of case study findings through a process called triangulation" (p. 460). A triangulation of research methods strengthened the qualitative portion of this research, as a case study, to discover the instructor and student perceptions of TML. The data were gathered using convenience sampling, for the purposes of this study. Convenience sampling, or availability sampling, relies on available respondents who are accessible (Berg & Lune, 2012, pp. 50-51). Numerical data were analyzed and reported quantitatively to make statistical inferences specific to this community college setting. Qualitative data were collected through interviews and analysis of syllabi as archival data. As analyses of comparison, TML was evaluated between instructional divisions and instructional models.

Variables

The researchers considered the following variables as key factors in the research: (a) instructional divisions, (b) types of technology use, (c) frequency of technology use, (d) instructor acquisition of TML skills, (e) instructor perceptions of technology use, (f) student perceptions of technology use, and (g) course delivery platforms. A description of the types of technology used and the frequency of use was gathered as they applied to the delivery of instructional content, the communication between instructors and students, and the uses to fulfill student assignment requirements. Instructors also provided a description of the ways in which they acquire training and skills necessary for the use of TML. Instructor and student perceptions of the extent in which these uses transfer into behavioral, cognitive, and emotional engagement as well as student achievement, were collected, analyzed, and compared. Instructor and student uses and perceptions of TML, the dependent variable, were compared between instructional divisions. Perceptions of achievement and engagement, the dependent variable, were compared between groups including course delivery platforms, age, gender, and major programs of study. A visual graphic of the variables compared in this study is provided below (Figure 1).

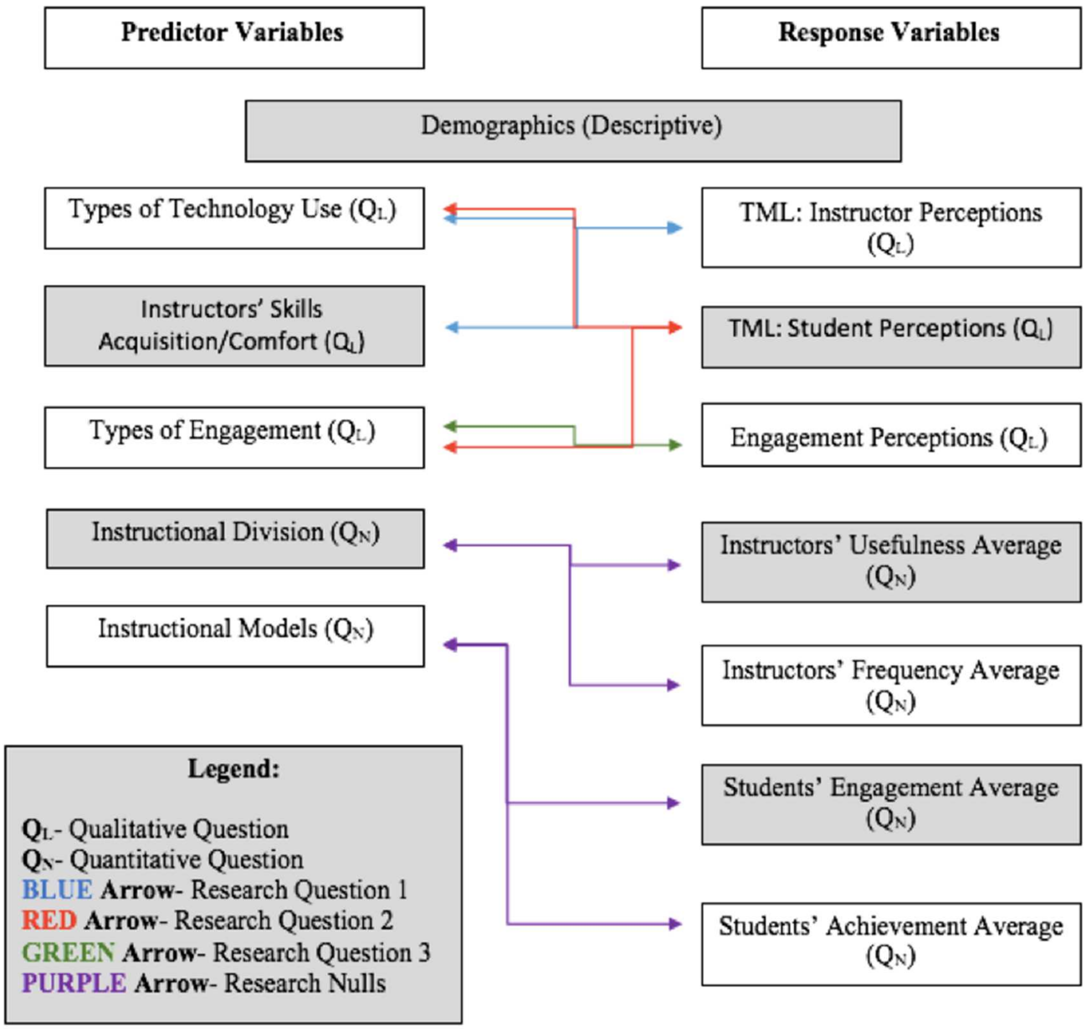

Figure 1: Variables of Technology-mediated Learning (TML) Study

Data Collection Procedures

The data collection methods included instructor and student questionnaires (Appendices B & D), in-depth interviews with instructors and students (Appendices C & E), as well as the archival data of course syllabi as well as student demographic and enrollment data. Analyzing the ways technology-mediated learning is used and perceived through these methods added to the validity of the findings.

The research team members previously completed the human subjects training and received completion certificates (Appendix I). After receiving IRB approval (Appendix H) and committee approval, the researchers requested archival data that included the main campus demographics for the current semester.

After submission of the instruments to IRB and the Juried Review Committee (JRC) and completion of the pilot testing, data collection began. Students and instructors were sent an invitation to participate in the study. This invitation was sent through school email and included a description of the research and a link to the respective questionnaires (Appendices B & D). The email was generated and sent through the client's Division of Institutional Effectiveness at the request of the client. Both questionnaires included statements of informed consent (Appendix A). After agreeing to participate, instructors and students responded to the questionnaire and had the opportunity to volunteer to participate in interviews. The instructor questionnaire also included a link for instructors to submit a copy of their course syllabi. Willing instructors could submit an electronic copy of one of their course syllabi via email to the client's Division of Institutional Effectiveness. The RedCap software compiled the responses to the questionnaire for coding and analysis purposes.

Per request, the data analyst for the institution collected and sorted the syllabi from the instructors by divisions and provided the team with three random sample syllabi by division. Syllabi were examined to gain insight to the use of technology, types of assignments, and expectations for the respective courses. The syllabi were used for the purpose of evaluating trends noticed by division.

Willing instructors who completed the survey were interviewed via phone. Emails were also sent to three randomly selected students, from each of the instructional divisions, who volunteered to participate in the interviews. Email and or telephone was used to schedule the interviews. Interviews were scheduled and conducted according to the availability of the researchers and volunteers. As a contingency plan, if student face-to-face interviews were not possible, telephone interviews would be conducted. In the event neither face-to-face interviews nor telephone interviews could be conducted, additional participants would be randomly selected from the responses of instructors and students who volunteered to participate in interviews.

Instructor and student interviews (Appendices C & E) were conducted with willing participants to gather anecdotal information to enhance understanding using interview questions. The interviews were audio recorded to ensure accuracy and capture subtleties in responses. These interviews were transcribed and recorded for analysis.

Research Participants

The community college, including main and satellite campuses, had a 60% female and a 40% male student population, with a total enrollment of 10,812 students. The average age of students enrolled in the institution was 23 years old. The population of students enrolled in the institution was 79% White, 9 % Black, 5 % Hispanic, and 6% other. Students enrolled full-time made up 53% of the population. The institution reported having 808 faculty and staff members. The faculty held varied levels of degrees: Associate degree (2%), Bachelor's degree (9%), Master's degree (68%), Doctorate or Professional degree (20%), and other credentials (1%).

The convenience sample for the student questionnaires was 96 respondents; there were 35 respondents on the instructor questionnaire. From the sample of students who completed the questionnaire, 67.71% were female and 32.29% were male. From the sample of instructors who completed, 77.14% were female and 22.86% were male. Originally the intent was to focus on the main campus faculty and students, but casting a wider net provided a much better chance at securing more random data. The target respondents were the entire faculty and students of the faculty of this community college for an assessment of technology skills and usage in the classroom. There were 40 instructor perception questionnaires received across five instructional divisions; 35 of those surveys were fully completed. Also, 128 student perceptions questionnaires across five instructional divisions were received; 96 were completed. Those students were enrolled in courses using three different instructional models—flipped, hybrid, and traditional.

For the questions of perception, all instructors and students were emailed an online questionnaire. Perceptions from these two questionnaires were analyzed from two different datasets. Via the campus's vice president of research, 160 instructors and 5000 students received the survey, from the total campus student body. Both full-time and part-time students were surveyed.

For the interviews, instructors and students who had agreed to participate were considered. Although the intention was to conduct focus groups based on the instructional division of the schools, the limited number of responses required capturing any and every available interview from the students and instructors. Convenience sampling was also used for interviews. At the end of the questionnaires, students and instructors who were willing to participate in interviews provided their contact information for further details. There were three different respondents from three divisions. There were six students from four different divisions.

In the instructor questionnaire, there were three respondents from the division of Health Sciences (A), 13 from Humanities (B), 10 from the Math and Science division (C), 8 from the division of Social Sciences and Education (D), and one from the division of Business & Technology (E). For the student questionnaire, there were 29 respondents from the division of

Health Sciences (A), 6 from Humanities (B), 12 from the Math and Science division (C), 22 from the division of Social Sciences and Education (D), and 27 from the division of Business & Technology (E).

Participation in the study was voluntary and participant responses to the questionnaire and interview questions were kept anonymous. The risks for both the student and instructor participants were minimal. It is highly unlikely the responses to the questionnaires or interviews could be directly connected with the identities of the participants. The researchers could possibly identify instructors and students who chose to participate in the interviews during face-to-face interviews. The identities were not reported and every measure was taken to protect the anonymity of the research participants. The volunteers could discontinue participation in the research at any time.

Descriptive Statistics

Out of 35 respondents to the instructor questionnaire, 77% were female and 23% of the respondents were male. The age groups were varied: there were 14% in the 25-34 age group, 29% in the 35-44 age group, 31% in the 45-54 age group, 17% in the 55-64 age group, and about 9% who identified as 65 and older. The Business and Technology division had 3% representation; Health Sciences had 9%, Humanities had 37%, Math and Science had 29%, and Social Science and Education had 23% representation in the data set for the questionnaire.

For the student questionnaire, 68% of the respondents were female and 32% were male. Regarding ages, 61% were in the 18-24 age group, 9% were in the 25-29 age group, 10% were in the 30-34 age group, 4% were in the 35-39 age group, 5% were in the 40-44 age group, 2% were in the 45-49 age group, and 7% of the sample identified as 50 and older.

With respect to racial and ethnic identification, 9% identified as Hispanic, 3% identified as American Indian or Alaskan Native, 2% identified as Asian, 10% identified as Black-American, and 84% identified as White-American, with no one self-identifying as Native Hawaiian. With respect to the institutional divisions, the Business and Technology division had 28% representation; Health Sciences had 30%, Humanities had 5%, Math and Science had 13%, and Social Science and Education had 23% representation in the data set for the questionnaire.

Description of Research Instrumentation

This predominantly qualitative case study described the instructor and student perceptions of TML and the ways in which instructors learn to use these tools in instructional practices. The research developed a deeper understanding of the perspectives of both community college instructors and students on the topic of technology as it relates to the uses, acquisition of skills, and perceptions to answer the research questions. The instruments were designed to consider the ways in which technology is used as a tool to mediate learning. Both the questionnaire and the interview questions were designed to reveal the student perceptions of their experiences with the use of technology in the classroom including technology used for the delivery of course content, communication, and assignments.

Moseley (2010) completed a similar study on the uses and perceptions of technology using instructor and student questionnaires as well as instructor and student interview questions. This conceptual framework regarding community college student and faculty technology perceptions helped to guide the selection and adaptation of the instruments used in this study. Permission to use and adapt the questionnaires, informed consent, and interview questions was obtained (Appendix F). The instructor and student questionnaire instruments were rewritten to include questions about the instructional division, the acquisition of technology skills, and the perceptions of the impact technology use has on student engagement and achievement (Appendix B & D). Questions concerning student engagement were developed to measure the perceived impact of TML on the behavioral, cognitive, and emotional engagement of students.

A field test and instrument pilot was performed using a panel of instructors and students to help determine the validity of the questionnaires. A statistical analysis of field test responses to the questionnaire items was conducted to determine the internal consistency and reliability for each item on the individual instructor and student questionnaires.

Instructor questionnaire. Descriptive and perception data were collected from the instructor questionnaire (Appendix B). The instrument consisted of 28 total items divided into 8 sections: personal information, frequency of use, technology used to deliver instructional content, technology used for communication, technology used for student assignments, comfort with technology, and the acquisition of new technology skills and further research participation questions, providing the research with demographic data, descriptions of the uses of technology, and the perceptions of technology use.

Questions 1 through 3 were demographic information including gender, age range, and instructional division. The items identifying gender and age range were optional response items. The choices for instructional divisions were: Health Sciences, Business and Technology, Humanities, Math and Science, Social Science and Education, and other, in the event that respondents knew their major but could not articulate their respective division (instructors could easily match the majors with the divisions through the institution's website).

Responses to Questions 4 through 7 described the frequency of technology use in the classroom using a 4-point Likert-type scale. Each frequency level was assigned a number value:

occasionally= 1, somewhat occasionally= 2, somewhat consistently= 3, and consistently= 4. These items included an overall frequency of technology use as well as items to individually reported the frequency in which technology is used in the classroom, used to deliver instructional content, used to communicate with students, and used as part of a required student assignment. These scores were averaged to yield an overall score for frequency of use. The responses to Questions 8 through 12 described the perceptions of the use of technology to deliver instructional content and identified the specific technology tools, applications and programs used to deliver instructional content.

The next two sections of the questionnaire included technology used for communication and technology used for student assignments. For each of these sections (Questions 13 through 22), the instructor was asked to rate how strongly they agreed or disagreed with a series of statements describing the specific uses of technology and to rate their perceptions of how those uses translate into behavioral engagement, cognitive engagement, emotional engagement, and student achievement. The ratings were a Likert-type scale with an assigned value in order to achieve an average score for each section: strongly disagree= 1, disagree= 2, agree= 3, and strongly agree= 4. A neutral rating was not provided in an effort to avoid ambiguity in individual response items. Instructors were then asked to identify the technology tools, applications, and programs they used to deliver instructional content, for communication, and for student assignments.

The questionnaire also included open-ended response items. Questions 23 through 25 and Question 27 were open-ended response items. Instructors were asked to describe their overall comfort with technology-mediated learning tools and the types of ways in which they acquire those skills needed for TML. They were asked to share other thoughts and ideas about

TML. Question 25 asked instructors to identify what technology tools, applications, or programs they would use frequently if they were made available. Question 26 asked for the instructor's participation in interviews for further research. The last item was included for willing instructors to upload a sample course syllabus, if they desired.

Student questionnaire. The student questionnaire consisted of 34 items to identify student uses and perceptions of technology-mediated learning (Appendix D). The questionnaire was divided into 7 sections: personal information, frequency of use, technology used to deliver instructional content, technology used for communication, technology used for assignments, instructional models including traditional, hybrid, and flipped classroom models, and a further research participation question.

Questions 1 through 5 were demographic information including gender, age range, race/ethnicity identification, high school dual-enrollment status, and instructional division. The items identifying gender and age range were optional response items. The student questionnaire helped to identify basic demographic information and eliminate the participation of minors and high school students in the study. If the student was below the age of 18 or still enrolled in high school, the RedCap program terminated the questionnaire and thanked the student for their participation. The next items included the student's major program of study. The choices for instructional divisions were: Health Sciences, Business and Technology, Humanities, Math and Science, Social Science and Education, and other.

Responses to Questions 6 through 10 described the frequency of technology use in the classroom using a 4-point Likert-type scale. Each frequency level was assigned a number value: occasionally= 1, somewhat occasionally= 2, somewhat consistently= 3, and consistently= 4. These items included an overall frequency of technology use as well as items to individually report the frequency in which technology is used in the classroom, used to learn instructional content, used to communicate with peers and instructors, and used as part of completing student assignments. These scores were averaged to yield an overall score for frequency of use. The responses to Questions 11 through 15 described the perceptions of the use of technology to deliver instructional content and identified the specific technology tools, applications and programs used to deliver instructional content.

The next two sections of the questionnaire included technology used for communication, and technology used for student assignments. For each of these sections, Questions 15 through 25, the student was asked to rate how strongly they agreed or disagreed with a series of statements describing the specific uses of technology and to rate their perceptions of how those uses translate into behavioral engagement, cognitive engagement, emotional engagement, and student achievement. The ratings were a Likert-type scale with an assigned value in order to achieve an average score for each section: strongly disagree= 1, disagree= 2, agree= 3, and strongly agree= 4. As with the instructor questionnaire, a neutral rating was not provided in an effort to avoid ambiguity in individual response items. Students were then asked to identify the technology tools, applications, and programs used to deliver instructional content, for communication, and for student assignments.

The final questions on the student questionnaire dealt with traditional, hybrid and flipped classroom instructional models. In Questions 26 through 28, the students reported the percent of their courses that utilized traditional, hybrid, or flipped classroom instructional models. Students used a 4-point Likert-type scale to report the extent to which they agree with statements concerning the instructional models' influences on student engagement and achievement. One item was included for students willing to participate in an interview for further research.

Archival data analysis. The researchers analyzed the course syllabi submitted from a random sample of three instructors, per division. The archival documents were coded and findings were recorded as they related to uses of TML. The number of class sessions and any evidence of instructional models for the course were recorded, if available. Any items relating to technology used to deliver instructional content, technology used for communication, and technology used for assignments were coded and recorded.

Instructor and student interviews. The instructor and student interview questions in the Moseley (2010) study (Appendix F) were used and modified based on the analyses of the responses from the instructor and student questionnaires and observations from the collection of course syllabi. Emergent themes from prior research, responses to the instructor and student questionnaires, and observations made during the review of course syllabi were discussed and further explored in the face-to-face instructor and student interviews.

Pilot/Field Testing

According to Gall et al. (2007), when using an instrument, it must be tested for reliability and validity to ensure the data will be reasonably unbiased (p. 253). The instruments created by Moseley (2010) were tested for validity by a panel of experts. Changes have been made to these instruments and required an additional field test for reliability and validity. The researchers developed two questionnaires, one for the instructors and one for the students of the institution. The researchers obtained permission from Dr. Bill Moseley, Dean of Academic Technology at Bakersfield College, to adapt the instruments specific to addressing the hypotheses in this study (Appendix F). The questionnaires were modified and formatted for this study and sent to the Institutional Review Board (IRB) approval.

Once IRB cleared the questionnaires and interview questions, the researchers piloted the questionnaires for validity and reliability. To test the validity of the questionnaires, the researchers sent the instruments to a panel of experts requesting relevant feedback. Among the four experts were an academic technology dean, a data analyst and accountability director of a local school district, and a director of curriculum and instruction of a local university. Lastly, the researchers enlisted the feedback from a research and statistics expert and professor of a local university, to look at the continuity of the purpose, research questions and questionnaires of this study. The feedback received suggested changes to the Likert-scales, layout, and formatting of questions. The Likert-scales were changed from five to four options, per advisement, to reduce ambiguous, individual responses. An explanation was added to the beginning of each section to add clarity to definitions and concepts related to that section. Statements were formatted to show positive affect and allow the respondents to strongly agree, agree, disagree, or strongly disagree. The research and statistics expert confirmed that the questions were congruent to the research questions and aligned with the purpose of the study. Afterward, the instruments were uploaded to an online platform and sent out to local high school instructors and students to gather perceptions of technology used in classroom for the purposes of measuring the instrument reliability.

The reliability was tested with 31 student responses and 32 instructor responses, using the Cronbach's alpha test for item reliability. Only the perceptions questions with Likert-responses were included in the analysis. Demographic and open-ended questions were excluded. This analysis was used to determine the consistency of the items. According to Wells and Wollack (2003):

> Test reliability refers to the consistency of scores students would receive on alternate forms of the same test. Due to differences in the exact content being assessed on the alternate forms, environmental variables such as fatigue or lighting, or student error in responding, no two tests will consistently produce identical results. (p. 1)

Wells and Wollack also asserted that testing for consistency of scores is important because it measures random measurement error, achieved through various factors such as participant, test and scoring-specific errors (p. 1).

Using the interactive statistical discovery software, JMP, both instruments were analyzed for reliability. According to AEA, LLC (2016) the value of the Cronbach's alpha should be between .70 and .95, suggesting that lower than this range might indicate errors in test items that need to be corrected, and that higher than this range might suggest redundancy in test items (p. 1). In the instructors' perceptions dataset, the Cronbach's alpha (0.897) and the standardized alpha (0.914) were within the accepted range and close in value, giving no indication that any test items should be excluded from the instrument. In the students' perceptions dataset, the Cronbach's alpha (0.899) and the standardized alpha (0.904) were also within the proper range and closer in value, suggesting that no items should be eliminated for better instrument reliability. After the pilot testing, the researchers sent the improved instruments to IRB and JRC for final approval before actual administration of the instruments for this study.

Data Analysis

As a predominantly qualitative study, the researchers employed the use of content analysis to gain a better understanding of the data from questionnaires and instructor interviews. According to Berg and Lune (2012) content analysis is the "systematic examination and interpretation of a particular body of material in an effort to identify patterns, themes, biases, and meanings" (p. 349). These qualitative data are coded and analyzed to in this way to address the research questions (p. 350). For this research an interpretative approach was used for content analysis of qualitative data. Data from this study were analyzed using the following process (adapted from Berg & Lune, 2012, p. 352):

1. Data were collected and converted into text and descriptions (e.g. interview notes, tallies and thick descriptions of technology use from syllabi, etc.).
2. Codes were developed and attached to the descriptions and responses.
3. Codes were assigned based on themes.
4. Transcribed data were sorted into these categories and themes.
5. The sorted materials were analyzed to find patterns.
6. These patterns were compared to the existing research.

The research team identified emergent patterns and analyzed open and Likert scale responses. Questionnaire, interview transcription notes, archival data were codified, categorized, and compared in order to find the common themes and patterns. The individual responses and patterns were used to answer the research questions and develop interview questions.

Specific items from instructor and student questionnaires and interviews were aligned to each of the qualitative research questions. Coded course syllabi, responses to Instructor Questionnaire Questions 8, 13, 17, 23, 24, and 25 and responses to all interview questions were used to answer Question 1. Research Question 2 was answered using Student Questionnaire Questions 5 through 25. The responses to Questions 13, 18, and 23 represented student perceptions of the impact of TML on cognitive engagement, Questions 12, 17, 22 represented student perceptions of the impact of TML of behavioral engagement, Questions 14, 19, and 24 represented student perceptions of the impact of TML on emotional engagement, and Questions

15, 20, and 25 represented perceptions of the impact of TML on achievement. Responses to all student interview questions were also used to answer Research Question 2. Research Question 3 was answered using instructor questionnaire responses to Questions 9, 14, and 19 for instructor perceptions of the impact of TML on behavioral engagement, responses to Questions 10, 15, and 20 represented instructor perceptions of the impact of TML on cognitive engagement, questions, and Questions 11, 16, and 21 represented instructor perceptions of the impact of TML on emotional engagement.

A nomenclature was used to classify the responses and maintain the anonymity of participants. The first letter indicated whether the response was from a student (S) or instructor (I). The second letter indicated whether it was referencing a questionnaire response (Q), or an interview response (X). The number at the end of the nomenclature referenced the number assigned to the response. For example, SX5 refers to Student Interview 5 and IQ17 refers to Instructor Questionnaire 17. If the responses were incomplete, they were not included in the analysis.

A similar nomenclature was used to code course syllabi and to protect the anonymity of instructors. The first letter of this coding is (Y) to indicate the data was collected from course syllabi. The second letter represents the division the course syllabi belongs to: Health Science (A), Humanities (B), Math & Science (C), Social Sciences & Education (D), and Business & Technology (E). Three course syllabi were collected from each division. Thus, the number at the end of the nomenclature referenced the number assigned to individual course syllabi. For example, YA3 refers to the third course syllabus collected from the Humanities division.

The quantitative analyses of data included tests of comparison to detect statistically significant differences between variables in the study to answer Research Questions 4, 5, 6, and

7. ANOVA analyses (parametric and nonparametric equivalent) were used to determine how the instructional divisions compared in the measure of perceived usefulness of TML instruction and the frequency of instructors' use of TML instruction. This was helpful to give the researchers an idea of variance between different divisions. According to Gall et al. (2007), this test is usually issued instead of running myriad t-tests for comparisons between the groups to find variances. Instead, the t -Test for multiple comparisons is used to focus on specific subgroups that have the greatest correlation with itself than between the groups themselves (pp. 318-319). This information identified which group of technology-user is the most likely to have the most variance, thus strengthening any comparisons that could be made between those groups.

Quantitative Research Questions 4 through 7 were answered using coded data from instructor and student questionnaires. Items from instructor and student questionnaires and interviews were aligned to each of the quantitative research questions. Responses to instructor questionnaire items 9 through 12, 14 through 17, and 19 through 22 were averaged to one score to represent instructor perceptions of the usefulness of TML, answering Question 4. A non-parametric Kruskal-Wallis test was performed to determine if there was a statistically significant difference of the perceptions of usefulness scores between instructional divisions. A combined average of responses to items 4 through 7 of the instructor questionnaire was used to answer Research Question 5. A Kruskal-Wallis was performed to determine if there was a statistically significant difference in the frequency scores between instructional divisions. Responses to items 32 and 33 of the student questionnaire were used to provide the answer Research Question 6. A Kruskal-Wallis was performed to determine if there was a statistically significant difference in the perception of the impact of the use of TML on engagement between students' preferred instructional model. For Question 7, the responses to items 15, 20, and 25 on the student questionnaire were averaged for a score that represented a perception of the effect of TML on achievement. After resolving all assumptions for this particular set of variables, an Independent t-Test was performed to compare the perception score with the students' responses to Question 33. This analysis was used to determine if there was a statistically significant difference in the perceptions of the use of TML on achievement between students' preferred instructional model.

Disposition of Data

The tables of instructor and student uses and perceptions of technology, as provided in this study, was the only artifact that was retained. The researchers used a secured external drive to collect and store data. The drive was retained for a calendar year after the research was completed. Once the data have been held for a year, the researchers destroyed the external drive and its contents.

Chapter 4: Results

This chapter reports the findings based on instructor questionnaires, student questionnaires, instructor interviews, student interviews, and course syllabi. A statistical analysis of quantitative data is also presented in this chapter. The analysis includes qualitative and quantitative data, reported by research question. The qualitative research Questions 1 through 3 are reported with a priori and emergent themes that arose from the study. The quantitative Questions 4 through 7 are reported with assumptions and statistical analyses.

Results of Qualitative Data

To answer the first three questions of the research, the researchers employed a qualitative research design. Instructor and student perceptions were determined from the collection of questionnaire responses, interview responses, and observations of course syllabi. All data acquired from questionnaires, interviews and observations of syllabi were coded and analyzed for trends that appeared in the timeframe provided for data collection and analysis. The themes reported in this study involved various methods of technology mediation in the classroom—delivery of course content, communication, assignments. Each of these themes repeat as they relate to the instructors' or students' perceptions based on the research question. Pursuant to the MOU and the questionnaire, comfort of use, acquisition of technology, and student outcomes of engagement and achievement were also reported. In addition, other themes that came from the student data were affirmations and barriers to the use of TML.

Research Question 1. What is the perception of instructors regarding how they utilize technology in the classroom, and how they acquire skills used in technology-mediated learning (TML)?

To address this question, the researchers analyzed various data points based on aspects of technology use in the classroom as categorized in the questionnaires, discussed in the interview questions and observed in syllabi. The themes that emerged to address this portion of the research were: delivery of course content, communication, assignments, comfort of use, and acquisition of technology skills.

Delivery of course content. Instructors identified ways in which technology is used in their classrooms to deliver instruction and course content. Table 1 shows the technology reported, the number of instructors who reported that technology, and the percent of the responses that included that technology. Information from interview responses and a random sample of course syllabi was also used to identify technology used to deliver course content.

The uses most frequently reported on the instructor questionnaire were PowerPoint or Slide show type presentations (85.71%), video (77.14%), online discussion forums (68.57%), and class websites (57.14%). Responses that included Kahoot and other online quizzes (IQ4, IQ7, IQ15, IQ21, and IQ40) were classified as online quizzes. References to digital guided notes (IQ39), ELMO projector (IQ31), projected web pages (IQ25), and projections (IQ1) were grouped into the projection hardware category. The responses that included Padlet (IQ7), clickers (IQ23), and Poll Everywhere (IQ7, IQ21, IQ30, IQ38) were included in student response technology. App based demonstrations (IQ9), in class web apps (IQ1 and IQ9), and interactive graphs and maps (IQ21) were grouped as in-class web applications. MyMathLab (IQ23) and online software with multifunctional exercises and real world simulations (IQ18) were grouped as online software. Graphing calculators (IQ23) and AppleTV (IQ39) were grouped as other hardware.

Table 1

Technology used to Deliver Instructional Content

Technology	n	Percent of Respondents
PowerPoint or slides	30	85.71
Videos	27	77.14
Online discussion forums	24	68.57
Class websites	20	57.14
Podcasts	8	22.86
Recorded audio	7	20
Gaming	6	17.14
Student response technology	6	17.17
Online quizzes	5	14.28
Projection hardware	4	11.42
Class web applications	4	11.42
Online software	2	5.71
Textbook websites	2	5.71
Other hardware	2	5.71

Instructor interviews also revealed the use of technology to deliver instructional content. Instructors were asked to identify which technologies from the questionnaire they find the most useful and how the technology is used in their classes. One instructor stated, “all of the above (PowerPoint, video, etc.) are important. Online discussion boards and gaming, if used in balance" (IX2). Another instructor explained that the most useful technology is, "PowerPoint, if they can do a good PowerPoint. It has to be used purposefully" (IX1). A third instructor reported, "E-Learn (D2L) is very useful but you can't force students to log on. It has everything, students have access to study materials, tutorial videos with practice modules, notes, PPTs, videos" (IX3).

Responses to other interview questions revealed technology used by instructors to deliver course content. These statements included: "I see a lot of people using PowerPoint" (IX1), "I bring in an iPad to remotely control slide presentations. That way I can walk away from the podium" (IX1), "homework and tests are taken online" (IX3), "I use online learning tools like Kahoot. I don't use it as a grade in class, but as an engagement tool" (IX2), "I still do traditional stuff. I use technology to play music, show videos, use interactive games, polling apps and WheelDecide.com" (IX2), "Padlet is an app that allows students to take selfies and descriptions to introduce themselves" and, "World of ClassCraft is a role-play character game a lot like World of WarCraft" (IX2), "All have to have an online page for each course" (IX3).

Technology used to deliver instructional content was also observed in course syllabi. In course syllabus (YA1) the instructor required the use of a web-based tutorial site that allows students to prep for certification exams and take continued education courses. This course also employed the use of "Desire 2 Learn/E-Learn", which is referred to as D2L, a web-based campus-wide learning management system. Course syllabus (YB1) stated that students would use featured films and would require reliable internet connection. This course followed a hybrid class format. The textbook for this course was also offered in an electronic book (e-book) format. The course (YB3) was conducted in an online course format. Students enrolled in this course accessed e-Learn, Windows Media Player, QuickTime, and Launch Pad for delivery of course content. The textbook for this course was also offered in e-book format. Course (YC1) only offered access to an e-book, but did not use much technology for delivery of course content. The course syllabus for (YC2) utilized technology for mathematical reasoning and problem solving, and required students to have an access code to MyLabsPlus. This is a web-based learning management system where students can access the electronic textbook and blended learning opportunities. Course (YD2) mentioned that students could retrieve selected chapters of a textbook and other course resources online via the school's e-Learn system. Courses (YE1), (YE2), and (YE3) were all online courses that used e-Learn as the main hub of course content. The course syllabi for (YE1) and (YE3) made use of a special web-based program titled, CengageNOWv2, for course materials and e-book access. Course (YE3) also utilized a web-based site by the name of LabSim which is a learning platform that offers course work, certification prep, and virtual simulations. The course syllabi for courses (YA2), (YA3), (YB2), (YC3), (YD1), and (YD3) did not employ any technological use for the delivery of course content.

Communication. Table 2 reveals the communication technology most frequently was: email (100%); online discussion forums (71.43%); and texting and alert services (40%). Technology used to communicate were also observed in course syllabi. In course syllabus (YA1), the instructor explained that Facebook, Messenger, and email would be used daily as the primary mode of communication to interact with students. Course syllabus (YE1) stated that email, e-Learn/D2L, Cengage, and online discussion would be utilized to transmit information. The course syllabus (YB2) made use of email and the Academic Early Alerts system to communicate and offer feedback to students. Based on the course syllabi (YC1), the

Academic Early Alert system was the only mode of technology used to warn students of poor academic progress. The course syllabi (YD2), (YE2), and (YE3) employed the specific use of emails via e-Learn/D2L. Syllabi (YE2) and (YE3) also used online discussion. Course syllabus (YC2) only spoke of email to converse with students. Syllabi from courses (YB1), (YB3), and (YD3) show instructors engaged with students via email, and used online discussion to foster communication between students. The following syllabi did not reference any form of technology to communicate with students: (YA2), (YA3), (YC3), and (YD1).

Table 2

Technology used to Communicate

Technology	n	Percent of Respondents
Email	35	100
Online discussion forum	25	71.43
Texting and alert services	14	40
Social media	6	17.14
e-Learn news bulletin	1	2.85
Apps	1	2.85
Office and cell phone	1	2.85

The perceptions of technology used for communication were discovered in the open response question on the questionnaire and through interview responses. A common theme among the responses was the failure of students to participate in communication through the use of email or other technologies. One instructor responded:

> Email is great as long as a student responds. Students aren't good with following through on emails… I have to take class time to prompt them to do what I told them in the email since I am not able to get students to respond to feedback... I would like to start using some version of Skype for communication, but I think that students won't log in… technology can help to speed up the feedback that is given to students. (IX3)

Another response noted, "I can e-mail a student all day long. If that student never opens the e-mail, technology has done nothing to enhance my contact with that student" (IQ24). One instructor has received negative feedback from students regarding the usefulness of technology for communication and noted that most students prefer to ask about grades and feedback informally (IX2).

Assignments. Online discussion forums (62.86%), PowerPoints (45.71%), videos (45.71%), and class websites (48.57%) were reported most often by instructors as technology needed to complete assignments for their courses. IQ27 reported, "Some student assignments are submitted through the class website, although website is rather a misnomer. It is the e-Learn location for the class." IQ18 added, "databases, Word, Excel spreadsheets" as technology needed for assignments. Other technology added by instructors to this question included graphing calculator (IQ23), clickers (IQ23), Dropbox (IQ9), professional organization websites (IQ14), online homework sites (IQ16), and questions posted online/quizzes (IQ15). MyLabsPlus (IQ6, IQ13, IQ39) and MyMathLabs (IQ23) were combined and reported as MyLabsPlus/ MyMathLabs. The response that indicated e-Learn was used to complete assignments was combined with class websites. Table 3 reports the technology required to complete assignments.

Table 3

Technology required to Complete Assignments

Technology	n	Percent of Respondents
Online discussion forums	22	62.86
Class websites	16	48.57
PowerPoint or slides	16	45.71
Videos	16	45.71
Recorded audio	6	17.14
e-portfolio	5	14.29
Podcast	5	14.29
MyLabsPlus / MyMathLabs	4	11.42
Gaming	1	2.86
Online quizzes	1	2.86
Online homework site	1	2.86
Professional website	1	2.86
Dropbox	1	2.86
Clickers	1	2.86
Graphing calculator	1	2.86
Databases	1	2.86

Interview responses and course syllabi referenced technologies needed to complete course assignments. The interview responses, however, did not reveal detailed descriptions of uses. Respondents referenced, "software that goes along with the textbook… technology helps with tests and assignments… homework and tests are taken online" (IX3). One instructor noted student-created PowerPoints typically, "are very fundamental and lack depth necessary to evaluate student learning" (IX1). Syllabi generally referenced the use of D2L and e-Learn where students are expected to post and respond to discussion boards. Course syllabus (YE1) indicated the instructor employed the use of email, e-Learn/D2L, Cengage, and online discussion posts. Course syllabus (YB1) mentioned online discussion posts, Dropbox, and email. Course syllabus (YE3) spoke of email via e-Learn/D2L, LabSim, and online discussion posts. While course syllabus (YC2) utilized MyLabsPlus, e-Learn, and graphing calculators. Course syllabus (YD3) made use of Aplia, email, and online discussion posts. The course syllabus for (YE2) only used email via e-Learn/D2L and online discussion posts. Similarly, (YB3) only used online discussion posts and video recording devices. Syllabi (YA1), (YC1), and (YD2) utilized e-Learn solely. Lastly, course syllabus (YB2) only used Aplia. The following syllabi did not use any form of technology for course assignments: (YA2), (YA3), (YC3), and (YD1).

Comfort of use. Comfort of use was determined by analyzing responses to instructor questionnaires and instructor interviews. Instructors were asked to describe their comfort with the use of technology in the classroom through an open response item on the instructor questionnaire. Interview responses were also analyzed for indications of comfort with technology use. The responses were coded into common themes including levels of comfort, concerns, assurances and willingness to adopt.

The replies to the open response item were generally able to be placed on a scale to represent the level of comfort. Those responses were categorized into low comfort, moderate comfort, and high comfort in Table 4. Responses coded as moderate comfort included: “Good”, “Okay”, “Moderate comfort”, “Moderate to strong”, “Average but getting more comfortable”, “Proficient”, “I am comfortable with the technology I currently use”, “Average”, “Adequate”, and “Somewhat comfortable.” Responses coded as high comfort included: “Strong”, “Very”, “Very comfortable”, “Comfortable—8 out of 10”, “Very high comfort”, and “Extremely comfortable.”

Table 4

Level of Comfort with Technology Use

Level	n	Percent of Responses
Moderate Comfort	18	51.42
High Comfort	17	48.57
Low Comfort	0	0

Instructor interview responses indicated barriers that have affected the comfort with the use of technology in the classroom. These barriers fall into five categories including hardware, internet speed, and interface issues, instructor perceptions of student efficacy with technology, failure of technology to meet the instructional purpose, instructor buy-in, and student access and willingness to access.

Hardware, internet speed, and interface concerns were revealed in interview responses as barriers to the comfort with use of technology. One instructor stated:

> I use Keynote which is the Mac version of PowerPoint, we are officially a Microsoft campus so I need to bring in my own connectors and cables. I would like it if there wasn't an assumption that we all use PCs. Our goal should be to make things work. There is a Microsoft monoculture, there need to be more options for making materials accessible. I make mine accessible and ADA compliant by creating PDF files. Work-stations were different between rooms and we are not always assigned to the same room. There is no real standard, for how to set up projectors. It can break the students' confidence in the instructor's abilities. It would be good to walk into any classroom and be uniform. (IX1)

Another instructor noted:

> Some of the disadvantages that you see are technology lagging. Students can't access quickly, the technology is not moving quick enough, or the internet is lagging due to over access. I would like to use the Smart board more, but I become somewhat impatient with it. Patience with technology is a weakness for me. (IX2)

An instructor described technology as, "...wonderful when it works. In our campus, we have a number of issues that interrupt our ability to use the technology that is available" (IQ30). Instructor perceptions of the students' ability to appropriately use technology also interferes with the comfort they have for use in instruction. A common theme in responses is that students think they know more about technology use than they do. An instructor explained, "I want to make sure that the technology isn't providing an extra layer getting in the way of learning. Student information technology use is just horrible. Students struggle with searches" (IX1). One instructor stated, "About 80% of my students can comfortably use technology" (IX2). Another instructor pointed out that, "students won't take advantage, they think they know it already so they don't take advantage of D2L and end up failing. I have to take class time to prompt students to do what I said in an email" (IX3).

The ability of the technology to meet the instructional purpose also influenced an instructor's use in instruction. An instructor explained:

> I try to decide if it is going to be more trouble than it is worth. I need to set up 5 minutes before the class to be ready to go. I try to determine if there is a more direct and cost effective way to do this. I always think about purpose, if this is the most cost effective, efficient and interesting way to do this. If it is, then I use it. We need to be intentional not to standardize the students' experiences. They need to work in a variety of settings and deal with certainty and ambiguity and be able to navigate different learning environments. (IX1)

A response to the final open ended question on the survey stated, "Technology is a tool, not a panacea" (IQ24).

The lack of instructor buy-in was also established as a barrier to comfort with the integration of technology into instruction. One instructor stated, "I would like the college to provide data to see that it works better" (IX1). Another instructor explained:

> They are trying to go more paperless and there is a concern, based on research, that it is not as helpful. It's convenient, but not as effective. I believe that some of my colleagues' barriers with TML is their willingness or ignorance to access. There are times when people get settled and think their class is in the right place. But you can't remain stagnant. (IX2)

Acquisition. In Table 5, instructors described ways in which they have acquired the skills necessary to use technology in instruction. The responses on the questionnaire revealed the majority of instructors acquire technology skills through self-study. When describing the acquisition of technology skills, a combination of both self-study and institutional support were reported by 37.14% of the instructors. One instructor reported, “I learn about technology and choose what to select through the institution, through my colleagues, and some of it I learn from my own personal interest and research” (IX2). Most of the interview responses represented the instructional support and professional development that is offered by or through the institution. One instructor reported using the media room for professional development (IX2). “IPads in the Classroom” and “Windows 95 and Beyond” were both mentioned as professional development attended by instructors (IX2 and IX3). The Distributive Technology department was recognized as a support for instructors to ensure that online Americans with Disabilities Act (ADA) standards are met (IX3). Prior career fields were also noted for providing experience with technology.

Table 5

Instructor Acquisition of Technology Skills

Acquired by	n	Percent of Respondents
Self-study	18	51.42
Combination of Both	13	37.14
Institutional Support	4	11.42

Research Question 2. What is the perception of students regarding their experience with technology in the classroom?

For Question 2, the researchers analyzed student perceptions of aspects of technology use in the classroom through the questionnaire and interview responses. Within each of these uses of technology, the student perceptions of frequency of use, the use of specific technology tools and applications, the impact on engagement, and the impact on achievement were analyzed. Affirmations of and barriers to technology use were additional themes that emerged from the analysis of the student interview responses.

Perceptions of frequency were collected on the student questionnaire and from responses to student interviews. The mean score for the student perceptions of the overall frequency of technology use in the classroom was 2.86 which falls between “somewhat occasionally” and “somewhat consistently”. The majority of students’ reported technology is used in all of their classes. This was revealed in statements including: “I can’t think of one class that I haven’t used technology in. Out of 3 hours a week, half or more of that time is using technology. I’m counting PowerPoints, and all of that, too, not just internet-based” (SX1), “We use it in every class, we are able to download PowerPoints and all of the content on a daily basis” (SX2), “We use technology pretty much all of the time” (SX5), and “I use technology in every class I’ve taken. It has mostly been entry-level stuff. All instructors I have had have used technology as an instructional tool” (SX6).

Perceptions of the usefulness of technology to influence engagement and achievement were also gleaned from the student questionnaire and interviews. The individual scores for the perception of the uses of technology to impact behavioral, cognitive, and emotional engagement and the scores for the perceptions of the uses of technology to impact student achievement were combined to yield a mean score of usefulness. The individual items on the questionnaire asked students to select how strongly they disagree or agree with a statement about the influence of technology. The overall mean usefulness score was 3.04. This was interpreted to mean students generally agreed that technology has a positive impact on engagement and achievement.

Student interviews revealed both positive and negative perceptions of the effect of TML on engagement and achievement. Some students claimed the use of TML increases engagement and student learning while others felt it can be distracting. One student stated, "If you would incorporate it more, you would get more engagement from students. Classes are more engaging because of pure interaction with technology" (SX3). Another student shared:

> It felt nice when there was material to practice outside of class to dig deeper and clarify concepts through the use of technology. Good supplemental material is most effective. I'd like it if professors would use it more in the classroom. (SX6)

SX3 also credited TML for positively impacting student achievement stating, "It has improved my learning." Technology was also reported as having negative implications for student engagement. Technology was negatively credited for its distractions, tendency for over reliance, and improper usage. One student stated:

> As a mother, I feel like it's distracting to everyone. It takes away from personal relationships. It can present a divide with people who don't know how to use the technology like foreign exchange students and students who are old school. Technology can further complicate and take away from their experiences. (SX1)

This respondent also shared her perception of TML on learning and achievement. She was skeptical of how much students are actually learning. She explained:

> The school browser is not secure, and one can simply do work and look up the information. It takes away from the people's basic skills. People who are younger can't do basic math anymore and they rely on calculators because that's all they're used to. (SX1)

Delivery of course content. Student perceptions of the specific uses of technology to deliver instructional content were represented by the responses to Student Questionnaire 11 and interview responses. Table 6 shows the technology reported, the number of students who reported that technology, and the percent of the responses that included that technology. Interview responses were also coded and reported to identify the student perception of the technology used to deliver course content. One student identified the e-Learn learning management system (SQ94). The e-Learn learning management system was combined and reported with class websites. Virtual labs and interactive simulation software were also combined into one category. The uses most frequently reported on the student questionnaire were PowerPoint or slides (95.83%), videos (77.08%), online discussion forums (71.87%), and class websites (66.66%). Student interview responses also referenced classroom use of PowerPoint presentations, e-Learn websites, discussion board posts, e-books, YouTube videos, and Microsoft Office products.

Table 6

Student Perceptions of Technology used to Deliver Instructional Content

Technology	n	Percent of Respondents
PowerPoint or slides	92	95.83
Videos	74	77.08
Online discussion forums	69	71.87
Class websites	64	66.66
Podcasts	14	14.58
Recorded audio	7	20

Gaming	5	5.20
Interactive Virtual Software	3	3.12
Google Drive	2	2.08
Adobe PDF	1	1.04
Microsoft Office Products	1	1.04
AutoCAD	1	1.04
E books	1	1.04
Phones	1	1.04

Most perceptions of the usefulness of technology used to deliver instructional content were positive. The mean score of the student perception of the frequency of use of technology to deliver instructional content was 3.26 which falls between “somewhat consistently” and “consistently”. Table 7 revealed that students generally agreed that technology used to deliver instructional content positively impacts student engagement (M= 3.00) and student achievement (M= 2.94). SX2 felt being able to access and download the instructional PowerPoints and course content from the e-Learn environment was helpful. SX5 noted the e-book used for one class was particularly useful because it provided examples of lab work. SX6, however described one class experience when he perceived the D2L e-Learn environment was “just a dump for PowerPoints.”

Aspects of e-books and online content emerged as a theme for perceptions of technology use to deliver instructional content. The perceptions of e-books and online content were inconsistent. SX3 explained that she prefers e-books over regular textbooks. She noted:

> There is no book purchase required. I can do all of the things in a digital book that I can in a regular book and spend less on materials. We already pay for technology, might as well benefit from the access I have. Online books are cheaper and more accessible and there's no losing them. The content apps go with you. (SX3)

SX5 explained e-books were not as useful because "there isn't much nuance in an e-book," and SX4 shared, "Online books are the least useful. You can't write in them or put sticky notes."

Table 7

Usefulness of Technology used to Deliver Instructional Content: Students

Use	M	Qualitative Interpretation
Overall Engagement	3.00	Agree TML has a positive impact on student engagement
Behavioral Engagement	3.08	Agree TML has positive impact on behavioral engagement
Cognitive Engagement	3.02	Agree TML has positive impact on cognitive engagement
Emotional Engagement	2.92	Agree TML has positive impact on emotional engagement
Achievement	2.94	Agree TML has positive impact on student achievement

Communication. Table 8 shows the technology reported, the number of students who reported that technology, and the percent of the responses that included that technology. The response that specifically cited e-Learn email was combined with the email responses (SQ114). Interview responses were also coded and reported to identify the student perception of the technology used to communicate.

Table 8

Student Perceptions of Technology used to Communicate

Technology	n	Percent of Respondents
Email	91	94.79
Online discussion boards	75	78.12
Texting	67	69.79
Social Media	44	45.83
Apps	2	2.08
None	2	2.08
Skype	1	1.04

The mean score for the student perceptions of the frequency of use of technology to communicate was 3.12 which is slightly above “somewhat consistently”. This score is an average of the perception of frequency of technology used to communicate with peers (3.03) and the perception of frequency of technology used to communicate with instructors (3.28). Both averages fell in the “somewhat consistently” frequency level.

The student perceptions of the usefulness of TML to communicate were acquired from questionnaire and interview responses. In Table 9, responses to the student questionnaire showed technology used to communicate was generally perceived as having a positive impact on student engagement (M= 3.03) and student achievement (M= 3.04). SX4 identified email as the most useful technology and recognized he depended on email more than text messaging for communication. SX6 noted message and chat boards in e-Learn are good to build community, but found them to be the least useful technology for academic engagement and achievement. He stated, "There are never any real requirements on the chat board."

Table 9

Usefulness of Technology used to Communicate: Students

Use	M	Qualitative Interpretation
Overall Engagement	3.03	Agree TML has a positive impact on student engagement
Behavioral Engagement	3.12	Agree TML has positive impact on behavioral engagement
Cognitive Engagement	3.02	Agree TML has positive impact on cognitive engagement
Emotional Engagement	2.92	Agree TML has positive impact on emotional engagement
Achievement	3.04	Agree TML has positive impact on student achievement

Assignments. Student perceptions of the specific uses of technology to complete assignments were represented by the responses to Student Questionnaire Question 21 and interview responses. Table 10 represents the perceptions reported on the questionnaire. PowerPoints (78.12%), online discussion boards (75%), and class websites (68.75%) were the most frequently reported uses. The e-Learn class portal was classified as a class website (SQ26). Responses including MyLab (SQ65) and interactive simulations (SQ40) were combined. Interview responses were also coded and reported to identify the student perception of the technology used to complete assignments. Student interview responses revealed the use of library databases, YouTube videos, and Google as research tools to complete assignments (SX1, SX5, SX6). Students also reported creating blogs and PowerPoint presentations (SX3), writing and responding to discussion board posts (SX3), completing online assignments from an e-book (SX5), using online homework programs (SX6), and online books (SX3, SX4, and SX5) to complete assignments.

Table 10

Student Perceptions of Technology used to Complete Assignments

Technology	n	Percent of Respondents
PowerPoint	75	78.12
Online discussion	72	75
Class website	66	68.75
Video	48	50
ePortfolio	31	32.29
Recorded Audio	28	29.16
Podcasts	12	12.5
Gaming	6	6.32
Microsoft Products	4	4.16
Internet/ Web	2	2.08
Aplia	1	1.04
Online school library database	1	1.04
Other apps	1	1.04

Dropbox	1	1.04
Interactive simulations	2	2.08
E-books	1	1.04

The student questionnaire and interview responses revealed perceptions of frequency and usefulness of TML used to complete assignments. The mean score of the student perception of the frequency of use of technology to complete assignments was 3.68. This level of frequency was between "somewhat consistently" and "consistently". Table 11 reports that technology used to complete assignments was generally perceived as having a positive impact on student engagement (M= 3.08) and student achievement (M= 3.17). SX4 explained his preference for the use of online labs. He stated, "Online labs are what help me. I don't get much out of standing in in-person labs. I can breeze as fast as you'd like online." SX6 stated, "D2L is always useful. A lot of students don't like it, but it's helpful."

Table 11

Usefulness of Technology used to Complete Assignments: Students

Use	M	Qualitative Interpretation
Overall Engagement	3.08	Agree TML has a positive impact on student engagement
Behavioral Engagement	3.15	Agree TML has positive impact on behavioral engagement
Cognitive Engagement	3.07	Agree TML has positive impact on cognitive engagement
Emotional Engagement	3.02	Agree TML has positive impact on emotional engagement

Achievement	3.17	Agree TML has positive impact on student achievement

Affirmations of technology use. Student questionnaire and interview responses exposed other student perceptions that support technology use in the classroom. The themes that emerged from the responses included perceptions of usefulness for real world application, student familiarity and comfort of use, and the variability of student preferences for instructional models.

Regarding the instructional models, 4% identified flipped models to be their predominant (75-100%) model and 75% identified that it is their least used method (0-24%). In comparing the models used for the majority of the time, 17% chose hybrid as their predominant model, and 44% chose lecture-based as their predominant model. Approximately 35% of the students identified a combination of either model, from the total data set. With regards to the model perceived as the most impactful on student achievement, 48% of students agreed that flipped classrooms had a positive impact on grades, 77% agreed that hybrid classes had a positive impact on grades, and 88% agreed that traditional classes had a positive impact on grades, when asked these questions in succession.

Some students perceived the use of technology as a support for preparation for real-world work and life experiences. SX3 stated, “Technology is forceful. Whether we like it or not, it’s here. Find a way to use it rather than push it out. Our lives are consumed in it. In order for us to deal with it, we have to learn how to integrate it.” SX4 noted that all of his current work as an engineer is dependent on technology use.

Students also reported feeling comfortable with technology use. SX3 said she started using technology “shortly after the inception of computers and the internet, around 1995. I have to have it! People say that I’m so astute with it. It’s beautiful… I can’t imagine life without it!" SX5 shared, "I feel pretty good about it and use it every day." When asked about the use of computers SX6 stated, "I own a Mac as well as a PC and have been comfortable with both for about 12 years… Overall I've had a positive experience."

The variability in student learning styles and preference as a need to provide a variety of structures and instructional models for course delivery was identified in the research. The Student Questionnaire Question 33 had students respond by selecting the instructional model in which they feel the most engaged. The frequency and percentage of responses are presented in Table 12.

Table 12

Preferred Instructional Model

Instructional Model	n	Percent of Respondents
Lecture-based	58	60.42
Hybrid	30	31.25
Flipped	8	8.33

The variability of student perceptions and preferences were also evident in student interview responses. SX1 stated:

> Traditional models are more engaging because in the setup you have more of a dependence with real people to engage in group projects, class discussions, etc. You can put work off in the other models. Traditional models keep you more on schedule and you can retain information better. As opposed to models with little accountability. (SX1)

SX2 and SX6 also preferred traditional classrooms over flipped and hybrid models. SX2 noted, "You have to be more interactive," and SX6 said, "you are forced to learn without cheating your way through. There is also immediate feedback in the traditional model." When students were asked to describe their perceptions of the perfect balance of technology use in a class, SX3 stated, "If they did use it from start to finish, I'd be on board the whole time." SX2 responded:

> There's so much out there, it's hard to say what the right amount is. There are different ways that people learn, book learners versus real life learners etcetera. I don't want to see class time go away. Technology was used very beneficially. We observed and experienced it, but they also gave other avenues to learn on our own. (SX2)

Barriers to technology use. Student interview responses uncovered a variety of concerns and barriers to technology use beyond the perceptions of engagement and achievement. These perceptions fell into three main categories including access to technology, instructor and student skill deficits, and the misuse of technology.

Problems with infrastructure, connectivity, and the availability of technology were classified as problems with access. Student perceptions of access barriers included:

- "Sometimes even D2L goes down and you can't log in and the email is located on the homepage. Then you're not even able to email teachers. There's so much inside of technology that we're required to use that no one has control over." (SX1)
- "...unless you have copied or printed all of the notes, you lose all of the information that the teachers would have otherwise passed out. They post it on e-Learn and unless you have downloaded it by a certain time, you don't have access to it anymore." (SX2)
- "There is a new building where there are connection issues and challenges because of how the building was constructed. There are Wi-Fi issues, but that is

how the building was constructed with energy efficiency. Sometimes instructors can't even access." (SX3)

- "Technology can fail. Sometimes there are system updates when you have to submit work." (SX4)
- "When the technology doesn't work." (SX5)
- "Sometimes the server will go down and we can't access homework or the portal was under maintenance." (SX6)

Student and instructor skill deficits were also perceived to be barriers to technology use. Statements of student skill deficits included:

- "...for someone at home who isn't tech savvy, it could be challenging." (SX1)
- "... using WebAssign, the instructor did not know how to communicate with students or how to operate it." (SX4)
- "...when the teacher cannot use the technology effectively." (SX5)
- "... lack of technology knowledge is a barrier." (SX6)

Students also perceived instructor and student misuses of technology as barriers. Interview statements that supported student and instructor misuses included:

- "When teachers just completely rely on YouTube or videos… when it's relied on completely for the entire course, it's not good. You can only watch TV so many times." (SX1)
- "Cell phone technology usually is not used for educational purposes. It's usually used for gaming and ignoring the teacher." (SX5)
- "...the back of the classroom, they are sitting, talking and texting the whole class." (SX2)

Research Question 3. What is the perception of instructors regarding the impact of TML on student engagement in their classes?

In Question 3, the themes that supported instructor perceptions were: delivery of course content; communication; assignments; and types of engagement analyzed for the purpose of this study. The combined instructors' usefulness score was 2.94. The following analysis included the respondent comments and observations of syllabi.

Delivery of course content. Data from surveys, interviews and syllabi were analyzed in the theme of course delivery through the focus of engagement. As listed in Table 1, the most commonly used technologies were PowerPoint, Video, Online Discussion, or Class Website. This accounted for more than 50% of respondent selection. While instructors identified tools used in the classroom, some were very clear about its uses in learning and engagement. Table 13 lists the instructor's perception mean scores of instructional delivery based on the domains of engagement.

Table 13

Usefulness of Technology used to Deliver Instructional Content: Instructors

Use	M	Qualitative Interpretation
Overall Engagement	3.00	Agree TML has a positive impact on student engagement
Behavioral Engagement	3.14	Agree TML has positive impact on behavioral engagement
Cognitive Engagement	3.00	Agree TML has positive impact on cognitive engagement
Emotional Engagement	2.94	Agree TML has positive impact on emotional engagement

Achievement	2.91	Agree TML has positive impact on student achievement

In some cases, context was cited as having an impact on the usefulness of TML. One instructor wrote:

> I teach several statistics courses, and as I have gone away from technology I have found that my students actually flourish more. I find that in that setting the technology can keep the students from thinking about the problem solving process (IQ1).

Another instructor mentioned:

> I'm beginning to think that TML is becoming something of a detriment to student success and making the classroom boring through over reliance on PowerPoints, etc. Students are not as tech-savvy as we may think they are, and I'm starting to believe that going back occasionally to writing things on the board may actually facilitate learning a bit more (IQ2).

Those who found TML helpful in delivering instructional content gave specific uses of technology. According to one instructor:

> I was hesitant to answer the questions about using technology for instructional content since they were ambiguous to me. Foreign language students are not generally successful in online classes for example. However, when instructional content is presented using technology as well as using traditional methods, students do obtain success (IQ22).

Other instructors referenced accessibility issues, stating “I would use more technology if all my students had access to the various techniques available,” (IQ8); and “Technology is wonderful when it works. In our campus, we have a number of issues that interrupt our ability to use the technology available,” (IQ30). The interview data show that some instructors still employ a traditional teaching model, while incorporating technology-mediated instruction. In the interviews, one instructor (IX2) in particular, mentioned that she still does traditional stuff, but she plays music, videos, interactive games, polls, etc. In one interview, another instructor maintained that drive and interest in learning are not replaced by technology. The instructor also stated that "Technology won't transform students, tech helps good students but can't make good students," (IX3).

Communication. Data from surveys, interviews and syllabi were analyzed regarding communication through the focus of engagement. The survey data showed that online discussions and email are the main means of communication in the classroom, as revealed in Table 2. Specific to the domain of communication, Table 14 lists the instructor's perception mean scores of student engagement.

Table 14

Usefulness of Technology used to Communicate: Instructors

Use	M	Qualitative Interpretation
Overall Engagement	2.98	Agree TML has a positive impact on student engagement
Behavioral Engagement	3.08	Agree TML has positive impact on behavioral engagement
Cognitive Engagement	2.91	Agree TML has positive impact on cognitive engagement
Emotional Engagement	2.97	Agree TML has positive impact on emotional engagement
Achievement	2.97	Agree TML has positive impact on student achievement

Some instructors expressed difficulty in communicating with students. One instructor acknowledged the limitations of technology due to disengagement (IQ24), while another instructor commented on the limitations due to physical circumstances. With respect to technology use in an in-class setting, one instructor mentioned, via interview, not being a fan of cellphone use since students become completely distracted (IX3).

Assignments. The instructors' perception mean scores were tabulated, as well, on TML's impact on engagement through assignments in table 15.

Table 15

Usefulness of Technology used for Assignments: Instructors

Use	M	Qualitative Interpretation
Overall Engagement	2.90	Agree TML has a positive impact on student engagement
Behavioral Engagement	3.03	Agree TML has positive impact on behavioral engagement
Cognitive Engagement	2.86	Agree TML has positive impact on cognitive engagement
Emotional Engagement	2.86	Agree TML has positive impact on emotional engagement
Achievement	2.86	Agree TML has positive impact on student achievement

With respect to student engagement, some instructors spoke to the use of technology for in-class assignments. For example, in an interview, one professor discussed integrating cellphones in their classroom. This instructor approved the use of cellphone as an interactive tool mentioning, "Hopefully you can stay off your phone for an hour, but that's not the reality!

So you might as well use it productively in class, even if just for a moment." (IX2). There were other instructors in our study who used technology for assigning work and activities, but were cautionary. An open-ended instructor response mentioned that:

> I am eager to use all technologies that actually help with a class, and I do feel that all the technologies I employ are positive. However, I also feel there is a push to use technology for its own sake, even when it solves no real problem or provides no real benefit. I am quick to embrace technology to solve problems and make things easier but I do not wish to encumber my class with gimmickry. (IQ14)

In an interview, another instructor mentioned that the use of technology "doesn't take place of disciplined, hard work… Facebook is more important than finishing an assignment" (IX3).

Discussions of engagement and achievement. In this theme, the researchers averaged the scores of the engagement questions based on their domain: behavioral, cognitive and emotional. On a 4-point scale, the faculty generally agreed (M= 3.09) that TML has a positive effect on student participation and on-task behaviors, identified in this study as behavioral engagement. On the whole, the faculty also generally agreed that TML has a positive effect on cognition, measured by student analysis, decision making, and problem solving behaviors (M= 2.92) and emotional engagement, measured by a student's level of anxiety, interest, or excitement (M= 2.92).

In interviews and questionnaires, few instructors also spoke to the three domains of engagement. With respect to behavioral engagement, one instructor mentioned, "I think if they are doing rote practice with formulas…. Those can be done on a computer," (IX1). Another instructor used various technologies as engagement tools, such as Kahoot! an online gaming format, World of Class Craft, role-playing character game, and cellphones in the classroom

(IX2). One caveat, as expressed in IX1 was that they did not use cellphones in class, as a way to help students be present and involved. With respect to cognitive engagement, one instructor used technology to help students make a claim and cite evidence, yet stated that online discussion boards are difficult to do well due to student's lack of determining value in their posts (IX1). Another instructor stated they "noticed that the interactive stuff is what students tend to remember," (IX2). On the other hand, a response from the instructor questionnaire mentioned that technology can hinder students' cognitive processes stating, "I find that sometimes (especially with mathematics) technology can restrict a student's ability to think," (IQ1). In the same vain of critique, in the instructor interview 1, the respondent mentioned that "A lot of the student's interactions with computers take them away from a moment and involved in shallow activities." (IX1). With respect to emotional engagement, one instructor mentioned the use of some well-planned technology as a management and accountability tool (IX2).

Perception of achievement was a measure that was used in this study to provide context to how instructors engage the use of technology. On a 4-point scale, on average, instructors perceive TML used to communicate has a greater impact on student achievement (M= 2.97) than TML used to deliver instructional content (M= 2.91), or TML used to complete assignments (M= 2.86).

Other qualitative data. Other qualitative themes emerged in the student and instructor questionnaire and interview responses. Instructors shared perceptions of teacher autonomy and the need for purposeful selection of technology to fit the academic and instructional needs for their students. Instructors also described the institutional involvement in technology selection and requirements. Mixed perceptions of cellphone use and cellphone policies were shared by both instructors and students.

Statements of the need for autonomy and purposeful selection included:

- I am eager to use all technologies that actually help with a class, and I do feel that all the technologies I employ are positive. However, I also feel there is a push to use technology for its own sake, even when it solves no real problem or provides no real benefit. I am quick to embrace technology to solve problems and make things easier but I do not wish to encumber my class with gimmickry (IQ14).
- "The students should be encouraged to think about why you would use a certain technology and determine if there is a better way to get information across" (IX1).
- "I think about the purpose and if there is a more direct and cost effective, efficient, and interesting way to do this. If the answer is yes, then I use it" (IX1).
- "I know if the technology matches my standard by trial and error and lots of feedback… so if technology can help that then great" (IX2).
- There are great PowerPoints and there are tedious ones. There are PowerPoints that just list a lot of stuff and others that do a good job clarifying main points from those that are subordinate. There are good podcasts and bad, good forums and useless ones. What's more important than the technology itself is 1) whether it fills a need or is used just because money was spent on it, and 2) how well it's used (IQ23).

Statements describing the institutional involvement in technology selection and requirements included:

- "I feel there is a push to use technology for its own sake" (IQ14)
- "The technology is purchased and provided but is not necessarily targeted to the needs in the classroom… it's not integrated into the discussions of how we do what we do" (IX1).
- "The campus is pushing Apple products" (IX2).

- "...everything is handed down from administration. Technology and textbooks are pre-selected by higher-ups. You can select from the texts but cannot bring in separate items" (IX3)
- Stop spending money on technology for technology's sake. Assess whether there is an actual difference in teaching capacities before spending money. Prioritize funding to reduce reliance on adjuncts and to pay competitive salaries and retain excellent faculty. Books and blackboards/whiteboards remain the only essential educational technologies. Resist the sales pitches of edtech leeches and spend money on the core educational mission (IQ32).

Perceptions of cellphone use and cellphone use policies varied. Statements of perceptions included:

- "I am not a fan of cellphone use; students are completely distracted…" (IX3).
- "Because I want my students to be present, I have a cellphone policy not to use them in the class" (IX1).
- "Hopefully you can stay off your phone for an hour, but that's not the reality! So you might as well use it productively in class, even if just for a moment" (IX2).
- One respondent noted:

  > Instructors say don't use your cell phones, but they use theirs… You're paying to go to college, so if you want to be on your phone, not paying attention, failing grades, then that's your fault. I'm a mother. I'm not going to have my phone. (SX2)

- "I like having my cell phone and having it available in class. I don't like when they say, 'no cellphones'... If I can't use it, I'll just go to the bathroom. I pay to go to school; I'm not getting a freebie!" (SX3).
- Another respondent said:

  > I don't have a problem with using it. The workplace doesn't require it, but you're an adult as a student. They are paying, who cares? There are students who get bored. Then what am I going to do? I'm almost 20 years with a degree, I won't just sit there. (SX4)

- "Cell phone technology usually is not used for educational purposes. It's usually used for gaming and ignoring the teacher" (SX5).
- "Cell phones are not particularly useful in the classroom. It's fine for communication, but not as far as educational purposes" (SX6).

Results of Quantitative Data

There were a total of seven questions that guided the research. The quantitative questions of the study were Questions 4, 5, 6, and 7. These questions were written as null hypotheses to address the research questions. The hypotheses tested were meant to provide the client with a snapshot of student and instructor data, building on the study conducted by Dr. Moseley.

Testing of hypotheses. Adapting the model from the Moseley study, the researchers were interested in knowing how students perceived TML, how instructors perceived TML, if there were differences between the two and if there were differences in perceptions based on the different instructional divisions and instructional models in which learning occurs. From the questionnaires, each question pertaining to perception was qualitatively coded and analyzed, or quantitatively analyzed to provide aggregate perspectives. The perception questions were conducted on a 4-point Likert-scale. Also, these data were compared to interview responses from both stakeholders' perspectives and a random sample of each division's course syllabi. The hypotheses are listed below with their null hypotheses.

Research Question 4. Hypothesis: There are differences in the perceptions of instructors from different instructional divisions within the institution regarding the usefulness of technology. Null Hypothesis: There are no statistically significant differences in the perceptions of instructors from different instructional divisions within the institution regarding the usefulness of technology.

Assumptions. The descriptive statistics were performed and assumptions were not resolved for instructional divisions and the measure of perceived usefulness of technology-mediated learning (TML) instruction. The data collection process resulted in independent random data. Due to receiving only one response from the Business and Technology department, this division was excluded in the quantitative analysis.

Division A had a mean score of 3.33. Regarding statistical assumptions, A had a high positive skew of 1.46, exceeding -1 to 1, where skewness is considered acceptable. The kurtosis for this division did not calculate, thus indicating that this division did not have a fairly normal distribution. Kurtosis should be between -2 and 2, for a fairly normal distribution. The Levene's test for variance was above the confidence interval (5%), at 0.98, signaling that all groups are likely to have equal variances.

Division B had a mean score of 2.99. B had a low positive skew of 0.15, within the range of -1 to 1, where skewness is considered acceptable. The kurtosis for this division was 0.86, thus indicating that this division did have a fairly normal distribution. The Levene's test for variance was above the confidence interval (5%), at 0.98, which means that all groups are likely to have equal variances.

Division C had a mean score of 2.79. Division C had a low skewness of -0.1, within the -1 to 1 range, where skewness is considered acceptable. The kurtosis was -0.66, thus indicating that this division did have a fairly normal distribution. The Levene's test for variance was above the confidence interval (5%), at 0.98, meaning that all groups are likely to have equal variances.

Division D had a mean score of 3.1. D had a low negative skewness of -.018, within -1 to 1, where skewness is considered acceptable. The kurtosis for this division was moderately high at 1.43. Since the skewness was acceptable, the kurtosis, in this group was not considered. The Levene's test for variance was above the confidence interval (5%), at 0.98, indicating that all groups are likely to have equal variances.

Analysis results. Since one group's assumptions were not satisfied (A), the nonparametric test was employed. The nonparametric analysis, the Kruskal-Wallis H test, was used to compare divisions by group on the dependent variable of how instructors perceive the usefulness of TML because there were no equal sample sizes. In Table 16, the analysis of the Kruskal-Wallis H test yielded $\chi 2$ =3.99 and a p-value of 0.26, which was not statistically significant at both $\alpha<.05$ and $\alpha<.001$. The power of this test was low, at 0.33. Based on this p-value, the null hypothesis was retained since statistical significance was not found. An ANOVA was also performed for comparison, though data rendered the need for nonparametric analysis. The ANOVA was selected to perform the comparison because independent t-tests are more susceptible to type-1 errors. The Student's t was used to compare the divisions based on the level of perceived usefulness. There were no statistically significant differences between any of the instructional divisions.

Table 16

Kruskal-Wallis H-test - Mean Instructor Usefulness score by Division

Instructional Division	n	M	*df*	χ^2	*P*
A	3	3.33	3	3.99	0.2623
B	13	2.99			
C	10	2.79			
D	8	3.10			

*Note. P-value is *Significant at the .05 level*

Research Question 5. Hypothesis: There are differences in instructor's frequency of technology use by instructional division within the institution. Null Hypothesis: There are no statistically significant differences in instructor's frequency of use of technology by instructional division within the institution.

Assumptions. The descriptive statistics were performed and assumptions were not resolved for instructional divisions and the measure of perceived frequency of technology-mediated learning (TML) instruction. The data collection process resulted in independent random data. Due to receiving only one response from the Business and Technology department, this division was excluded in this question, as well.

Division A had a mean score of 3.5. Regarding statistical assumptions, A had a skew of 0, directly between -1 to 1, the range in which skewness is considered acceptable. The kurtosis for this division did not calculate, and while the skewness poses no concern, this possibly indicates that this division did not have a fairly normal distribution. Kurtosis should be between -2 and 2, for a fairly normal distribution. The Levene's test for variance was above the confidence interval (5%), at 0.79, showing that all groups are likely to have equal variances.

Division B had a mean score of 3.67. B had a high negative skew of -1.73, beyond the range of -1 to 1, where skewness is considered acceptable. The kurtosis for this division was also high 2.71, thus indicating that this division did not have a fairly normal distribution. The Levene's test for variance was above the confidence interval (5%), at 0.79, which means that all groups are likely to have equal variances.

Division C had a mean score of 3.75. Division C had a high negative skewness of -1.41, exceeding -1 to 1, where skewness is considered acceptable. The kurtosis was 1.74, within range, suggesting that that this division could have a fairly normal distribution. The Levene's test for variance was above the confidence interval (5%), at 0.79, signaling that all groups are likely to have equal variances.

Division D had a mean score of 3.66. D had a high negative skewness of -1.26, outside the range -1 to 1, where skewness is considered acceptable. The kurtosis for this division was at 0.82, thus indicating that this division could have a fairly normal distribution. Since the skewness was not acceptable, kurtosis, in this group was considered. The Levene's test for variance was above the confidence interval (5%), at 0.79.

Analysis results. Since groups A and B did not have fairly normal distributions, assumptions could not be resolved and a nonparametric test was employed. Again, the Kruskal-Wallis H test was used to compare divisions by group on the dependent variable of how instructors perceive their frequency of use of TML. An ANOVA was also performed for comparison. In table 17, the analysis of the Kruskal-Wallis H test yielded χ^2 =0.75 and a p-value of 0.86, which was not statistically significant at both $\alpha<.05$ and $\alpha<.001$ (Table 17). This null hypothesis was also retained. There were no statistically significant variances between the instructional divisions.

Table 17

Kruskal-Wallis H-test - Mean Instructor Frequency score by Division

Instructional Division	n	M	*df*	χ^2	*P*
A	3	3.5	3	0.7493	0.8616
B	13	3.67			
C	10	3.75			
D	8	3.66			

*Note. P-value is *Significant at the .05 level*

Research Question 6. Hypothesis: There is a difference in student perceptions of engagement between hybrid, flipped, and traditional instructional models. Null Hypothesis: There is no statistically significant difference in student perceptions of engagement between hybrid, flipped, and traditional instructional models.

Assumptions. Using another data set for student perceptions data, the descriptive statistics were performed and assumptions were not resolved for the instructional models and the measure of perceived engagement of students in TML instruction. The three instructional models—flipped (F), hybrid (H) and traditional/lecture (L)—were the independent variables in this question. The data collection process resulted in independent random data.

Model F had a mean score of 3.5. Regarding statistical assumptions, F had a skew of 0, directly between -1 to 1, the range in which skewness is considered acceptable. The kurtosis was -2.8, beyond the -2 to 2 range, however, was not considered since this model's skew value was within acceptable range. The Levene's test for variance was above the confidence interval (5%), at 0.79, meaning that all groups are likely to have equal variances.

Model H had a mean score of 3.23. B had a negative skew of -1.03, slightly beyond the range of -1 to 1. The kurtosis for this instructional model was also high at 2.79, thus indicating that H did not have a fairly normal distribution. The Levene's test for variance was above the confidence interval (5%), at 0.79.

Model L had a mean score of 3.05. L had a negative skewness of -0.94, barely within -1 to 1. The kurtosis was 0.61, signaling that this instructional model did have a fairly normal distribution. The Levene's test for variance was above the confidence interval (5%), at 0.79.

Analysis results. Due to unresolvable assumptions, the Kruskal-Wallis H test was used. In table 18, the Kruskal-Wallis H test yielded a χ^2 =2.29 and a p-value of 0.32, which was not statistically significant at both $\alpha<.05$ and $\alpha<.001$. The instructional models, or groups, were traditional/lecture (L), hybrid (H), and flipped-classroom (F). The ANOVA was performed, in spite of the nonparametric data, to compare the models with each other. As a result of using the Student's t analysis to compare the different instructional models, there was nothing statistically significant, in terms of differences of engagement between the instructional models. Also, the power was calculated at 0.29. Based on the p-value (0.3177), this null hypothesis was retained.

Table 18

Kruskal-Wallis H-test - Mean Student Engagement score by Instructional Model

Instructional Model	n	M	*df*	χ^2	*P*
F	8	3.5	2	2.2931	0.3177
H	30	3.23			
L	58	3.05			

*Note. P-value is *Significant at the .05 level*

Research Question 7. Hypothesis: There is a difference in the perceptions of the use of TML on achievement between students' preferred instructional model (hybrid, flipped, and traditional). Null Hypothesis: There is no statistically significant difference in the perceptions of the use of TML on achievement between students' preferred instructional model (hybrid, flipped, and traditional).

Assumptions. Using the same data set for student perceptions, the descriptive statistics were performed and assumptions were resolved for the instructional models and the measure of perceived achievement of students in TML instruction. The three instructional models—flipped (F), hybrid (H) and traditional/lecture (L)—were the independent variables in this question. The data collection process resulted in independent random data.

Model F had a mean score of 3.21. Regarding statistical assumptions, F had a skew of 1.65, beyond the range of -1 to 1. The kurtosis was 1.35, within the -2 to 2 range. Since the skewness was beyond the acceptable range it was necessary to consider kurtosis (± 1.0 to 1.5), the assumption on fairly normal distributions was not resolved. The Levene's test for variance was above the confidence interval (5%), at 0.16, meaning that all groups are likely to have equal variances.

Model H had a mean score of 3.28. B had a negative skew of -0.29, within the range of -1 to 1. The kurtosis for this model was also low at -0.1, thus indicating that H did have a fairly normal distribution. The Levene's test for variance was above the confidence interval (5%), at 0.16.

Model L had a mean score of 2.92. L had a negative skewness of -0.79, within -1 to 1. The kurtosis was 0.59, signaling that this instructional model did have a fairly normal distribution. The Levene's test for variance was above the confidence interval (5%), at 0.16.

Analysis results. Initially, the Kruskal-Wallis was performed. Table 19 reports the Chi square value at 4.79 with a p-value of 0.09, retaining the null hypothesis. The instructional models, or groups, were traditional/lecture (L), hybrid (H), and flipped-classroom (F). The analysis on perceptions of achievement had a p-value that was close to the confidence interval, prompting the researchers to eliminate group (F), which had the least amount of random responses.

Table 19

Kruskal-Wallis H-test - Mean Student Achievement score by Instructional Model

Instructional Model	n	M	*df*	χ^2	*P*
F	8	3.21	2	4.7917	0.0911
H	30	3.28			
L	58	2.92			

*Note. P-value is *Significant at the .05 level*

Post-hoc test results. The researchers excluded the F group from the category whose response count (n=8) was substantially smaller than other groups. With eliminating the F group, assumptions remained resolved between the remaining groups—L and H, suggesting random data with normal distributions and equal variance as revealed in Table 20. An Independent t-Test, a test of difference between two groups, was then used to determine variance between the two instructional models. Both engagement and achievement variables were analyzed using the two groups (H and L), and only with the achievement variable was a statistically significant difference found between the models, with the p-value, at 0.01. The power was tested at 0.64.

Table 20

Independent t-Test – Mean Student Achievement score by Instructional Model

Instructional Model	n	M	*df*	t-Ratio	*P*
H	30	3.28	2	-2.63	0.0103*
L	58	2.92			

*Note. P-value is *Significant at the .05 level*

Other Results

The age and gender of the populations became of interest. After addressing the quantitative research questions with the data, the dependent variable of usefulness was analyzed across the samples' age and gender predictor variables. In the student sample, there was no statistically significant variance between gender or age groups. In the instructor sample, while the difference in the means of the two gender groups ($p = 0.0786$) was not statistically significant; the value is approaching significance. There also was no statistically significant difference between the age groups of instructors regarding their opinions on usefulness.

Also, the researchers realized how close the averages of the instructional divisions were and were curious about whether there was an actual difference between the frequency and usefulness perceptions of the instructional divisions. This discovery, since it served as an auxiliary research question, will be discussed further in the analysis of findings. The question was answered in the same fashion as the research questions in the study. Hypothesis: There is a difference between the instructor's perceptions of frequency and usefulness in the instructional divisions. Null Hypothesis: There is no statistically significant difference between the instructor's perceptions of frequency and usefulness in the instructional divisions.

Assumptions. The data collection process resulted in independent random data. Using the instructor data set, the assumptions, already resolved, were not met for both dependent variables—usefulness and frequency, Questions 4 and 5, respectively. Thus, the nonparametric test was performed for the independent t test. The usefulness variable was considered the dependent and the frequency variable was considered the independent, and each division was analyzed by group. Also, with only one completed response, the Business and Technology division was excluded from the analysis.

Analysis. The Wilcoxon signed rank analysis was performed, as this question was not found to have all assumptions resolved. For the whole campus, all divisions, the t-ratio was 7.09 and its p-value was <0.0001. For Division A, the t-ratio was 0.31and its p-value was 0.79, above the critical t to retain the null hypothesis. For Division B, the t-ratio was 5.7 and its p-value was 0.0007, well below the critical t to reject the hypothesis. For Division C, the t-ratio was 7.06 and its p-value was 0.0039, also below the critical t. Lastly, for Division D, the t-ratio was 2.31 and its p-value was 0.0469, right at the critical t value as revealed in table 21.

Table 21

Wilcoxon Signed Rank – Usefulness score by Frequency score between Divisions

Instructional Division	n	*df*	t-Ratio	*P*
A	3	2	0.3111	0.7852
B	13	12	5.6959	<0.0001**
C	10	9	7.0644	<0.0001**
D	8	7	2.3068	0.0272*
All	34	33	7.0939	<0.0001**

*Note. P-value is *Significant at the .05 level **Significant at the .001 level*

In summary, the qualitative data provided insight to how technology is used in the community college, across divisions. It gave specific examples of instructor and student efficacy with technology-mediated instruction (TML). The quantitative data retained all null hypotheses and provided little data to suggest that there were differences between divisions. The qualitative data showed, however, that different divisions experience technology in different ways due to location, access, attitudes or efficacy with its use in the classroom. With respect to instructional models, the quantitative data revealed that students who prefer hybrid models perceive TML's impact on student outcomes more positively. This did not corroborate with the qualitative findings, which suggest that tradition lecture based instructional models are perceived as more impactful, particularly if the instructor or the student uses technology in more efficient ways.

Chapter 5: Discussions and Recommendations

Summary

The primary goal of this mixed methods study was to understand ways in which faculty use TML, the ways faculty acquire the skills needed for TML, and the student and faculty perceptions concerning the usefulness and impact of TML practices on student engagement and achievement in a community college setting. Both qualitative and quantitative data were collected for triangulation of methods and analyzed to address all aspects of the research questions. Interviews, questionnaires, and archival data were used to gather data from faculty members and students. The instructor questionnaire was distributed to all 160 faculty members, campus wide. There were 40 instructor perception questionnaires received across five instructional divisions; 35 of those questionnaires were fully completed. The student questionnaire was distributed to all 5000 students, from the total campus student body. Students who were surveyed ranged from full-time, to part-time. There were 128 student perceptions questionnaires received across five instructional divisions; 96 of those questionnaires were fully completed. Only students who were 18 and older were included in the student data set. Students who were younger than 18 years old were excluded.

This chapter is organized into four key sections. The first section is labeled as Analysis of Findings, including Qualitative Findings, and Quantitative Findings. The analysis of results also includes a comparison of the findings with prior research. The second section is Discussion and Conclusions, and the third section is Limitations. The fourth section is Recommendations, which includes implications for practice and further research.

Analysis of Findings

The qualitative portion of this study was Questions 1 through 3, the remaining Questions 4 through 7 were quantitative. Themes that came from findings were explained, and compared using various instruments used in this study.

Research Question 1. The first research question was: What is the perception of instructors regarding how they utilize technology in the classroom, and how they acquire skills used in technology-mediated learning (TML)?

Delivery of course content. PowerPoint was the most frequently mentioned tool in instructor responses when asked to identify the most useful instructional tool. LMS platforms, as well as gaming and other online response tools were used for the delivery of instructional content. Responses on questionnaires, interviews and nine syllabi revealed similar platforms for instructional delivery, with most referencing use of the e-Learn platform. The nine syllabi revealed uses of technology in explicit and implicit ways. Outside of PowerPoint and the e-Learn platform, a variety of other technologies were reported as being used to deliver instructional content. The variety of uses suggests that instructors have the autonomy to select tools they feel are useful to instruction. Instructors also revealed that they seek technologies that will best support their instructional needs. Differences in instructor preferences and need prompt instructors to find and use these technologies. Of the 15 course syllabi used for observations, six of them did not identify specific technologies used to deliver instructional content. This lack of usage could potentially be a result of poor instructor self-efficacy, low instructor perception of usefulness, or deficient knowledge of how to use said technology.

Communication. The technology instructors reported they routinely used to communicate with and between students were email, online discussion forums, texting and alert services, mainly. Communication tools referenced in course syllabi were Facebook, Messenger, email, e-Learn, Cengage, online discussion boards, and the Academic Early Alert system. Technology used to communicate was not included on four of the course syllabi. Instructor interviews revealed some instructors perceive that students do not read their email communication and one instructor reported students would rather receive graded feedback informally.

Assignments. The main technology used by students to complete coursework were online discussion forums, class websites, PowerPoints and videos. Online quizzes, online homework sites, professional websites, Dropbox, clickers, graphing calculators, and databases were reported by a small percent of the respondents as technology required to complete assignments. Instructor interviews referenced PowerPoints, online homework, and online quizzes as technology used to complete course assignments. The course syllabi identified e-Learn assignments where students post in online discussion posts. The syllabi also referenced Dropbox and email for submitting assignments. Other technology used for completing assignment that were referenced on course syllabi were LabSim, MyLabsPlus, graphing calculators, Aplia, and video recording. Of the 15 course syllabi, four did not reference technology used to complete course assignments.

Comfort. Instructors described their perceptions of their comfort of use of technology and the barriers that influence use of technology. All instructors described their level of comfort with technology use to be moderate or high. The barriers reported to interfere with technology use and comfort were issues with accessibility, perceptions of student efficacy with technology, failure of technology to meet the instructional purpose, instructor buy-in, and student access and willingness to assess. Issues with accessibility included hardware, internet speed, and interface issues malfunctions. Instructor comfort of use and barriers to technology use seemed to present a number of issues that impacted instructor technology usage.

Acquisition. Instructors reported they acquire technology skills through both independent self-study and institutional technology support, but mainly through independent self-study. These findings indicate that the majority of instructors prefer to learn new technology either independently or independently with one-on-one support through professional development.

Research Question 2. The second research question was: What is the perception of students regarding their experience with technology in the classroom?

Student perceptions of frequency. The overall frequency reported on the student questionnaire revealed the student perception of the frequency of technology used in their educational experience was between “somewhat occasionally” and “somewhat consistently.” Student interview responses suggested “daily use” of technology for learning.

Student perceptions of technology usefulness on engagement and achievement. The students generally agreed that technology has a positive impact on engagement and achievement. Student interview responses were less consistent. Some students reported TML has a positive effect on student engagement and student achievement while others reported it as a distraction to learning. Furthermore, some mentioned the overreliance on technology can negatively impact engagement and achievement as well.

Delivery of course content. The most useful technology tools, applications and programs reported by students as technology used to deliver instructional content were PowerPoint, videos, online discussion forums, and class websites. Responses from student interviews were mixed concerning the tools, applications, and programs perceived to be the most useful. Some students reported PowerPoint and e-books as the most useful while others found them to be the least useful. The mean score for frequency of technology use to deliver course content was 3.26, which fell between "somewhat consistently" and "consistently." Students generally agreed that technology used to deliver instructional content positively impacts overall student engagement and student achievement. Students generally agreed that TML has a positive impact on behavioral engagement, cognitive engagement and emotional engagement.

Communication. The most reported student perceptions of the tools, applications and programs being used to communicate with instructors and between students were email, online discussion boards, texting, and social media. Of the students who responded, two indicated that they do not use technology to communicate with instructors or other students. The mean scores for the student perceptions of frequency of technology used to communicate with instructors and peers was rated in the "somewhat consistently" frequency level. The mean score of the student perceptions of technology used for communication on overall engagement (including behavioral, cognitive and emotional engagements) revealed students generally agree TML has a positive impact on student engagement and student achievement, with emotional engagement scoring the lowest.

Assignments. The most reported tools, applications, and programs used to complete assignments reported by students were PowerPoint, online discussions, class websites, and video. The perception of frequency of technology used to complete assignments fell between "somewhat consistently" and "consistently". The technology used to complete assignments was generally perceived as having a positive impact on overall student engagement.

Affirmations for technology use. Affirmations for technology use included the perceptions of technology to support preparedness for real world work and life experiences, student levels of comfort with technology use, and the ability for technology to address individual learning needs and personal preferences. Students also reported differences in their preference for instructional model. The majority of the students reported they prefer lecture-based. The hybrid instructional model was chosen as the preferred model, and the flipped model was least preferred. More student interview responses supported the perceptions in favor of traditional classrooms because they offer interpersonal learning experiences with greater accountability.

Perceptions of barriers to technology use. Access to technology, instructor and student skill deficits, and the misuse of technology were cited for creating barriers to the use of technology in learning. Students who reported problems with access related to problems with the network infrastructure, and connectivity. Students identified instructor skill deficits as perceived barriers to technology use. Both student and instructor misuse of technology were also recognized by students as causing barriers to the use of technology.

Research Question 3. The third research question was: What is the perception of instructors regarding the impact of TML on student engagement in their classes?

Delivery of course content. In order to engage students, more than half of the instructor responses suggested the use of PowerPoint, Video, Online Discussion, or Class Website. Issues surrounding TML uses of engagement were addressed, with instructor feedback mentioning the disruption of cognitive engagement. Instructors felt that without traditional teacher mediation, TML's impact was not positive. Access was also discussed, as some instructors mentioned insufficient access to technology services (Wi-Fi, and other software/hardware malfunctions).

Communication. With respect to how instructors use TML to communicate as a means of engagement, online discussions and email are the primary media. Many issues surfaced regarding engaging students in this way. One instructor mentioned the lack of concern students have for maintaining email correspondence. Issues with access were addressed in this context as well, as faculty made it clear that there are technology and network challenges in certain areas of campus. Another concern that was addressed is student use of cellphones in the classroom. One instructor mentioned the distraction of students in class with cell phone use.

Assignments. Some instructors saw the potential to exploit the use of electronics in the classroom, particularly with cell phones. The integration of technology as a tool of engagement was mentioned as a way to mitigate student distractions with technology. Instructors who exhibited a high level of comfort and use in technology were likely to perceive their use of technology as more engaging. Instructors who exhibited challenges with technology use in the classroom were less likely to assign the use of technology in their practice.

Engagement and achievement. In interviews and questionnaires, few instructors also spoke to the three domains of engagement: behavioral, cognitive and emotional. Faculty generally agreed that TML has a positive effect on behavioral and emotional engagement, but did not agree as strongly to the cognitive engagement. A possible explanation for this is due to evidence in our findings that instructors are clear that technology is a tool, in need of mediation from the instructor. Another possible explanation is that there could be lack of clarity on cognitive engagement than with the other domains of engagement used for the purposes of this study. Some instructors exhibited a greater level of efficacy with TML and gave the researchers multiple tools used in their practices, including gaming tools. Due to various instructor perceptions of TML, some instructors may consider the use of technology in direct instruction, while others may consider TML in other engaging and challenging ways. Finally, instructors perceived that TML used to communicate has a greater impact on student achievement, than TML used to deliver instructional content or to complete assignments.

Research Question 4. Are there differences between instructional divisions in respect to how instructors perceive the usefulness of TML instruction?

There were no statistically significant differences in the perceived usefulness of TML instruction between instructional divisions. The mean scores for each division revealed that the instructors in each division generally agreed TML positively affects student engagement and achievement. The power for this analysis was weak, with a low p-value. Though not statistically significant, the overall mean perceived usefulness scores were different across instructional divisions. Instructor responses indicated instructors in the Health Science division more strongly agree that TML positively affects student engagement and achievement than the instructors in other divisions. The range in usefulness perceptions had a 0.52 difference between the perceived usefulness scores. Responses from the Math and Science division had the lowest perceived usefulness rating. These findings indicated instructors in the Math and Science division perceived the usefulness of TML less favorably than other divisions. The mean score for the Math and Science division (C) ($M = 2.79$) fell between “disagree” and “agree”. The perceived usefulness scores for each division were consistent with the overall instructor perceptions of TML on the three engagement domains as well as achievement. These scores show instructors across the instructional divisions value TML as it contributes to student engagement and achievement, yet are not strongly convicted of its affect.

Research Question 5. Are there differences between instructional divisions in respect to the frequency of instructors’ use of TML instruction?

There were no statistically significant differences in the frequency of the instructors' use of TML instruction between instructional divisions. On a Likert scale, each division scored the overall frequency of use between "consistently" and "somewhat consistently". Instructors across divisions perceive that they use TML in most of their instruction, communication and course assignments. There was a 0.25 range between the divisions' frequency scores. This narrow difference shows there is very little difference in the instructors' perceived frequency of use of TML between instructional divisions. Instructors across divisions were more in agreement in their frequency of technology use, than in their perceived usefulness of TML. On average, the instructors in all instructional divisions reported regular and consistent use of TML.

Research Question 6. Is there a difference in the perceptions of the use of TML on engagement between students' preferred instructional models (hybrid, flipped, and traditional)?

There was no statistically significant difference in the perceptions of the effect of the use of TML on engagement between students grouped by their preferred instructional model (hybrid, flipped, or traditional). Despite the inferred differences in the level of technology use in each of the instructional models, students selecting one instructional model over the others did not perceive TML to have a significantly greater or less impact on student engagement. Slight differences in student perceptions were found between the groups. Students who selected flipped classrooms perceived TML to more positively impact student engagement than students who selected hybrid or lecture based classrooms. Students who selected lecture based classrooms scored the impact slightly higher than students who selected the hybrid instructional model.

Research Question 7. Is there a difference in the perceptions of the use of TML on achievement between students' preferred instructional models (hybrid, flipped, and traditional)?

In the analyses on the perceptions of instructional models as means of positively impacting student achievement, there was no statistically significant differences. The analysis resulted in a low p-value, prompting the researchers to analyze the general achievement scores over the two mainly represented instructional models. When considering the qualitative and quantitative results on the hybrid and lecture, the researchers performed an additional t-Test as well as a Wilcoxon Signed Rank for further analyses, in comparison.

Post-hoc analyses. With instructional models as means of achievement, the null hypothesis was retained based on the quantitative findings. However, when the F group was eliminated, there was a statistically significant difference between the perceptions of TML in both instructional models ($p= 0.01$). Possible explanations for this variance was more familiarity with hybrid and lecture/traditional models, rather than flipped models. Also, students may consider that hybrid classrooms ($M= 3.28$) give students multiple access and control of the learning material, while still providing that teacher-led facilitation in traditional ($M= 2.92$). While students perceived these models to engage students differently, it did not corroborate with the qualitative findings, where students preferred traditional instructional models over hybrid models on impact of course grades. Further, while not a focus of this study, Student Questionnaire Questions 29 through 31 revealed the mean scores for how students perceived the model's impact on achievement were: flipped ($M= 2.43$), hybrid ($M= 2.86$), and traditional classrooms ($M= 3.23$). This anecdotal finding supported the qualitative findings. Students desired the traditional model over the hybrid model when asked directly about the academic impact of instructional models. However, when students consider TML's impact on course grades across the three domains of engagement—behavioral, cognitive and emotional—there was a statistically significant difference in favor of the hybrid model. Context of engagement and achievement is to be considered when comparing instructional models. In this study, it was clear that students who found hybrid models to be more engaging also found TML's impact on achievement to be greater. However, aggregately, students agree that traditional models impact achievement more. One possible explanation, given the interview data, is that students see the greatest academic impact of TML coming from traditional classes where facilitation is more likely; yet if they prefer hybrid models, they could persist with increased usage of TML.

In the case of the auxiliary analysis, the researchers wanted to know if there is a difference between the instructor's perceptions of frequency and usefulness in the instructional divisions? The frequency scores were derived from a metric of use— "occasionally" to "consistently;" the usefulness scores were derived from a metric of agreement— "strongly disagree" to "strongly agree." Due to the close aggregate scores in usefulness perceptions between the divisions, the researchers compared these perceptions across each division to see if there were divisions whose data showed differently. The nonparametric analysis ($p= <0.0001$) was performed for each of the divisions, suggesting that there is variance between the groups. Additionally, the Humanities, Math and Science, and the Social Sciences and Education divisions showed statistically significant differences in their perceptions of TML frequency and usefulness. The Health Sciences division did not have statistically significant differences between their perceptions. This possibly shows that instructors in soft disciplines, as suggested in Adams (2002), may perceive their concerns differently than hard disciplines. Similar to Henrickson's (2007) results, there also could be variance in the access to technology that each division experiences, impacting the perceptions of frequency of TML, supported by some of the qualitative data found in this study.

Relation to Previous Research

The following section presents the findings from this current study and how those findings relate to previous research and literature on instructor and student perceptions of TML and the effects on student engagement and achievement. This section is organized by the themes that emerged from the review of both qualitative and quantitative findings for each research question and the relationship those findings have to prior research and literature.

Technology uses. All respondents reported using some type of technology in instruction, communication, and assignments, which is 15.6% higher than the percentage reported by Martirosyan et al. (2017, p. 17). The technologies and uses reported in the current study were similar to those reported by Moseley (2010). Various technologies were reported by the instructor participants to be used to deliver instruction, communicate and to complete assignments. The prior research did not separate the instructional, communication, and assignment uses of technology. Both Moseley's (2010) study and the current study found a high use of video technology, class websites, and PowerPoints. Online discussions however, were reported more often in the current study (67%) than in Moseley's 2010 study (12%). Other instructional uses found in both studies included audio, online quizzes, email, library databases, simulation software, Microsoft Office products, calculators, blogs, and the use of social media.

The percentages of technology use reported in the current study were generally higher than the percentages reported in the previous research. This finding is consistent with the growth and use of technology in general. Prensky (2001) reported a shift in the culture of educational environments to embrace technology and its use as the generation known as digital natives enter into postsecondary education. Metlitzky (1999) described the growth of technology use in education over the last 60 years and the natural progression for these new technologies to be used in educational practices.

The technologies reported most often by instructors, like PowerPoint and video, are technologies that have been around longer than those that were not reported as often like gaming and online software. These findings are consistent with Geoghegan's (1994) research on the perceptions and willingness of instructors to integrate technology into instructional practices. The previous research classified 3% of instructors as those who were willing to use new technologies as they became available while 12% were willing to experiment with new technologies and 35% wanted to have research to support technology use prior to implementing the uses into their instructional practices. PowerPoint, email, videos, and online discussion boards were also mentioned in instructor and student interviews more often than other newer technologies like Padlet and World of ClassCraft.

Jaschik and Lederman (2016) found varied levels of faculty use of LMS. This is consistent with the findings in the current research where instructors reported varied levels of use of the LMS. One instructor noted that having a course page set up in the LMS is a minimum requirement for all courses. Most faculty reported using the LMS for syllabus information, record grades, and provide students with course related materials. These findings are also similar to Martirosyan et al. (2017). Instructors reported using the basic features of Blackboard and had not begun to integrate more advanced uses.

In addition to learning management systems, other online tools and learning resources were reported as being used by participants. These included programs like YouTube, MyMathLab, textbook websites and interactive learning sites. Martirosyan et al. (2017) also found that instructors integrated online learning tools and resources into instruction and assignments.

Acquisition. The current research revealed that instructors are more inclined to search for and learn about implementing new technologies on their own or a combination of independent learning and professional development. However, according to Georgina and Olson (2007, instructors receiving training in small groups with a trainer were more likely to demonstrate technology literacy and embed technology into practice. Very little prior research was found on the ways instructors prefer to learn and receive training to acquire new technology skills.

Instructor and student responses in the current study revealed that students are being offered a course in basic technology use and can receive technology support through the library and media services. This is consistent with the recommendations of Aragon and Johnson (2008). They suggest that institutions offer help desk staff and introductory computer classes for students.

The research conducted by Yesilyurt et al. (2016) supported Bandura’s self-efficacy theories and found teacher self-efficacy, academic self-efficacy, and computer self-efficacy could explain much of the variation in instructor attitude toward using technology in learning environments. They further recommended pre-service teachers receive professional development on computer use and instructional technologies to support self efficacy perceptions.

Perceptions of use. According to Moseley (2010), perceptions of technology’s effectiveness can be linked to frequency and use, and there is enough research to suggest that there are commonalities in student use and the relation to technology (p. 29). Overall both students and instructors perceived TML’s impact on student engagement to be positive. Moseley

(2010) suggested that there is an agreement between students and instructors that TML is generally found to be useful in the classroom (p. 109). This finding is consistent with the quantitative findings in the current research. The overall mean usefulness scores of students (M= 3.04) and instructors (M=2.94) were interpreted to mean students and instructors generally agreed that technology has a positive impact on engagement and achievement. Student perceptions were slightly higher than those of the instructors. Qualitative findings however, demonstrated there were mixed perceptions of the usefulness of TML. Both students and instructors reported advantages and disadvantages in the use of technology to mediate learning.

Martirosyan et al. (2017) reported on the perceptions of instructors as they relate to the barriers to successful technology use. Some perceived technology use to be time consuming. This, however was not noted in the current research as a factor that interferes with the use of technology in instructional practices. One instructor said she evaluated the use of technology to determine if its use was appropriate for the instructional goal or to determine if there were different, more effective means of teaching and learning the course content.

Martirosyan et al. (2017) also found instructors perceived the lack of institutional investment and support as well as outdated technology as barriers to technology use and integration into instructional practices. The current study, however, did not reveal these perceptions among instructors. In fact, instructors reported that technology support and training services are regularly available and provided by the institution. Support has been provided to help instructors develop and present content that is ADA compliant. The qualitative responses indicated an overall satisfaction with the availability of training at the institution.

Barriers to use. Student and instructor perceptions of the barriers to using technology to mediate learning were compared to those found in prior research. Specific barriers to technology use included access, misuse, perceptions of instructor and student efficacy, failure of technology to meet the instructional purpose, and instructor buy-in.

Access to technology. Dependable access to technology is critical to student and instructor use. The OECD (2015) reported student access to computers has increased on average to one computer for every one and three fourths students. The OECD also reported that access to computers impacted the willingness of instructors to use technology in instruction. Instructors from the current study, however, reported that only about 80% of their students have dependable access. The estimate of students with dependable access is more consistent with Lenhart's (2015) research that found that 80% of American teens have access to a desktop computer and 90% have access to the internet through a mobile device. Other accessibility issues reported in the current research included slow internet speed, lack of internet connectivity in specific locations on campus, and occasional issues with the compatibility of devices with available interface cables.

Student and instructor competencies. Martirosyan et al. (2017) found that instructors perceived a lack of technology competency as a barrier to technology use. A lack of technology competencies was reported by both students and instructors in the current study as a barrier to technology use or receiving a benefit from its use.

Instructor participants from the current research study frequently noted that students were not as skilled at technology use as the students may believe that they are. The college provides a course in computer literacy aligned to the goal of preparing students with the basic computer and technology skills necessary to navigate a technology-rich learning environment. Despite the availability of the course, it was reported that some students either do not take the course because they have a background or credit that allows them to be exempt or they enroll and do not put effort into receiving the most benefit from the course because they may believe they already possess the computer literacy skills being taught.

Failure to meet instructional needs. Several responses to interview questions revealed some instructors believe that the use of technology is not always appropriate for meeting an instructional need, and cautioned against the use of technology for technology's sake. The third stage of Rogers' (1962) diffusion of innovation theory described the point when an innovation supersedes another idea. Instructors from the current research described times when other tools and practices were not inferior to the use of technology to teach a specific skill or idea.

Misuse of technology. Both instructor and student participants from this study revealed the perceptions that technology can also be a nuisance to instruction and interfere with their willingness to use it in the classroom. In the current study, several instructors and students spoke to the fact that the misuse of technology had a negative impact on the learning environment. One student even revealed that cellphones are generally "used for gaming and ignoring the teacher" (SX5). Martirosyan et al. (2017) also reported that participants from their study felt that technology was a distraction in their classroom. According to Currie (2015), distracted learners lag in engagement causing in-class materials and activities to be less beneficial to learning (p. 2).

Instructional divisions. A comparison of perceptions of usefulness and frequency between instructional divisions was done in the current research. No statistically significant differences were found between divisions in either usefulness or frequency. Instructors in the Health and Science division more strongly agreed that TML positively affects student engagement and achievement than the instructors in other divisions.

Metlitzky (1999) found that the Political Science division reported using more different types of technology than the Mathematics or English divisions. The English department however, reported more frequent use of the internet, online discussion groups, and conferencing. The current study however, found there were no statistically significant differences in the reported frequency of TML between instructional divisions. The qualitative responses did show differences in the applications and types of technology used, but did not suggest differences in the frequency of use.

Henrickson (2007) reported a phenomenon where instructors self assessed as low users of technology in divisions where there is greater access. Henrickson rationalized the finding by explaining that access to technology could have been the reasons that the instructors in soft disciplines were not able to support higher-order concerns with technology use. Particular to Henrickson's study, the science and technology disciplines received technology packages sooner than other disciplines (p. 163). Henrickson further asserted that other disciplines' lack of exposure to newer technologies can potentially produce false positive perceptions, an elaboration that may explain why certain disciplines might rationalize technologies and its uses differently (ibid). Very little research was found, however, that dealt with divisional differences.

Perceptions of instructional models. Several instructional models for course delivery have emerged over time. Within these models, institutions and instructors have embedded technology in various ways to meet student needs. The on-campus courses offered at the institution in the current study included traditional, flipped, and hybrid instructional models.

Martirosyan et al. (2017) reported traditional instructional models as a favored instructional practice by 24% of the respondents (p.13). He noted, "The notion of balance (between technology and lecture) in the classroom was the most prevalent general comment…" (p. 16). Instructors specifically identified the characteristics of collaborative hands on learning experiences available in traditional instructional models as beneficial to student learning.

Bergmann and Sams (2012) characterized a flipped classroom experience as one that can personalize the learning experiences for students (p.28). Over time the flipped classroom model evolved into the flipped mastery model where students progressed through the course content at their own pace in an effort to support mastery of that content. Bergmann and Sams explained that flipped classrooms are designed to focus on the learner.

The researchers found that students preferred the hybrid class (M=3.28) over flipped (M= 3.21) and a traditional lecture based model (M= 2.92) with respect to student achievement. This was only statistically significant when the hybrid instructional model was compared to the traditional model in an independent t-test. Prior research described characteristics of the hybrid instructional model that contribute to student perceptions. Jaggars (2011) asserted that hybrid and online modalities provide freedom from the constraint of physical classroom space and allow administrators to lower the availability barrier (pp. 24-25). Agostini (2013) determined that students prefer having a choice in the modalities of coursework. Sewell (2016) noted that, "students in online and hybrid courses required more discipline, better time management, and a knowledge of technology that many students did not possess" (p. 84). Moreover, Sewell also found that students were more likely to fail or withdraw from online and hybrid courses more so than traditional courses.

Discussion and Conclusions

As community colleges and instructional practices evolve to meet the needs of the students they serve, so do the uses of technology in those learning environments. Community colleges and universities are eminently concerned with the impact technology use has, and can have, on engaging students and preparing them for success. The increase of technology resources has ushered in a growing concern for research to provide insight into the perceptions and implications of its uses in education. It was evident throughout this research that technology is and will continue to be embedded into the instructional practices in higher education, yet should remain at the forefront of conversations concerning best practices for its use. These conversations should help guide leaders in making sound decisions for the institution, its instructors, and its students and help to avoid chasing fads and spending money that may not benefit students.

Not only did the instructors share their instructional, communication, and assignment uses for their courses through questionnaire and interview responses, the research team was able to observe the technologies available for use throughout the campus. State of the art computer labs, training facilities, and real world technologies from broadcasting studio equipment to technologies needed for 21st century healthcare are part of the school's efforts toward providing students with a technology rich learning environment. The request of the institution for research to gain the insight and perspective of both students and instructors shows a concerted effort on the part of the school's leaders to understand the current uses and perceptions.

Technology uses. The current study generally included a higher representation of technology use than similar previous studies. This finding was not surprising. It was expected that the growth of technologies and the acceptance of technology over time would yield higher frequency of use. Over time technologies are becoming more user friendly and less reliant on owning and using specific hardware or platforms. The higher use of technology may also be due to the development and increased use of powerful educational tools like learning management systems (LMS). LMS provide a single platform for instructional materials, links to resources, communication, assignment completion, as well as post grades and provide a place for students to receive feedback. Instructors may also include more technology into instructional practices to fulfill institutional requirements or expectations.

Acquisition and acceptance. The evolution of new instructional hardware and software has created a need for instructors and students to acquire skills for its use. The acquisition of the technology skills necessary for mediated learning is vital to proficient and successful use in instructional environments for instructors and students alike. The study revealed instructors perceive that students have not acquired the technology skills necessary to mitigate learning environments with high levels of technology use. It is important to consider the way instructors prefer to acquire technology skills and learn about new technology compared to the research on the type of trainings that yield greater literacy with technology. Georgina and Olson (2007) revealed instructors learn better from small group faculty forums with a trainer yet 51.42% of the participants reported their preference is to acquire technology skills through self-study.

The researchers sensed a lack of instructor buy-in with technology use on campus. This lack of buy-in may be creating a barrier which hinders instructors from integrating technology into their instruction. Roger's Diffusion of Innovation theory would argue that instructor buy-in is dismal due to missed steps in the diffusion process. To further explain, Roger (1962) would argue that while innovations can occur in very fluid ways, implementation follows a decision to reject or adopt an innovation, employing the use of the innovation (pp. 172-175). This process explains how new innovations are communicated, introduced through certain channels over a sustained period of time, and finally adopted and implemented. Under Rogers' theory there are five well-defined stages one must cycle through before adopting any new innovation. These stages are, trialability, observability, relative advantage, complexity, and compatibility. Through the stages Rogers illustrated that an individual must be introduced to a new innovation and have the chance to test it, observe its results, see that it is supersedes other products, be able to understand and operate it with minimal difficulty, and it must meet the needs of the individual. After one has cycled through these stages then adoption can take place. If these stages are breached the adoption of a new innovation is undermined. Thus, in this case technology integration lags and the fidelity of implementation is subpar.

Another explanation of why instructors struggle with technology use and integration may be attributed to Davis' (1989) study of the Technology Acceptance Model (TAM). The (TAM) would accredit the failure to adopt technology to low perceptions of usefulness and low perceptions of ease of use. Davis stated that perceived usefulness was the strongest indicator for technology use (p. 333). If instructors cannot see the usefulness of technology, then they are less likely to integrate it into their instruction. Moreover, if instructors cannot easily operate technology then it will be seen as an obstacle to overcome and will dread using it. When technology becomes inconvenient it negatively affects instructors and students alike.

The increased use of technology in learning environments and specifically learning management systems will require professional development and learning opportunities for instructors to enhance their perceptions and efficacy of technology use. Prior to acquiring technology skills, instructors need the assurance that their time and money will be well spent. It is important to consider the Technology Acceptance Model (TAM) when considering the acquisition of the skills. Davis (1989) reported perceived usefulness as the most important indicator for technology use. Instructors will be more willing to acquire and use skills to embed technology in learning environments if they perceive it as useful.

Access to technology. Radovcic (2010) found that students classified as low socioeconomic status have limited access to resources. According to Vygotsky's theory of zone of proximal development, children develop and construct learning based, in part, on the facilitation of an expert until that skill is obtained. Congruent to the use of technology as a cultural tool, access to and facilitation of these tools are a necessary component. Without access to these tools necessary to construct learning, students may experience barriers that interfere with learning. This could explain some of the instructors' resistance to the use of technology. Other issues dealing with network accessibility and infrastructure were also reported by instructors and students that interfere with dependable access. These issues dealt with platform interface issues as well as consistent access to wireless connectivity.

Misuse of technology. The lure of the internet, social media, and text messaging is enticing. Not only is it convenient, but it is also ever present and simply a fingertip away. Instructors are forced to vie for the students' attention instead of focusing on facilitating learning. It is at this point that technology becomes adversarial and instructors' perceptions of technology use in the classroom is negatively influenced

Impact of TML on engagement and achievement. In the instructional delivery transaction, both instructor and student's overall engagement means (averages of the three domains) were the same, suggesting that both generally "agreed" that TML positively impacts engagement. In the communication transaction, instructors had an overall lower perception score than the students, suggesting that while instructors generally agreed, they may have experienced difficulty in reaching their active students through electronic means. The last transaction, assignments, showed that instructors also had an overall lower agreement average than students. This could suggest many possibilities, however, it is bears noting that the difference could interpret a cognitive dissonance with respect to how instructors and students perceive the quality of technology-mediated assignments.

In perceptions of behavioral engagement, students generally agree that TML practices make a positive impact, with the strongest impact in the assignments transaction and the weakest impact with instructor delivery methods. This contrasted in the reverse with instructors, who reported that TML has its strongest impact with their delivery methods and the weakest impact on assignments. The contrast could be explained, in part, by the perception of what is expected to remain on-task and complete work. The contrast also reveals the need of both perceptions for a holistic perspective on this phenomenon.

Regarding perceptions of cognitive engagement, students reported the strongest impact of TML on completing assignments, and the weakest impact on instructor delivery of instruction. Conversely, instructors reported TML's strongest impact in the delivery of instruction transaction and the weakest impact in the assigning of work or tasks. This contrast could exist due to how both perceive the learning process. In this case, the student and instructor perceptions of learning may reveal different expectations for effective learning experiences.

Analyzing differences in perceptions of emotional engagement, students reported TML's impact the weakest in both delivery of content and in communication with peers and instructor. In completing assignments, students reported TML's impact on emotional engagement to be the highest of the three transactions. The lowest instructor perception of TML's impact was in completing assignments, with the highest score in the communication transaction. For the students, the higher score possibly suggests that TML is more effective in helping students emotionally due to perceptions they may have regarding instructor expectations on evaluating material learned. For the instructors, the transaction of effective communication potentially provides scaffolding and clarity of expectations, and uses of technology may assist in the communication process. As a result of this study, it became obvious that both instructors and students perceive TML's greatest levels of engagement differently.

Instructional divisions. There were no statistically significant differences between any of the instructional divisions regarding the perceived frequency of use of technology or the perceived usefulness of technology. The findings were surprising based on the personal perceptions of the researchers regarding the use of technology in various career fields. The researchers thought that there could be divisional differences in the perceived frequency and believed the Business and Technology department would have reported greater perceived frequency as well as greater perceptions of usefulness. One possible explanation for little variability was the small number of respondents to represent the divisions. Another explanation for such little variability of perceptions of frequency is the perceptions of appropriate use of technology based on the learning objective. Instructors may have answered based on frequency relative to their perceptions of what they believed to be appropriate in respect to the learning objective. Instructors may have based their responses of perceptions relative to their perspectives on purposeful and relevant use.

Perceptions of instructional models. The characteristics of technology use varies between instructional models. Traditional lecture based models of instruction are now blending face-to-face instruction with the advantages of TML, thus allowing the instructor to be more of a facilitator while student make deeper meaning of their learning. Flipped classrooms are generally student focused and allow students to move through the course content at their own pace. This concept is not as common and could be foreign to some students. Therefore, some students in this study may not have experienced a flipped classroom learning environment and were unable to provide perceptions of this model. Hybrid models are characterized by a mixture of online instruction and assignments with occasional class meetings. Students may have preferred this model since it gives them access to face-to-face instruction while reaping the benefits and flexibility of online learning. It is important to recognize how each of these instructional models can fit the individualized needs and learning styles of the learners. Sewell (2016) noted students were more likely to withdraw or fail in an online or hybrid course than traditional courses and explained "students in online and hybrid courses required more discipline, better time management, and a knowledge of technology that many students did not possess" (p. 84).

Overall, students perceived flipped and traditional lecture based models for instructional delivery to have a more positive impact on student engagement than the hybrid instructional model. The perception is reversed when students considered the impact on student achievement. They reported that hybrid instructional delivery has a greater impact on student achievement than the flipped model or the lecture based traditional model. The differences in perceptions may be explained by student experiences or familiarity with each of the instructional models. Students may have more experience and familiarity with hybrid and traditional models, as opposed to flipped models. Also, students may have considered that hybrid classes (M= 3.28) give students multiple points of access and autonomy in their learning experiences, given that hybrid models combine the uniqueness of traditional (M= 2.92) and online models (for the purpose of this study, this variable was not considered). While students perceived these models to engage students differently, it did not corroborate with the qualitative findings where students preferred traditional instructional models over hybrid models.

Limitations

Several limitations appeared in this study. The findings of this study may only be relevant and transferable to community colleges with similar demographics. Questionnaire and interview responses were collected on a voluntary basis. The questionnaire instrument was disseminated to students and full-time instructors via institution email addresses, thus some students and instructors may not have opened the email that contained the online questionnaire requests. The respondents were also asked to self-assess their use of technology in the classroom, thus it was listed as a limitation because self-assessment may not reflect actual use. Also, during the time this study's questionnaire was disseminated students and instructors were inundated with several other survey requests which may have deterred potential respondents.

Another limitation in this study pertained to the sample size needed for each data set. The absence of necessary statistical data likely influenced the parametric data and power of the statistical analyses. This study surveyed 35 instructors and 96 students, which were far below their statistical minimums. The study was a primarily qualitative study; thus the methods were triangulated to confer with the findings from the limited sample sizes.

An additional limitation was an underrepresentation of some instructional divisions. This underrepresentation may have been due to apathy, lack of time, or fear of compromised anonymity which could lead to retaliation. Moreover, there was no way to link student data to instructors without revealing specific information about courses. Linking course information to the surveys could have also deterred respondents from honestly reporting frequency of use of technology.

Recommendations

The study revealed trends in the data that have implications for both institutional practices and further research. Recommendations for practice and further research are presented in this section.

Recommendations for practice. The implications for practice have been divided into five categories: communication, technology access, on-boarding student technology literacy, professional development for instructors, and policies for technology use. A strategic plan for technology integration and diffusion should be developed or amended to include steps to eliminate accessibility barriers, establish and coordinate a single Learning Management System (LMS) for instructor and student use, and create a culture of shared enthusiasm for technology acceptance and integration with both instructors and students. This should be done through professional development tailored to the needs of instructional divisions, and through a process for onboarding student technology skills and practices that will meet instructor expectations and course requirements. Significant technology purchases should be postponed to ensure alignment to the revised strategic plan and shared vision.

Communication. A strategic plan that emphasizes communication is paramount to the success of technology integration. Students' feedback is vital, as it can inform leaders of the uses and applications of technology from a learner's perspective. Interviews revealed that students and instructors felt disconnected from the decision-making processes concerning institutional technology. The planning committee should involve both student and instructor groups to be involved in the decision making. Accordingly, the first recommendation proposes that a portion of a strategic plan focus on increasing organizational communication and garnering input from stakeholders through dialogue. These discussions will guide the development of a shared vision for institutional technology, create a culture of collaborative decision making and foster greater stakeholder buy-in which could lead to increased technology implementation and promote a greater sense of choice in curriculum design. Giving the instructors a voice in the matter could open the door for stronger communication between instructors and administrators. This strengthened line of communication flows both ways. Administrators would be able to set and communicate policies regarding technology usage and expectations pertaining to course syllabi, grades, and feedback. Regular surveys revealing student and instructor perceptions should be used as part of the informed decision making process for the strategic planning of institutional technology. The committee should be included when changes to institutional purchases, processes and policies are considered.

The communication plan should also include ways to inform students and instructors of new and existing resources provided by the institution. Instructors and students need to be aware of the tools and support services available. The process for device checkout and the technology services available to students should be included in new student induction, and featured in campus communications and advertisements. Instructors can advertise the resources to students to mitigate barriers to technology use.

Technology access. Reliable access and connectivity to technology on campus is vital to enhance Technology-mediated Learning (TML) practices. The second recommendation addresses bolstering both student and instructor access to technology and learning resources. During the course of student and instructor interviews, both groups noted barriers to technology access, resources, and connectivity. One newer building on campus was reported to have limited or inconsistent Wi-Fi access. Thus, it is recommended that the institution determine the areas in which connectivity is problematic and invest in the equipment needed to establish consistent Wi-Fi access in those areas.

While technology resources are available on campus, instructors perceive between 10% and 20% of their students do not have reliable access to the hardware needed for use off campus. This could impact an instructor's decision to embed technology into the requirements for their classes. The institution's website describes student support services that are available to include computer laptop checkout. It is important for instructors to have information regarding the student support services available. This would not only allow them to include the information on their course syllabi and help them to advise students when a need arises, but it would also alleviate the fear instructors may have of adding unnecessary challenges for their students.

In addition to connectivity and student access, the variability of interface cables and available tools between classrooms were also a concern for instructors. In an effort to keep costs down while still addressing the problems caused by variability, the institution should establish uniformity of teaching stations within divisions or buildings. This could be done by pooling and moving similar connections and resources to one division or building. Instructors should be made aware of the changes in advance and the change should take place when it would be the least intrusive to instruction.

Some students reported a lack of access to course materials from previous courses during the time they are completing clinical internships as a barrier. The e-Learn course management system should be configured to allow students access to course materials through to completion of their program. If this is not an option within the e-Learn program, students should be advised to download important materials prior to losing access.

On-boarding student technology literacy. Students who enter the community college have a wide variety of technology skill levels, as well as levels of access to technology. A third recommendation is for the institution to continue to support and refine the current on-boarding process based on the feedback of instructors from each division.

In respective programs, the students take a course regarding the use of technology. The responses reflected positively on the impact it had on their ability to engage with technology in their courses. The student responses in this research did, however, demonstrate a need for the course to include projects and assignments that are representative of the various types of assignments used in other classes. Feedback and collaboration between divisions would provide a more comprehensive approach to the development of assignments for the orientation seminar to be representative of the expectations students will have in later coursework. The seven-week orientation seminar should then be adjusted to provide the on-boarding training that is reflective of the feedback from the divisions and include assignments that mimic the technology literacy needed to be applied with new learning.

The course should be a requirement for all new students. The student's technology skill levels would be assessed at the beginning and end of the orientation seminar using a pre- and post-assessment of TML. The data from these assessments will be used to guide further tutoring and instruction as an effort to mitigate ethics of care for those without personal access or certain skill sets. The researchers suggest an instrument that captures perceptions of frequency, perceived usefulness, types of technology, and their impact on student outcomes similar to the student questionnaire used in this research. During the first orientation sessions, students should become familiar with the technology that is used on campus, how to access and utilize learning management systems and become familiar with the technology support services available to students. The remaining coursework should be differentiated based on the technology skill level reflected on the beginning assessment. The students with greater need will be paired with peer mentors or library support staff to assist students in the use of technology. Revising the on-boarding process to include these supports in the orientation seminar may increase student comfort with accessing assistance, after the orientation course and decreased incidents of technology interference in future learning activities.

The institution should offer technological refresher sessions periodically throughout the year for students who continually struggle to build their technological skills. These sessions could be offered by the library staff on a rolling schedule. The refresher sessions would be brief, and designed based on the feedback received through the orientation assessments. These sessions would also be a great way to include peer mentors and possibly other technologically advanced students who are willing to teach other students.

Professional development. This category of implications offers a unique mixture of fine-tuning current practices and introducing some new practices. The fourth recommendation for practice is for the community college to employ greater use of the Distributive Technology facilitators for campus wide, instructional division, and course specific professional development. Professional development sessions should be intentional and practical to instructors' needs. In light of the data that show instructors are more likely to acquire technology skills independently rather than in professional developments, the institution may consider providing a bank of independent study learning modules aimed to develop educational pedagogy with technology use. The community college administrators should regularly assess instructor perceptions and encourage feedback on technology acquisition in order to track the climate amongst instructors and meet their needs. Each professional development session should start with clear objectives and end with steps or products for instructors to apply moving forward. To aid in this matter, instructors who are early adopters could serve as peer mentors and facilitators for other faculty members. This peer mentor approach allows for more collaboration and cultivates more buy-in amongst faculty as they may feel less vulnerable about skill deficits in working with peers. In addition, designated instructors who are early adopters could be used as technology coaches that would specifically focus on how to use technology to engage students in learning. These coaches could also be tasked with gathering data to determine the effectiveness of TML.

Institutional policies for technology use. The fifth recommendation for practice is to establish institutional policies that will establish continuity for students and allow for instructor autonomy, flexibility and ease of use within those policies. The number of learning management systems used throughout the campus should be limited to a single system. The D2L e-Learn management system is the only one endorsed and supported by Distributed Education for the institution. Thus, instructional policies surrounding D2L implementation should be revised and streamlined to allow for more ease of use for instructors. Instructors need to have a LMS that they can access and modify remotely instead of having the distributive facilitators have the only access to modify. Students reported being confused by the use of various class websites and other management systems to house course materials and provide links to learning resources.

While the use of one campus wide learning management system may not be feasible, depending on the nature of a course, each instructional division should exhibit a level of uniformity. Instructional divisions could establish uniformity by using a set learning management system in order to establish consistency and lessen the number of learning management systems that faculty and students must master. Each instructional division could have a webpage outfitted with resources and communication specific to the division that could serve as a hub that students and instructors can access.

Recommendations for further research. This study looked at trends of technology usage across a college community. Additional research is needed to examine technology uses within each of the five instructional divisions. This inquiry could bring deeper understanding of the ways the technology needs and usage shifts among disciplines. Exploring the different learning management systems used in courses and divisions could shed more light on the needs of specific disciplines when it comes to the use of TML.

Additional research is needed in several areas of technology. There is a need for more comparative research on technological tools in general. Ownership and usage of said tools can vary based on age, race, gender. A study designed to compare the technological tools owned and used by a diverse group of students and instructors could potentially speak to cultural, generational, and gender differences pertaining to technology. This type of information could help make technological acquisition and integration more effective in meeting the needs of instructors and students. Likewise, research focused on instructional delivery methods is crucial for meeting the demands of non-traditional students and supporting diverse learning needs. Lastly, the use of gaming and digital media to enhance the learning experience and increase engagement amongst younger students warrants more study.

Personal Reflections

Through this research opportunity, we have experienced organizational leadership and change peripherally through the lenses of student and instructor stakeholders in a learning organization. Contemporary issues like technology-mediated learning (TML) warrant intentional research to capture the perspectives of those most impacted by its use. As educational leaders, this experience has revealed a deeper understanding of how stakeholder perspectives can influence strategic change and the acceptance of institutional initiatives.

The most valuable take away has been to reflect on how the variability of personal and professional experiences can impact practice. Each of us came into this research with preconceptions about technology as well as personal beliefs concerning the best practices for its use. Through this research and our work together, we are able to more deeply identify with the role of educational leaders in the process of strategic change. We have developed a greater respect for the research process and the importance of using that research to give a voice to both students and instructors. The experience has also taught us the value of using research to guide leadership and decision making practices.

References

Some references are redacted per MOU (Appendix G). Both the MOU and a list of redacted references are on file in the Ed.D. office.

Adams, N. B. (2002). Educational computing concerns of postsecondary faculty. *Journal of Research On Technology in Education, 34*, 285.

AEA, LLC. (2016). *Lesson 17: Cronbach's alpha*. Unpublished manuscript, College of Education, Lipscomb University, Nashville, Tennessee.

Agostini, P. (2013). *Community college students' preferences of learning environment in three modalities* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 3606375).

American Association of Community Colleges (2016a). 21st century initiative. Retrieved from http://www.aacc.nche.edu/AboutCC/21st_century/Pages/default.aspx

American Association of Community Colleges (2016b). *2016 fact sheet*. Retrieved from http://www.aacc.nche.edu/AboutCC/Documents/AACCFactSheetsR2.pdf

Aragon, S.R. & Johnson, E.S. (2008). Factors influencing completion and non completion of community college online courses. *The American Journal of Distance Education, 22,* 146-158. doi:10.1080/08923640802239962

Astin, A. (1999). Student involvement and development theory for higher education. *Journal of College Student Personnel*, *40*, 518-529. Retrieved from https://www.middlesex.mass.edu/ace/downloads/astininv.pdf

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191-215. doi: 10.1037/0033-295X.84.2.191

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: W.H. Freeman and Company.

Berg, B., & Lune, H. (2012). *Qualitative research methods for the social sciences* (8th ed.). Boston, Massachusetts: Pearson.

Bergmann, J., & Sams, A. (2012). *Flip your classroom: reach every student in every class every day*. Eugene, Oregon: ISTE

Cai, Z., Fan, X., & Du, J. (2017, February). Gender and attitudes toward technology use: a meta-analysis. *Computers & Education, 105*, 1-13. doi: 10.1016/j.compedu.2016.11.003.

Care, E., Kim, H., Anderson, K., & Gustafsson-Wright, E. (2017). *Skills for a changing world: national perspectives and the global movement*. Retrieved from Center for Universal Education at Brookings Institute website: https://www.brookings.edu/wp-content/uploads/2017/03/global-20170324-skills-for-a-changing-world.pdf

Chuttur, M. (2009). *Overview of the technology acceptance model: origins, developments, and future directions.* (Research Report No. 9-37). Retrieved from Sprouts: Working Papers on Information Systems website: https://www.scribd.com/document/125174000/Chuttur-M-Y-2009-Overview-of-the-Technology-Acceptance-Model-Origins-Developments-and-Future-Directions-Indiana-University-USA-Sprouts-Worki

Clifford, P. M. (2007). *The computer self -efficacy of African American and Hispanic American community college students as compared to their Caucasian counterparts.* Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 3254445).

Currie, A. V. (2015). *Student use and misuse of personal technological devices in the higher education classroom*. Retrieved from https://repository.lib.ncsu.edu/bitstream/handle/1840.16/10309/etd.pdf?sequence=2

D2L. (2005, January 12). *E-learn campus teams with desire2learn to deliver world-class eLearning.* [Press Release]. Retrieved from https://www.d2l.com/newsroom/releases/elearn-campus-teams-with-desire2learn-to-deliver-world-class-elearning/

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, (3),* 318.

Dixson, M. (2010). Creating effective student engagement in online courses: what do students find engaging? *Journal of the Scholarship of Teaching and Learning*, *10*(2), 1-13. Retrieved from https://www.iupui.edu/~josotl/archive/vol_10/no_2/v10n2dixson.pdf

Donley, M. (2012). *Technology's influence on education*. University article retrieved from http://source.southuniversity.edu/print-article.aspx?ContentID=76874

Doss, M. (2014). *The perceived frequency of use and usefulness of instructional technology in community college general education courses* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses Global. (UMI No. AAI3626251)

Dutton, W. H., Helsper, E. J., & Gerber, M. M. (2009). *The internet in Britain: 2009*. Oxford University: Oxford Internet Institute. Retrieved from http://oxis.oii.ox.ac.uk/wp-content/uploads/sites/43/2014/11/oxis2009-report.pdf

Finn, J., & Rock, D. (1997). Academic success among students at risk for school failure. *Journal of Applied Psychology. 82*, 221.

Fredricks, J., Blumenfeld, P., & Paris, A. (2004, Spring). School engagement: potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59-109. doi: 10.3102/00346543074001059

Gall, M., Gall, J., & Borg, W. (2007). *Educational research: an introduction* (8th ed.). Boston, Massachusetts: Pearson/Allyn & Bacon

Geoghegan, W. (1994, July). *What ever happened to instructional technology?* Paper presented at the meeting of 22nd Annual Conference of the International Business Schools Computing Association, Baltimore, Maryland. Retrieved from http://eprints.soton.ac.uk/260144/1/Geoghegan-1994-WHAT_EVER_HAPPENED_TO_INSTRUCTIONAL_TECHNOLOGY.doc

Georgina, D. A., & Olson, M. R. (2007). Integration of technology in higher education: a review of faculty self-perceptions. *The Internet And Higher Education*, *11*, 1-8. doi:10.1016/j.iheduc.2007.11.002

Green, H., & Hannon, C. (2007). *Their space: education for a digital generation*. Retrieved from http://www.demos.co.uk/files/Their%20space%20-%20web.pdf

Hamilton, E. R., Rosenburg, J. M., & Akcaoglu, M. (2016). The substitution augmentation modification redefinition (SAMR) model: a critical review and suggestions for its use. *Techtrends: For Leaders In Education & Training, (5),* 433. doi:10.1007/s11528-016-0091-y

Hao, Y. (2016). Exploring undergraduates' perspectives and flipped learning readiness in their flipped classrooms. *Computers in Human Behavior*, *59,* 82-92. doi: 10.1016/j.chb.2016.01.032

Hargreaves, A., & Shirley, D. (2012). *The global fourth way: the quest for educational excellence*. Thousand Oaks, California: Corwin

Hatch, J. A. (2002). *Doing qualitative research in education settings*. Albany, New York: State University of New York Press

Helsper, E., & Eynon, R. (2009). Digital natives: Where is the evidence? *British Educational Research Journal*, 1-18. doi: 10.1080/01411920902989227

Henrickson, K. L. (2007). *Concerns of non- and low users of technology in the classroom among part- and full-time community college faculty* (Doctoral dissertation) Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 3263153).

Jaggars, S. S. (2011). Online learning: Does it help low-income and underprepared students? *Community College Research Center,* (26). Retrieved from https://ccrc.tc.columbia.edu/media/k2/attachments/online-learning-help-students.pdf

Jaggars, S. S. (2014, December 29). Democratization of education for whom? online learning and educational equity. Retrieved from https://www.aacu.org/diversitydemocracy/2014/winter/jaggars

Jaschik, S., & Lederman, D. (2016). *The 2016 inside higher ed survey of faculty attitudes on technology* (Rep.). Retrieved https://www.insidehighered.com/booklet/2016-survey-faculty-attitudes-technology

Kenning, C. (2017, May 12). Tennessee set to be first to make community college free for adults. *U.S. News and World Report.* Short article, retrieved from https://www.usnews.com/news/us/articles/2017-05-12/tennessee-set-to-be-first-to-make-community-college-free-for-adults

Laux, D., Luse, A., & Mennecke, B. (2016). Collaboration, connectedness, and community: an examination of the factors influencing student persistence in virtual communities. *Computers in Human Behavior*, *57*, 452-464. doi: 10.1016/j.chb.2015.12.046

Lawson, M., & Lawson, H. (2013). New conceptual framework for student engagement research, policy, and practice. *Review of Educational Research*, *83*, 432-479. doi: 10.3102/0034654313480891

Lenhart, A. (2015, April). *Teens, social media & technology overview 2015*. Retrieved from Pew Research Center: http://www.pewinternet.org/2015/04/09/teens-social-media-technology-2015/

Martirosyan, N. M., Kennon, J. L., Saxon, D. P., Edmonson, S. L., & Skidmore, S. T. (2017). Instructional technology practices in developmental education in Texas. *Journal Of College Reading And Learning, 47*(1), 3-25.

Ma, J., & Baum, S. (2016). *Trends in community colleges: enrollment, prices, student debt, and completion*. Retrieved from Trends in Higher Education website: https://trends.collegeboard.org/sites/default/files/trends-in-community-colleges-research-brief.pdf

Matthews, A. (2009). *Understanding the effects of student engagement on persistence and academic performance for community college students* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 3388726)

McClenney, K., Marti, N., & Adkins, C. (2006). *Student engagement and student outcomes: key findings from CCSSE validation research*. Retrieved from ERIC: http://eric.ed.gov/?id=ED529076

McLeod, S. A. (2014). *Lev Vygotsky*. Retrieved from www.simplypsychology.org/vygotsky.html

Metlitzky, L. (1999). *Bridging the gap for the mainstream faculty: understanding the use of technology in instruction.* Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 9963035).

Moseley, W.L. (2010). *Student and faculty perceptions of technology's usefulness in community college general education courses.* (Doctoral dissertation, University of Nebraska). Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 3412880)

Nakajima, M. (2008). *What factors influence student persistence in the community college setting?* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 3325086).

[Name] State Community College. (2016). [Name] State: At a Glance 2015-2016. A list of redacted references is on file with the Ed.D. office.

Nazar, J. (2013, July 23). 20 things 20 year olds don't get. *Forbes*. Short article, retrieved from http://www.forbes.com/sites/jasonnazar/2013/07/23/20-things-20-year-olds-dont-get/#3f0fdff15644

Nguyen, T. H., Lundy-Wagner, V., Samayoa, A. C., Gasman, M., Wilson, A., Diggs, D., . . . Boland, W. (2015). *On their own terms: two-year minority serving institutions*. Retrieved from http://ccrc.tc.columbia.edu/media/k2/attachments/on-their-own-terms-two-year-msis.pdf

OECD (2015), *Students, computers and learning: making the connection.* Paris, France: OECD Publishing. doi: 10.1787/9789264239555-en

Palak, D., & Walls, R. T. (2009). Teachers' beliefs and technology practices: a mixed-methods approach. *Journal of Research On Technology in Education, 41*, 417-441.

Prensky, M. (2001a). Digital natives, digital immigrants. *On The Horizon, 9*(5). Retrieved from https://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf

Prensky, M. (2001b). Digital natives, digital immigrants. *On The Horizon, 9*(6). Retrieved from https://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part2.pdf

Radovcic, A. (2010). *Factors impacting persistence for African-American and Latino community college students.* Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 3432891).

Riedel, C. (2014, February 3). 10 Major Technology Trends in Education. *The Journal.* Retrieved from https://thejournal.com/articles/2014/02/03/10-major-technology-trends-in-education.aspx

Rogers, E. M. (1962). *Diffusion of innovations.* Retrieved from https://teddykw2.files.wordpress.com/2012/07/everett-m-rogers-diffusion-of-innovations.pdf

Rogers, R. A. (2007). *Using Rogers's theory of perceived attributes to address barriers to educational technology integration.* (Doctoral dissertation, Walden University). Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 3277943)

Rowh, M. (2010). *Community college companion: everything you wanted to know about succeeding in a two-year school*. Indianapolis, Indiana: JIST Publishing.

Semuels, A. (2015, October 15). Free tuition is not enough. *The Atlantic*. Short article, retrieved from http://www.theatlantic.com/business/archive/2015/10/free-tuition/410626/

Sewell, T. R. (2016). *Student outcomes in traditional, hybrid, and online courses in community college career and technical education programs.* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 10290023).

Shaffner, M. (2007). *Technology integration professional development guide*. Retrieved from https://www.edutopia.org/technology-integration-guide

Smith, A. (2015, August 26). Responding to free. *Inside Higher Ed.* Short article, retrieved from https://www.insidehighered.com/news/2015/08/26/first-batch-tennessee-promise-students-kick-academic-year

Tinto, V. (1993). *Leaving college: rethinking the causes and cures of student attrition* (2nd ed.). Chicago, Illinois: The University of Chicago.

Tinto, V. (2012). Enhancing student success: taking the classroom success seriously. *The International Journal of the First Year in Higher Education*, *3*(1), 1-8. doi: 10.5204/intjfyhe.v2i1.119

Tschannen-Moran, M., & Hoy A.W. (2001). Teacher efficacy: capturing an elusive construct. *Teaching and Teacher Education, 17,* 783-805. Retrieved from https://www.researchgate.net/profile/Anita_Hoy/publication/222564347_Teacher_Efficacy_Capturing_an_Elusive_Construct/links/00463528a20374eea4000000.pdf

Urdan, T. C., & Pajares, F. (2006). *Self-efficacy beliefs of adolescents*. Greenwich, Conn: Information Age Publishing

Van der Veer, R. (1991). The anthropological underpinning of Vygotsky's thinking. *Studies in Soviet Thought*, *42*, 73-91. Retrieved from http://www.jstor.org/stable/20099397

Vygotsky, L. (1930). Mind and society (A. Blunden & N. Schmolze, Trans.). *Harvard University Press*. Retrieved from http://www.unilibre.edu.co/bogota/pdfs/2016/mc16.pdf

Walker, D.S., Lindner, J.R., Murphrey, T.P. & Dooley, K. (2016). Learning management system usage: Perspectives from university instructors. *The Quarterly Review of Distance Education*, *17*, 41-50.

Wells, C. S., & Wollack, J. A. (2003). *An instructor's guide to understanding test reliability.* Madison, Wisconsin: Testing & Evaluation Services, University of Wisconsin

Wood, S. (2016). Community colleges ease community career-ladder climbs. *Business North Carolina*, *36*, 48-51.

Xu, D., & Jaggars, S. S. (2011). Online and hybrid course enrollment and performance in Washington state community and technical colleges. *Community College Research Center,* (31). Retrieved from http://files.eric.ed.gov/fulltext/ED517746.pdf

Yesilyurt, E., Ulas, A., & Akan, D. (2016). Teacher self-efficacy, academic self-efficacy, and computer self-efficacy as predictors of attitude toward applying computer-supported education. *Computers in Human Behavior*, *64*, 591-601. doi: 10.1016/j.chb.2016.07.038

Zeidenberg, M. (2008, June). Community colleges under stress. *Issues in Science and Technology, 24*, 53-58. Retrieved from http://ccrc.tc.columbia.edu/media/k2/attachments/community-colleges-under-stress.pdf

Zhao, J. J., Alexander, M. W., Perreault, H., Waldman, L., & Truell, A. D. (2009). Faculty and student use of technologies, user productivity, and user preference in distance education. *Journal of Education for Business, 84*, 206-212. doi:10.3200/joeb.84.4.206-212.

Appendix A

Instructor Informed Consent Letter

Middle TN Community College Technology Study

INFORMATION AND CONSENT FORM

Introduction:

You are invited to participate in a research study investigating the impact of classroom technology on the engagement and achievement of students. This study is being conducted by **Sheri Coulter, MarQo Patton, and Candis White**, students in the College of Education at Lipscomb University under the supervision of Dr. Deborah Hoggatt, a faculty member of the Doctor of Education Program. You were selected as a possible participant in this research because you are an instructor in the organization we are researching. Please read this form and ask questions before you agree to be in the study.

Background Information:

The purpose of this study is to understand ways in which technology-mediated instructional practices (TML) impact student engagement and achievement in a community college setting. Approximately 300 people are expected to participate in this research.

Procedures:

If you decide to participate, you will be asked to complete a questionnaire giving the researchers feedback on perceptions of technology use and usefulness in instruction. This study will take approximately 20 minutes to perform. Should you choose to participate further, interviews will be formed based on voluntary providing of an email address. Interviews and focus groups will last 30 minutes and will not extend without permission. Though recorded, your identity will not be published. Please read risks and benefits of the study for more information.

Risks and Benefits of being in the study:

The study has minimal risks. First, you are providing information regarding your perception of technology in ways to learn about how technology engages students. Though highly beneficial, your anonymous responses will give the researchers a better understanding of how technological engagement influences or benefits student achievement. The likelihood of your feedback directly connecting with your identity (name and contact information) is highly unlikely, unless you desire to participate further in interviews or focus groups. There will be a risk regarding the college division with which you are affiliated, however, no published information will compromise anonymity. Secondly, should you agree to participate further in interviews and focus groups, you risk your identity (name and contact information) being made known to the researchers and/or fellow participants of the focus group. You should feel free at any moment of the questionnaire, interview, or focus group to stop should you feel the need to.

Being in the study provides your community college with valuable information on how to incorporate engaging ways to enhance your teaching experience. Your honest feedback provides the researchers with information that will help us think toward better and more career-aligned learning experiences. Your input is vital to understanding how various instructors address student engagement through technology. The study will not have the identities of people or of the community college published. However, there are no direct benefits to you for participating in this research.

Confidentiality:

Any information obtained in connection with this research study that can be identified with you will be disclosed only with your permission; your results will be kept confidential. In any written reports or publications, no one will be identified or identifiable and only group data will be presented. No one at (Institution Name) Community College will know your results. This information will be disclosed to the Internal Review Board and the Juried Review Committee at Lipscomb University for the purpose of conducting a Capstone Research Project and dissertation defense.

We will keep the research results in a locked file cabinet at Lipscomb University, and only the researchers named in this form and our advisor will have access to the records while we work on this project. We will finish analyzing the data by November 1, 2017. We will then destroy all original reports and identifying information that can be linked back to you. Audio recordings will be made, but only the researchers listed in this form will have access to the audio files. These files will be destroyed after December 1, 2017.

Voluntary Nature of the Study:

Participation in this research study is voluntary. Your decision whether or not to participate will not affect your future relations with (Institution Name) Community College in any way. If you decide to participate, you are free to stop at any time without affecting these relationships.

New Information:

If during course of this research study we learn about new findings that might influence your willingness to continue participating in the study, we will inform you of these findings.

Contacts and Questions:

If you have any questions or concerns, please feel free to contact either researcher at:

Sheri Coulter XXX-XXX-XXXX

MarQo Patton XXX-XXX-XXXX

Candis White XXX-XXX-XXXX

If you have any additional questions later, the faculty advisor, (Dr. Deborah Hoggatt XXX-XXX-XXXX), will be happy to answer them. If you have other questions or concerns regarding the study and would like to talk to someone other than the researcher(s), you may also contact Dr. Roger Wiemers. Chair of the Lipscomb University Institutional Review Board, XXXXXXXXXX@lipscomb.edu. You may keep a copy of this form for your records.

Statement of Consent:

You are making a decision whether or not to participate. Your signature indicates that you have read this information and your questions have been answered. Even after signing this form, please know that you may withdraw from the study at any time.

Student Informed Consent Letter

Middle TN Community College Technology Study

INFORMATION AND CONSENT FORM

Introduction:

You are invited to participate in a research study investigating the impact of classroom technology on the engagement and achievement of students. This study is being conducted by **Sheri Coulter, MarQo Patton, and Candis White**, students in the College of Education at Lipscomb University under the supervision of Dr. Deborah Hoggatt, a faculty member of the Doctor of Education Program. You were selected as a possible participant in this research because you are a student in the organization we are researching. Please read this form and ask questions before you agree to be in the study.

Background Information:

The purpose of this study is to understand ways in which technology-mediated instructional practices (TML) impact student engagement and achievement in a community college setting. Approximately 300 people are expected to participate in this research.

Procedures:

If you decide to participate, you will be asked to complete a questionnaire giving the researchers feedback on perceptions of technology use and usefulness in instruction. This study will take approximately 20 minutes to perform. Should you choose to participate further, interviews will be formed based on voluntary providing of an email address. Interviews and focus groups will last 30 minutes and will not extend without permission. Though recorded, your identity will not be published. Please read risks and benefits of the study for more information.

Risks and Benefits of being in the study:

The study has minimal risks. First, you are providing information regarding your perception of technology in ways to learn about how technology engages students. Though highly beneficial, your anonymous responses will give the researchers a better understanding of how technological engagement influences or benefits student achievement. The likelihood of your feedback directly connecting with your identity (name and contact information) is highly unlikely, unless you desire to participate further in interviews or focus groups. There will be a risk regarding identifying the college division that houses your major of study, however, no published information will compromise anonymity. Secondly, should you agree to participate further in interviews and focus groups, you risk your identity (name and contact information) being made known to the researchers and/or fellow participants of the focus group. Students will not meet with professors. You should feel free at any moment of the questionnaire, interview, or focus group to stop should you feel the need to.

Being in the study provides your community college with valuable information on how to incorporate engaging ways to enhance your learning experience. Your honest feedback provides the researchers with information that will help us think toward better and more career-aligned learning experiences. Your input is vital to understanding how various students perceive student engagement and perceptions of achievement through technology. The study will not have the identities of people or of the community college published. However, there are no direct benefits to you for participating in this research.

Confidentiality:

Any information obtained in connection with this research study that can be identified with you will be disclosed only with your permission; your results will be kept confidential. In any written reports or publications, no one will be identified or identifiable and only group data will be presented. No one at (Institution Name) Community College will know your results. This information will be disclosed to the Internal Review Board and the Juried Review Committee at Lipscomb University for the purpose of conducting a Capstone Research Project and dissertation defense.

We will keep the research results in a locked file cabinet at Lipscomb University, and only the researchers named in this form and our advisor will have access to the records while we work on this project. We will finish analyzing the data by November 1, 2017. We will then destroy all original reports and identifying information that can be linked back to you. Audio recordings will be made, but only the researchers listed in this form will have access to the audio files. These files will be destroyed after December 1, 2017.

Voluntary Nature of the Study:

Participation in this research study is voluntary. Your decision whether or not to participate will not affect your future relations with (Institution Name) Community College or your professors in any way. If you decide to participate, you are free to stop at any time without affecting these relationships.

New Information:

If during course of this research study we learn about new findings that might influence your willingness to continue participating in the study, we will inform you of these findings.

Contacts and Questions:

If you have any questions or concerns, please feel free to contact either researcher at:

Sheri Coulter XXX-XXX-XXXX

MarQo Patton XXX-XXX-XXXX

Candis White XXX-XXX-XXXX

If you have any additional questions later, the faculty advisor, (Dr. Deborah Hoggatt XXX-XXX-XXXX), will be happy to answer them. If you have other questions or concerns regarding the study and would like to talk to someone other than the researcher(s), you may also contact Dr. Roger Wiemers. Chair of the Lipscomb University Institutional Review Board, XXXXXXXXXX@lipscomb.edu. You may keep a copy of this form for your records.

Statement of Consent:

You are making a decision whether or not to participate. Your signature indicates that you have read this information and your questions have been answered. Even after signing this form, please know that you may withdraw from the study at any time.

Appendix B

Instructor Questionnaire

Statement of Consent

I have read the above information and have had the opportunity to ask questions and receive answers. I consent to participate in the study.

Yes No

Signature: ______________________________ Date: ______________________

This questionnaire is designed to gather data that reflects an instructor's uses and perceptions of technology-mediated learning (TML) in educational environments. TML refers to an instructor or student's use of computers, tablets, and other devices, as well as digital media to enhance learning and engage students in the learning process. The main sections of the survey include frequency of use, uses of technology to deliver instructional content, uses of technology to communicate with students, and uses of technology in course assignments.

Personal Information

1) Gender Identity (circle one): Male Female Prefer not to say

2) Select your age range: 25-34, 35-44, 45-54, 55-64, 65 and over

3) In which instructional division do you primarily teach?

Health Sciences, Business & Technology, Humanities, Math & Science, Social Science & Education, Other

Frequency

4) I use technology in the classroom.

occasionally 1 2 3 4 consistently

5) I use technology to deliver instructional content. (Delivery of content refers to the use of technology to aide in instruction. Examples: PowerPoint, Video, Recorded Audio / Podcasts, Online Discussion Forums, Class Web Site, Gaming Engagement, Other…)

occasionally 1 2 3 4 consistently

6) I use technology to communicate with students.

occasionally 1 2 3 4 consistently

7) Technology is required to complete the assignments in my class.

occasionally 1 2 3 4 consistently

Delivery of Instructional Content

Delivery of content refers to the use of technology to aide in instruction. (Examples: PowerPoint, Video, Recorded Audio / Podcasts, Online Discussion Forums, Class Web Site, Gaming*,* Other…)

8) What technology tools, applications, and programs do you use to deliver instructional content? Select all that apply and list any additional responses by selecting "Other".

PowerPoint presentations, Video, Recorded Audio / Podcasts, Online Discussion Forums, Class Website, Gaming, None, Other

For the following items, select how strongly you agree or disagree with each statement.

9) Technology used to **deliver instructional content** has a positive effect on student participation and on-task behaviors.

strongly disagree 1 2 3 4 strongly agree

10) Technology used to **deliver instructional content** has a positive effect on student analysis, decision-making, and problem solving behaviors.

strongly disagree 1 2 3 4 strongly agree

11) Technology used to **deliver instructional content** has a positive effect on a student’s level of anxiety, interest, or excitement.

strongly disagree 1 2 3 4 strongly agree

12) Technology used to **deliver instructional content** has a positive effect on a student’s grade in a course.

strongly disagree 1 2 3 4 strongly agree

Communication

Communication refers to ways in which information is exchanged between the instructor and students. (Examples: Online Discussion Forums, Email, Social Media, Other…)

13) What technology tools, applications, and programs are used to communicate with and between students? Select all that apply and list any additional responses by selecting "other".

Online Discussion Forums, Email, Social Media, Texting or Alert Services, None, Other

For the following items, select how strongly you agree or disagree with each statement.

14) Technology used to **communicate** has a positive effect on student participation and on-task behaviors.

strongly disagree 1 2 3 4 strongly agree

15) Technology used to **communicate** has a positive effect on student analysis, decision-making, and problem solving behaviors.

strongly disagree 1 2 3 4 strongly agree

16) Technology used to **communicate** has a positive effect on a student's level of anxiety, interest, or excitement.

strongly disagree 1 2 3 4 strongly agree

17) Technology used to **communicate** has a positive effect on a student's grade in a course.

strongly disagree 1 2 3 4 strongly agree

Student Assignments

Student assignments refer to the tasks and work students complete as part of a course requirement (Examples: PowerPoint, Video, Recorded Audio / Podcasts, Online Discussion Forums, Class Web Site, Gaming, Other.)

18) What technology tools, applications, and programs do you require students to use in completing assignments? Select all that apply and list any additional responses by selecting "other".

PowerPoint presentations, Video, Recorded Audio / Podcasts, Online Discussion Forums, Class Website, Gaming, Other

For the following items, select how strongly you agree or disagree with each statement.

19) Technology used to **complete assignments** has a positive effect on student participation and on-task behaviors.

strongly disagree 1 2 3 4 strongly agree

20) Technology used to **complete assignments** has a positive effect on student analysis, decision-making, and problem solving behaviors.

strongly disagree 1 2 3 4 strongly agree

21) Technology used to **complete assignments** has a positive effect on a student's level of anxiety, interest, or excitement.

strongly disagree 1 2 3 4 strongly agree

22) Technology used to **complete assignments** has a positive effect on a student's grade in a course.

strongly disagree 1 2 3 4 strongly agree

Other

23) How would you describe your comfort level with the use of technology in the classroom?

___

___

___

24) How do you acquire technology skills?

___

____

____

25) What technology tools, applications, and programs would you use frequently if they were made available to you?

____

____

____

26) Are there other thoughts and ideas you would like to share about TML?

____

____

____

27) Further Research: Would you be willing to participate in an interview gathering your perspective on technology use?

No Yes

28) Would you be willing to provide course a sample syllabus for this study?

No Yes

If so, please provide the contact information below:
Name: ____
Email: ____
Phone: ____
Email a syllabus of your choice to [redacted]

Appendix C

Community College Faculty Member Interview Guide

Background Questions

1. In what instructional division do you teach?
2. How many years have you taught full time at [redacted] State Community College?
3. What is your experience in learning about and using technology?
4. Do you use a computer outside of your work?

Essential Questions

5. What prompted you to use the technologies that you currently use in your class?
6. Did you receive any help or training in order to implement these technologies? If so, what?
7. In your opinion, what factors make a particular technology more useful to students than others?
8. Please describe a time when you felt like technology was particularly useful to the students in your class.
9. Please describe a time when you felt like technology was not useful to the students in your class.
10. What process do you use to select technologies for use in your class?
11. How do you make a connection between the use of a technology, and a specific instructional goal?
12. About what percentage of your current students do you think are fluent in technology?
13. About what percentage of your current students do you think has access to a computer at home?
14. Are there any technologies that you would like to start using in your class?
15. What are the barriers to technology use experienced by your colleagues?
16. What disadvantages do you see in using technology in your classes?
17. What is your opinion regarding the use of cellphones in the classroom as interactive tools?*

Instructor-specific Questions (personalized based on survey responses)

18. What was the most useful technology indicated on the survey? What makes you believe this? Please tell me more about how this technology is used in your class.

* Last question added after receiving feedback from Dr. Moseley (2017, personal communication).
** Note that each of these questions is an open ended starting point. Additional, probing questions will be asked in order to gain additional information from participants according to the procedures for Formal interviews found in Hatch (2002).

Appendix D

Student Questionnaire

Statement of Consent

I have read the above information and have had the opportunity to ask questions and receive answers. I consent to participate in the study.

No Yes

Signature: ______________________________ Date: ______________________

This questionnaire is designed to gather data that reflects the uses and perceptions of technology-mediated learning (TML) in educational environments. TML refers to an instructor or student's use of computers, tablets, and other devices, as well as digital media to enhance learning and engage students in the learning process. The main sections of the survey include frequency of use, uses of technology to deliver instructional content, uses of technology to communicate, and uses of technology in course assignments.

Personal Information

1) Gender (select one): Male Female Prefer not to say

2) Select your age range: Under 18, 18-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50 and over **(If student is under 17, don't participate).**

3) Race/Ethnicity (select one): Caucasian African American Asian Hispanic Other_____________

4) Are you currently enrolled in this college as part of a dual-enrollment high school course?

   Yes No

5) Select your major program of study: Health Sciences, Business & Technology, Humanities, Math & Science, Social Science & Education, Other

Frequency

6) I use technology in the classroom.

occasionally 1 2 3 4 consistently

7) I use technology to learn instructional content.

occasionally 1 2 3 4 consistently

8) I use technology to communicate with peers.

occasionally 1 2 3 4 consistently

9) I use technology to communicate with instructors.

occasionally 1 2 3 4 consistently

10) I use technology to complete my assignments.

occasionally 1 2 3 4 consistently

Delivery of Instructional Content

Delivery of content refers to the use of technology to aide in instruction. (Examples: PowerPoint, Video, Recorded Audio / Podcasts, Online Discussion Forums, Class Web Site, Gaming, Other…)

11) What technology tools, applications, and programs are used in your courses to deliver instructional content? Select all that apply and list any additional responses by selecting "other".

PowerPoint presentations, Video, Recorded Audio / Podcasts, Online Discussion Forums, Class Website, Gaming, None, Other

For the following items, select how strongly you agree or disagree with each statement.

12) Technology used to **deliver instructional content** has a positive effect on participation and on-task behaviors.

strongly disagree 1 2 3 4 strongly agree

13) Technology used to **deliver instructional content** has a positive effect on the ability to analyze, make decisions, and solve problems.

strongly disagree 1 2 3 4 strongly agree

14) Technology used to **deliver instructional content** has a positive effect on my level of anxiety, interest, or excitement.

strongly disagree 1 2 3 4 strongly agree

15) Technology used to **deliver instructional content** has a positive effect on my grade in a course.

strongly disagree 1 2 3 4 strongly agree

Communication

Communication refers to ways in which information is exchanged between the instructor and students. (Examples: Online Discussion Forums, Email, Social Media, Other…)

16) What technology tools, applications, and programs are used to communicate with and between students? Select all that apply and list any additional responses by selecting "other".

Online Discussion Forums, Email, Social Media, Texting or Alert Services, None, Other

For the following items, select how strongly you agree or disagree with each statement.

17) Technology used to **communicate** has a positive effect on my participation and on-task behaviors.

strongly disagree 1 2 3 4 strongly agree

18) Technology used to **communicate** has a positive effect on my ability to analyze, make decisions, and solve problems.

strongly disagree 1 2 3 4 strongly agree

19) Technology used to **communicate** has a positive effect on my level of anxiety, interest, or excitement.

strongly disagree 1 2 3 4 strongly agree

20) Technology used to **communicate** has a positive effect on my grade in a course.

strongly disagree 1 2 3 4 strongly agree

Student Assignments

Student assignments refer to the tasks and work students complete as part of a course requirement (Examples: PowerPoint, Video, Recorded Audio / Podcasts, Online Discussion Forums, Class Web Site, Gaming, Other.)

21) What technology tools, applications, and programs are required to complete assignments? Select all that apply and list any additional responses by selecting "other".

PowerPoint presentations, Video, Recorded Audio / Podcasts, Online Discussion Forums, Class Website, Gaming, None, Other

For the following items, select how strongly you agree or disagree with each statement.

22) Technology used to **complete assignments** has a positive effect on my participation and on-task behaviors.

strongly disagree 1 2 3 4 strongly agree

23) Technology used to **complete assignments** has a positive effect on my ability to analyze, make decisions, and problem solve.

strongly disagree 1 2 3 4 strongly agree

24) Technology used to **complete assignments** has a positive effect on my level of anxiety, interest, or excitement.

strongly disagree 1 2 3 4 strongly agree

25) Technology used to **complete assignments** has a positive effect on my grade in a course.

strongly disagree 1 2 3 4 strongly agree

Instructional Models

The following questions ask about different instructional models that are used for learning. *Flipped* classes have students who receive lessons outside of class and practice the material in class. *Hybrid* classes are a combination of in-class and online learning. *Lecture-based* classes are classes where the teacher provides the instruction in class in a traditional learning format.

26) Select the range that describes the percent of the courses you are currently enrolled that fit the description of a flipped classroom.

1. 0-24% **2.** 25-49% **3.** 50-74% **4.** 75-100%

27) Select the range that describes the percent of the courses you are currently enrolled that fit the description of a hybrid classroom.

1. 0-24% **2.** 25-49% **3.** 50-74% **4.** 75-100%

28) Select the range that describes the percent of the courses you are currently enrolled that fit the description of a lecture-based classroom.

1. 0-24% **2.** 25-49% **3.** 50-74% **4.** 75-100%

Select the degree to which you agree with each statement.

29) *Flipped* classrooms have a positive effect on a student's grades in a course.

strongly disagree 1 2 3 4 strongly agree

30) *Hybrid* classrooms have a positive effect on a student's grades in a course.

strongly disagree 1 2 3 4 strongly agree

31) *Lecture-based* classrooms have a positive effect on a student's grades in a course.

strongly disagree 1 2 3 4 strongly agree

32) Technology used in the classroom positively impacts student engagement. (Student engagement refers to a student's involvement in learning).

strongly disagree 1 2 3 4 strongly agree

33) I am the most engaged in a:

1. flipped classroom.
2. hybrid classroom.
3. lecture-based classroom.

34) Further Research: Would you be willing to participate in an interview gathering your perspective on technology use?

Yes No

If so, please provide the contact information below:
Name: ____
Email: ____
Phone: ____

Appendix E

Community College Student Interview Guide

Background Questions

1. Tell me a little bit about yourself, and schooling here at [redacted] State Community College- for example, how many classes have you taken, what's your major, etc.?
2. Do you own a computer? What kind?
3. How long have you been using computers?
4. What other technology devices do you use on a regular basis?
5. What do you use technology for in your everyday life?
6. How would you describe your feelings about technology?

Essential Questions

7. What are some of the ways that you use technology in your coursework here at (Institution Name)?
8. What courses have you used technology in here at (Institution Name), and how frequently have you used it?
9. How frequently do instructors in classes you have taken this semester, use technology as an instructional tool? (How many hours or how many class periods, etc.)
10. Please describe a time when you felt that technology was really useful in helping you learn.
11. Please describe a time when you felt that technology was a part of your coursework, but wasn't very useful.
12. What technologies do you find the most useful for you as a student, and why?
13. What technologies do you find least useful in your learning?
14. How would you describe your own expertise with technology?
15. What are some similarities between how you use technology for your coursework and how you would choose to use technology in your everyday life?
16. What are some differences between how you use technology for your coursework and how you would choose to use technology in your everyday life?
17. Describe what a college course would look like if the instructor was using just the right amount of technology for you.
18. In your experiences, what barriers exist for technology to be more useful in college courses you are taking?
19. What do you think technology in college courses will be like in the future?
20. Are there problems with technology in classes you have taken that interfered with learning? (If they say yes, follow up with questions of what were they, etc.?)
21. What is your opinion on using your cell phone in class to interact with the teacher and other students?*

Class Specific Questions (questions will be personalized based on survey data)

22. You were asked a question regarding the engagement in 3 different class models—traditional, hybrid, and flipped. Which of these instructional models is more engaging for you? Describe why.
23. Could you describe the overall expectation of technology and services that are provided by the university?

* Last question added after receiving feedback from Dr. Moseley (2017, personal communication).
** Note that each of these questions is an open ended starting point. Additional, probing questions will be asked in order to gain additional information from participants according to the procedures for Formal interviews found in Hatch (2002).

Appendix F

Permission from Researcher and Moseley's (2010) Instruments with Informed Consent

Email Correspondence with Dr. Moseley

to me

Sure. I would love to see the results.

--
Bill Moseley, Ph.D.

On August 24, 2016 at 12:56:31 PM, MarQo Patton (marqopatton@gmail.com) wrote:

> Dr. Moseley-
>
> Greetings from Nashville! My name is MarQo Patton, an Ed.D. student in Learning Organizations and Strategic Change at Lipscomb University. As part of our capstone dissertation, my team, Sheri Coulter, Candis White and I are working closely with our client, a local community college, to address their need. This campus is interested in an audit in instructor's use of technology to learn from various instructional divisions' success in student engagement and achievement. While your study recognized the fact that various departments would vary in their level of technology engagement and thus studied general education courses, we think our client would find it advantageous to interpret the variance. Your study laid a lot of the ground work for this increasingly important phenomenon.
>
> We also noticed that there were not many studies that focused on technology's implications on the community college level. The instruments used in your study (2010) really provide a framework to produce such an audit that our client needs, and we would be thrilled for your permission to use your instrument, making a few adjustments to tailor it to our research. May we use your instruments and interview guides, making adjustments as needed by our university and our client? This would really help us think of how technology influences student engagement and achievement.

Informed Consent

Thank you for your willingness to answer this survey, which focuses on your use of technology in the courses you teach. The information that you provide will be reported in a research study that will be available to other higher education institutions.

At the end of this questionnaire, you will be asked to indicate whether you would be willing participate in additional segments of this study. If you agree to further participation, then you would be asked to:

1. Participate in a short interview with Bill Moseley regarding your technology use.□2. Allow a short period of time in one of your classes to allow your students to be surveyed regarding their perceptions of the technology use in your class.

Your answers will be confidential, and neither your [NAME], nor the [NAME] will be able to identify you. Your responses and the results of any student responses or survey participation will also be kept confidential, and will not be used in any manner related to your faculty evaluation or any other evaluation of your performance at [NAME], or at any other institution.

We appreciate participation in this survey. If you have any questions or concerns, please contact the researcher or supervisor below:

Bill Moseley -- Phone: [redacted] -- Email: [redacted] □ [redacted] -- Phone: [redacted] -- Email: [redacted] (Supervisor)

If you have any questions about your rights as a research participant or concerns about the study, you can contact the [NAME] IRB at [redacted] or [redacted]

Instructions and consent

I give my consent to the following:

For this survey you were selected as part of the full-time faculty at [NAME]. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Bill Moseley, in partial fulfillment of his Ph.D. in Educational Leadership and Higher Education at the University of [NAME].

If you are willing to participate in this study, please complete the following survey. The survey should take approximately 5-10 minutes to complete.

Risks and Benefits of Being in the Study

There are no known risks involved in participating in this study. The benefit of your participation is feedback on the perceived usefulness of your technology use, and the contribution to the body of knowledge in this area of study.

Confidentiality

Your responses to this study will be kept private and confidential, and in any published document that uses this data, participants will not be personally identifiable. Only the researchers in this study will have access to the research data and records.

Voluntary Nature of the Study

This study is completely voluntary, and the decision to participate or to abstain from participation is yours. This decision will not affect any relationships or standing with your institution or classes or anyone within that institution or your classes. If you choose to participate, then you may choose to abstain from responding to any of the questions in the survey that you do not wish to answer, for any reason.

Statement of Consent

I have read the above information and have had the opportunity to ask questions and receive answers. I consent to participate in the study.

No Yes

You should print this page for your own records prior to continuing. [Give Consent and Continue with Survey]

Community College Faculty Technology Use Survey

In the spaces below, please list the five technologies that you use most frequently in your classes. If you use fewer than five, please list the ones you do use.

Next to each technology you list, please select the number corresponding to the frequency with which you use that particular technology.

Examples of such technologies might include blogs, wikis, a class web site, online discussions, podcasts, videos, and PowerPoint, although if you use something other than these please feel free to list it.

For each of the five technologies that you mention at the top of this survey, please circle the number that corresponds to how useful you think this technology is in terms of helping students learn in your class.

1. ______________________________ 5 4 3 2 1
2. ______________________________ 5 4 3 2 1
3. ______________________________ 5 4 3 2 1
4. ______________________________ 5 4 3 2 1
5. ______________________________ 5 4 3 2 1

Select the three technologies above that you think are the most useful to students in terms of helping them learn in your classes. For each one, briefly state your goals for using that technology in your class.

1. ______________________________:

   ____

   ______________________________________.

2. ____:

   ____

   ____.

3. ____:

   ____

   ____.

If asked, would you be willing to provide additional data for this study?

[ ] No [ ] Yes.

If so, please provide the contact information below:

Name: ______________________________

Email: ______________________________

Phone: ______________________________

Community College Faculty Member Interview Guide

Background Questions

What department do you teach in? How many years have you taught full time at [NAME]?

College? What is your experience in learning about and using technology? Do you use a computer outside of your work?

Essential Questions

What prompted you to use the technologies that you currently use in your class?

Did you receive any help or training in order to implement these technologies? If so, what?

In your opinion, what factors make a particular technology more useful to students than others?

Please describe a time when you felt like technology was particularly useful to the students in your class.

Please describe a time when you felt like technology was not useful to the students in your class.

What process do you use to select technologies for use in your class?

How do you make a connection between the use of a technology, and a specific instructional goal?

About what percentage of your current students do you think are fluent in technology?

About what percentage of your current students do you think has access to a computer at home?

Are there any technologies that you would like to start using in your class?

What are the barriers to technology use experienced by your colleagues?

What disadvantages do you see in using technology in your classes?

Instructor-specific Questions (personalized based on survey responses)

On your survey, you indicated that _________________ was the most useful technology that you use in class. What makes you believe this? Please tell me more about how this technology is used in your class.

** Note that each of these questions is an open ended starting point. Additional, probing questions will be asked in order to gain additional information from participants according to the procedures for Formal interviews found in Hatch (2002).

Community College Student Technology Survey

Informed Consent

Thank you for your willingness to answer this survey, which focuses on your experiences with and opinions about your technology use, both in your personal life and in your school-related work. The information that you and other students at your college provide will be reported in a research study that will be available to other higher education institutions.

Your answers will be confidential, and your school, your instructor, and the University of [NAME] will not be able to identify you. We appreciate participation in this survey. If you have any questions or concerns, please contact the researcher or supervisor below:

Bill Moseley -- Phone: [redacted] -- Email: [redacted] □ [redacted] -- Phone: [redacted] -- Email: [redacted] (Supervisor)

If you have any questions about your rights as a research participant or concerns about the study, you can contact the [NAME] IRB at [redacted] or [redacted]

Instructions and consent

We may only survey students age 18 or older.

I am 18 years old or older, and give my consent to the following:

For this survey you were selected at random from a list of students at your institution. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Bill Moseley, in partial fulfillment of his Ph.D. in Educational Leadership and Higher Education at the University of [NAME].

The survey asks for basic information on how you use technology, both in your personal life and related to schoolwork at this institution. It should take about 15 minutes to complete. Please answer each question to the best of your ability. There is no right or wrong answer.

Risks and Benefits of Being in the Study

There are no known risks involved in participating in this study. The benefit of your participation is to provide important information about technology use by community college students to leaders at your college, as well as other institutions.

Confidentiality

Your responses to this study will be kept private and confidential, and in any published document that uses this data, participants will not be personally identifiable. Only the researchers

in this study will have access to the research data and records.

Voluntary Nature of the Study

This study is completely voluntary, and the decision to participate or to abstain from participation is yours. This decision will not affect any relationships or standing with your institution or classes or anyone within that institution or your classes. If you choose to participate, then you may choose to abstain from responding to any of the questions in the survey that you do not wish to answer, for any reason.

**** Please keep this page for your own records, or if you have any questions**

Statement of Consent

1. I have read the above information and have had the opportunity to ask questions and receive answers. I consent to participate in the study.

No Yes□Signature: ______________________________________

Date: ______________________________

Community College Student Technology Survey

Personal Information

2. Your age: ____ 3. Your Gender (circle one): Male Female

(You must be at least 18 years old to participate in this study. If you are not 18, please do not continue)

Questionnaire

Please answer each of the following questions as they relate to the technology use in this class.

For each of the technologies listed below, please circle the number that represents how often that technology is used in this class.

For each, please circle the number that represents how useful that technology is to your learning in this class.

4. PowerPoint	

5. Video	
6. Recorded Audio / Podcasts	
7. Online Discussion Forums	
8. Class Web Site	
9. ____________________	
10. ____________________	
11. ____________________	

12. PowerPoint	
13. Video	

14. Recorded Audio / Podcasts	
15. Online Discussion Forums	
16. Class Web Site	

17. ______________________	
18. ______________________	
19. ____________________	

20. What technologies would you like to use in your class that aren't currently used?
____
____

21. What do you think would make technology more useful to you in your class?
____
____

22. If you would be willing to participate in a short interview regarding your responses to this survey, please write your name/email address/ phone number below:

N: ________________________ E: ________________________ P:____________

Community College Student Interview Guide

Background Questions

- Tell me a little bit about yourself, and schooling here at BC - for example, how many classes have you taken, what's your major, etc.?
- Do you own a computer? What kind?
- How long have you been using computers?
- What other technology devices do you use on a regular basis?
- What do you use technology for in your everyday life?
- How would you describe your feelings about technology?

Essential Questions

- What are some of the ways that you use technology in your coursework here at BC?
- What courses have you used technology in here at BC, and how frequently have you used it?
- How frequently do instructors in classes you have taken this semester, use technology as an instructional tool? (how many hours or how many class periods, etc.)
- Please describe a time when you felt that technology was really useful in helping you learn.
- Please describe a time when you felt that technology was a part of your coursework, but wasn't very useful.
- What technologies do you find the most useful for you as a student, and why?
- What technologies do you find least useful in your learning?
- How would you describe your own expertise with technology?
- What are some similarities between how you use technology for your coursework and how you would choose to use technology in your everyday life?
- What are some differences between how you use technology for your coursework and how you would choose to use technology in your everyday life?
- Describe what a college course would look like if the instructor was using just the right amount of technology for you.
- In your experiences, what barriers exist for technology to be more useful in college courses in courses you are taking?
- What do you think technology in college courses will be like in the future?
- Are there problems with technology in classes you have taken that interfered with learning? (if they say yes, follow up with questions of what were they, etc.?) Class Specific Questions (questions will be personalized based on survey data)

- Your instructor indicates that they use ________________ in the class. How useful do you believe this is, and why?
- Your instructor says that their goal for using technology in the class is _____________________ . Do you think that their use of technology accomplishes this goal? Why / why not?

** Note that each of these questions is an open ended starting point. Additional, probing questions will be asked in order to gain additional information from participants according to the procedures for Formal interviews found in Hatch (2002).

Appendix G

The MOU is on file at Lipscomb University and has been excluded to provide anonymity for the client.

Appendix H

IRB Approval Letter

LIPSCOMB UNIVERSITY

Institutional Review Board

Status of Research Review

Date: January 18, 2017

Title of Project: Perceptions of Technology-Mediated Instruction at a Southeastern Community College

Principal Investigator(s) and Co-Investigator(s): Sheri Coulter, MarQo Patton, Candis White

- [x] Research approved.
- [ ] Conditional approval. *(See comments.)*
- [ ] Committee requests further information before a decision can be made.
- [ ] This proposal has been denied.

The IRB has met and reviewed your project proposal, and its decision is marked above. Please review the appropriate text below for the decision that was rendered regarding your proposal:

Research approved: If your protocol has been approved, please note that your project has IRB approval from today for a period of one year and you are free to proceed with data collection. If this study continues unchanged for longer than one year, you will need to submit a ***Request for Project Continuation*** form. If this study continues for more than one year and there are changes to the research design or data that is collected, you will need to submit a ***Request for Amendment to Approved Research*** form. The IRB reserves the right to observe, review and evaluate this study and its procedures during the course of the study.

Conditional approval: If conditional approval is granted, you are allowed to proceed with data collection provided that the required modifications (see attached) are in place. You will need to submit ***a Request for Amendment to Approved Research*** form within 30 days. If this study continues unchanged from that amended protocol for more than one year, you will need to submit a *Request for **Project Continuation*** form. If this study continues for more than one year and there are changes to the research design or data that is collected, you will need to submit a ***Request for Amendment to Approved Research*** form.

Committee requests further information: Please see the attached document and use it to guide required modifications, then re-submit your request.

This proposal has been denied: See the attached document for an explanation of why your proposal has been denied.

Roger W. Wiemers

Roger Wiemers, Ed.D
Chair, Lipscomb University Institutional Review Board

Comments:
Reviewed by Jeff Lee, PharmD, FCCP, Associate Professor, Pharmacy Practice

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Appendix I

NIH Certificates of Completion

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Sheri Coulter** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 07/04/2016.

Certification Number: 2106845.

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **MarQo Patton** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 07/05/2016.

Certification Number: 2106891.

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Candis White** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 07/06/2016.

Certification Number: 2107563.