Developing a Blended Learning Model in Advanced Manufacturing Technologies Programs: Faculty Development Through Action Research

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DEVELOPING A BLENDED LEARNING MODEL IN ADVANCED MANUFACTURING TECHNOLOGIES PROGRAMS: FACULTY DEVELOPMENT THROUGH ACTION RESEARCH

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Presented to
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By
Eugene Basil

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DEVELOPING A BLENDED LEARNING MODEL IN ADVANCED MANUFACTURING TECHNOLOGIES PROGRAMS: FACULTY DEVELOPMENT THROUGH ACTION RESEARCH

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Public institutions of higher education in Kentucky have been experiencing cuts in state budgets. Kentucky lawmakers have moved state colleges to a performance-based form of budgeting. In this new budget paradigm, an institution’s funding is based on a metric that significantly considers student outcomes. Technical college programs are not currently meeting the quantity, and in some cases quality, outputs required to sustain the economic growth in the community. To increase the capacity, quality, and accessibility of technical programs, the faculty members of the Advanced Manufacturing Technologies division of the Southcentral Kentucky Community and Technical College implemented a blended learning approach of conducting advanced manufacturing technologies courses at the program level during the Fall 2017 semester. Learning to teach in new ways required significant change. Thus, faculty development efforts were necessary components needed for a successful transition.

Research has supported the benefits of implementing blended learning courses in higher education, but faculty members have hesitated to apply the blended learning approach due to a reluctance to face the challenges of integrating technologies into their instruction. This action research study identifies factors that influence faculty members’ attitudes and behavioral intentions to use CMCD technologies to implement a programmatic change in the provision of technical education offered by Southcentral Kentucky Community and Technical College.
The Technology Acceptance Model was considered as a base to establish the theoretical and conceptual framework for this study. Faculty members from the Advanced Manufacturing Technologies division of Southcentral Kentucky Community and Technical College were purposefully selected and represented the total population for this study. The implications of the findings from this study may be used to develop practical recommendations for facilitating successful adoption and implementation of a blended learning approach for curriculum delivery at the program or institutional levels.
CHAPTER I: INTRODUCTION

Due to a changing and increasingly more global economy, the demand for a highly skilled, more sophisticated workforce is increasing. While the demand for high-skilled workers steadily increases, the supply consistently lags. Among stakeholders, the sentiment is that technical colleges exist to fill this growing gap between the supply and the demand. Lawmakers, students, taxpayers, industry leaders, and society at large are demanding that leaders of educational institutions heed the charge of supplying the workforce with qualified high-skilled employees. Also, public institutions of higher education in Kentucky have been experiencing cuts in state budgets. Along with decreasing amounts of funding that are available, Kentucky lawmakers have moved state colleges to a performance-based form of budgeting. In this new budget paradigm, an institution’s funding is based on a metric that significantly consider student retention rates, graduation rates, and the number of credentials awarded. In the new funding model, the money is allocated to the public institutions on a progressive scale based on institutional achievement.

Situated in the automotive manufacturing center of Kentucky, south-central Kentucky has had the good fortune of attracting new industry and, consequently, many new jobs to the area. The demand for properly trained and experienced skilled technicians in advanced manufacturing technologies is increasing to a critical level. Technical college programs are not currently meeting the quantity, and in some cases quality, outputs required to sustain the growth in the community. At this point, leaders of technical college programs are asking, “What can be done to effect the change(s) required
to increase the quantity and quality of graduates in the advanced manufacturing technologies?"

The transition from school to work in the trades has long been accomplished through a master-apprentice relationship; a relationship predicated on the amount of quality time the master has to spend with the apprentice. That relationship still exists in technical programs to some degree. While the one-on-one relationship is not used or practical in the college environment, the class size is still limited by the amount of equipment available for hands-on training, allowing the instructors more time with the students in the laboratory setting. While the low student-to-instructor ratio may help the quality of the educational experience, the restricted capacity hinders student access to the programs, thereby limiting the quantities of graduates.

Faculties and administrations have often determined the current use of resources will not accommodate the growth needed to meet the future needs of industry. While colleges have invested in maintaining the most advanced laboratory equipment for training, pedagogically little has changed in course delivery. Therefore, to increase the capacity of technical programs, a new method of delivering technical courses must be explored. The traditional face-to-face model creates an environment that brings learners together and aids students’ motivation to learn. It is not, however, flexible and requires the student and instructor to use valuable laboratory space for a lecture as well as lab activities. Conversely, online learning does not provide the hands-on activities needed to develop transferable skills for the workplace. Blended learning may be the answer. Blended learning combines face-to-face and online learning. In this case, the lecture time that is typically conducted in the same areas as the laboratory is facilitated using the
Blackboard content management system. The blended learning approach could double the availability of laboratory times. The online portion of the course would not only serve to provide a consistent source of knowledge, but also will be used to qualify the student for the laboratory side of the course. Blended learning strategies should provide a rich and productive hands-on experience with the instructor.

**Problem Statement and Significance of Study**

Implementing a blended learning course for the first time is a complicated process. Transforming a course from a face-to-face format to a blended learning format requires the instructor to integrate technology significantly into the instructional design. Therefore, an instructor must re-examine course goals, develop new online and face-to-face learning activities, use new types of assessment, and interact with students in new ways. Designing an effective blended learning course and learning to teach in new ways involve significant pedagogical changes that will require instructors to gain new skills and assume multiple roles. Thus, faculty development efforts must consider the necessary components needed for a successful blended learning program, especially in the realm of technical education (Garrison & Vaughan, 2008).

While research has supported the benefits of implementing blended learning courses in higher education, many faculty members have hesitated to apply the blended learning approach due to a reluctance to face the challenges of integrating technologies into their course curricula (Ocak, 2011). According to Oh and Park (2009), faculty have expressed a poor attitude and lack of motivation to accept and adopt the integration of new teaching and learning technologies. Along with external factors, the faculty’s perception of the usefulness and ease of use of technology in the instructional design
process and delivery are what drive the faculty member’s behavioral intentions to use the new technologies (Lee, Hsieh, & Chen, 2013).

Technical education programs have historically followed the master-apprentice training model. Therefore, technical faculty default to the face-to-face lecture modality of training. Changing to a blended learning modality requires the faculty members to move out of their comfort zone and embrace the advantages the blended learning model brings to the institution, students, and faculty. This action research will add to the understanding of faculty experiences with the adoption of technological innovations in the delivery of technical program curricula. The results of this study also will aid in understanding the process of integrating blended learning technologies into the delivery of technical education programs. With limited and diminishing resources, the careful planning of innovations adoption is necessary to sustain viability as an educational resource to meet the economic growth needs of the Commonwealth of Kentucky.

**Purpose**

The purpose of this action research study is to determine factors that influence faculty member’s attitude and behavioral intentions to use computer-mediated content delivery (CMCD) technologies to implement a programmatic change in the provision of technical education offered by Southcentral Kentucky Community and Technical College (SKYCTC). The implications of the findings from this study may be used to develop practical recommendations for facilitating a successful adoption and implementation of a blended learning approach that may include program areas other than Advanced Manufacturing Technologies (AMT) programs. Additionally, the outcomes of this study may help to ensure a more efficient use of scarce resources to sponsor faculty
development activities designed to foster faculty members’ acceptance and integration of new CMCD technologies into the AMT program curricula.

**Background of Study**

SKYCTC has been providing access to quality and affordable training for citizens of the community for over seven decades. During the school’s 78-year history, thousands of students have engaged in training programs designed to teach students transferable and marketable job-related skills. Following the school’s inception in 1939, training programs were initiated to prepare workers for industry-related jobs and, soon after that, training armed service personnel to assist in the war efforts of World War II. During the war years, and until 1962, the school was known as Western Trade School. In 1968 the school moved to its current location and the name changed to the Western Area Vocational School. Following an additional two name changes, in 1997 the school became part of the Kentucky Community and Technical College System, facilitating yet again a new name. The school was renamed Bowling Green Technical College to reflect its new standing as a college and not just a vocational training school. In 2008, the College became a comprehensive community and technical college, and in 2012 the name changed to its current name, SKYCTC.

SKYCTC currently consists of five academic divisions: Arts and Humanities, Math and Science, Allied Health, Business, and AMT. Arts and Humanities, along with the Math and Science division, were created to support the comprehensive nature of the community college, while Business, Allied Health, and AMT continue to represent the school’s legacy of providing relevant, low-cost, high-quality technical training programs to meet the local workforce needs.
Industries’ employment needs have changed to reflect a more competitive world market over the years, and the demand for high-skilled personnel to fill the supply gap has continued to grow. Meeting the new global market demands has required leaders of industries to rely more on automation to save the bottom line and, thus, requiring a more technologically sophisticated workforce. Fortunately, the Commonwealth along with federal grants have contributed financially to the college’s ability to keep up with the technological advancements. Consequently, the college maintains the facilities and training equipment required to meet the training demands expressed by leaders of industries and the community. However, while the technological advancements in the modern workplace have brought about a parallel modernization in equipment and facilities, pedagogy employed in the instructional design of technical program curricula has not advanced in conjunction with available CMCD; Blackboard has not replaced the blackboard as a means of delivering course lecture materials.

The SKYCTC faculty who engage in teaching programs within the AMT division have expressed concerns about the quality and availability of AMT programs. The instructors have commented that the lectures are not adequately preparing the students to achieve a high level of performance on the laboratory portion of the training. The stated reasons for this gap are the quantity and complexity of the requisite information required. The faculty has concluded that lecturing and note taking are not providing the students with sufficient access to the course material to retain the requisite knowledge required to maximize the effectiveness of the laboratory portion of the course. While the laboratory activities have become more complex, the associated content lecture materials have increased in volume and complexity, thereby requiring more lecture time in class, while
diminishing the students’ quality hands-on laboratory time with the instructor. Learning knowledge and skills that will transfer to the workplace is the goal of technical education, and the students’ laboratory experience is a critical factor in the successful transfer of knowledge and skills.

The instructional methods used by technical program teachers in the modern classroom of today are identical to the teaching strategies employed during and soon following WWII. While Microsoft PowerPoint, along with similar presentation software packages, has finally replaced the overhead projector, the calculator has replaced the slide rule. Available CMCD and the pedagogical strategies to effectively use the technologies contained are woefully underutilized. The faculty has not moved away from the face-to-face lecture as a means of conveying course lecture materials to the student. As a consequence, as technology becomes more complex, the gap between the student’s knowledge gained via lecture and his or her laboratory preparedness has widened.

Blended learning may have all the attributes necessary to fill the gap.

Blended learning as a pedagogical approach to teaching and learning has become a trend in higher education. However, the current utilization of blended learning as described in the literature often is conducted by a teacher as an experiment in the use of technology to facilitate a more efficient learning environment for the students in his or her classroom. There is little mention of blended learning in the facilitation of technical education courses, and never as a part of a broader effort to convert an entire division of technically-related courses to the blended learning format. Ocak (2011) found that blended learning is supported in the literature as a viable approach to improve student learning outcomes. Ocak also found that researchers have neglected to take faculty
members’ perceptions of the challenges and concerns of implementing blended learning courses into consideration. “In particular, educators have struggled to adapt to their new roles because they face the challenge of integrating technology into their teaching” (Ocak, 2011, p. 690). Furthermore, Humbert (2007) showed that there had been little research on faculty members’ perceptions of online assignments, their technological competence, or their development of course materials for blended courses. Ocak (2011) concluded that converting face-to-face courses to a blended learning or hybrid format is a complicated task, requiring significant time and effort by the faculty to master the pedagogical and technological skills needed to be successful. The perceived difficulties and usefulness of designing and teaching blended courses are among the leading reasons teachers resist taking advantage of the available CMCD required to facilitate blended learning.

Carbonell, Dailey-Hebert, and Gijselaers (2013) suggested how the perceived barriers to blended learning can be removed to unleash the creative potential of the faculty to create engaging blended learning experiences for the students. Along with providing support within an institutional culture and collaborative climate that values experimentation, administrators should manage the change with a bottom-up approach that empowers faculty to create the change. Ocak (2011) acknowledged without the faculty involvement in a systematic and sustained design of the complex pedagogical and technical aspects of blended learning, the potential benefits of blended teaching do not attract faculty to blended courses.

The faculty members are aware of the problem that will require significant effort to solve. Therefore, the faculty members are involved in the design of a series of
professional development activities that address the perceived barriers to adopting and implementing blended learning.

**Research Questions**

The research problem is concerned with faculty members’ experiences with the acceptance and adoption of an innovative CMCD modality to replace the traditional face-to-face lecture in AMT programs. As such, the study addresses the following questions:

Q1: What are faculty members’ perceptions regarding the usefulness of CMCD technologies?
Q2: What are faculty members’ perceptions regarding the ease of use of CMCD technologies?
Q3: Which external variables do faculty members perceive as aiding the integration of CMCD technologies?
Q4: What attitudes do faculty members perceive to support the integration of CMCD technologies?
Q5: What are faculty members’ perceptions regarding what influences the behavioral intentions necessary to facilitate the integration of CMCD technologies?

**Theoretical and Conceptual Framework**

The Technology Acceptance Model (TAM) is considered to establish the theoretical framework for this study. The conceptual framework is derived from combining the constructs and variables from the first two iterations of TAM to the third iteration, TAM3. TAM 2 identifies antecedents of the perceived usefulness, with little attention to the perceived ease of use. Venkatesh (2000) sought to determine antecedents
of the perceived ease of use construct. Venkatesh identified determinants that have been a result of previous research (Davis, Bagozzi, & Warshaw, 1989; Venkatesh & Davis, 2000). Venkatesh created TAM3 by extending TAM2 to include the new antecedents to the perceived ease of use construct.

The conceptual framework for this study encompasses four interrelated core constructs and nine sub-constructs identified as “Priori-coding Categories” (see Figure 5 to review the conceptual framework diagram). The core constructs are: (a) perceived usefulness, (b) perceived ease of use, (c) attitude toward use, and (d) behavioral intent. The nine sub-constructs are: (a) subjective norms, (b) image, (c) job relevance, (d) output quality, (e) results demonstrability, (f) external variables, (g) perception of external control, (h) objective usability, and (i) computer self-efficacy. The four core constructs are influenced by the nine sub-constructs to form a faculty member’s intentions to use the CMCD technologies; intentions are predictive of whether a faculty member will adopt CMCD technologies into his or her instruction.

**Terms and Definitions**

**Attitude toward use.** “Individual’s positive or negative feeling about performing the target behavior” (Lala, 2014, p. 157).

**Perceived ease of use.** Perceived ease of use is defined as the degree to which a user believes that using specific technology is painless (Teo, 2010).

**Perceived usefulness.** Perceived usefulness is defined as the degree to which a user believes that using specific technology could improve their job performance (Teo, 2010).
**Behavioral intentions.** “A measure of the strength of one’s willingness to perform a specific behavior” (Davis et al., 1989, p. 984).

**External variables.** Includes all the factors that could affect a faculty member’s perceptions of the technology innovation being considered: faculty development process, past experiences with computer technologies (Davis, 1986).

**Subjective norms.** Person’s perception that most people who are important to them think he or she should or should not perform the behavior in question (Venkatesh & Davis, 2000).

**Image.** The degree to which use of innovation is perceived to enhance one’s image or status in one’s social system (Venkatesh & Davis, 2000).

**Job relevance.** The capabilities of a system to enhance an individual’s job performance (Venkatesh & Davis, 2000).

**Output Quality.** The perception how well the system performs tasks that match with job goals (Venkatesh & Davis, 2000).

**Results demonstrability.** The degree to which the results of adopting/using the innovation are observable and communicable to others (Venkatesh & Davis, 2000).

**Perception of external control.** The control beliefs relating to resource factors such as time and money and IT compatibility issues that may constrain usage (Taylor & Tood, 1995).

**Objective usability.** “A comparison of systems based on the actual level (rather than perceptions) of effort required to complete specific tasks” (Lala, 2014, p. 157).

**Voluntariness.** The degree to which use of the innovation is perceived as being voluntary, or of free will (Venkatesh & Davis, 2000).
**Computer self-efficacy.** “The degree to which an individual believes that he or she has the ability to perform specific task / job using a computer” (Lala, 2014, p. 157).

**Limitations and Delimitations**

The limitations of the study include threats to internal and external validity. Data collector bias may threaten internal validity. Although protocols are used to mitigate bias, the interviews are conducted by internal resources. Delimitation involves, the study being conducted at one two-year college, thereby limiting the generalizability of the findings.

**Summary of Research Methods**

This action research study employs qualitative methods to collect and analyze data related to technical program faculty members’ experiences with the adoption of CMCD technologies associated with a blended learning modality of instruction within a community and technical college context. The research problem is concerned with faculty member experiences with the acceptance and adoption of an innovative CMCD modality to replace the traditional face-to-face lecture in AMT programs. The procedures that used to address the research questions are summarized in this section.

Action research methods in education are used to help educators identify problems, collect data, design steps to address the problems, and develop a reflective practice to effect positive change. Essentially, action research is a learn-by-doing method of research. The action research of this study is designed to follow the widely used four-phase process postulated by Kurt Lewin in 1948; namely, plan, act, observe, and reflect (Adelman, 1993). An initial action plan is employed that consists of scheduled faculty development workshops to address each of the four constructs to foster the faculty’s
intentions to use the new CMCD technologies; intentions are predictive of whether a faculty member will do so. Therefore, the four constructs of the TAM combine to form a person’s intention actually to use the CMCD technologies.

**Data Collection, Analysis, and Participants**

This study utilizes a researcher authored questionnaire during the initial planning phase of the action research process to identify the disposition of each faculty member’s behavioral intent to accept and implement CMCD technologies into his or her curricula. Once identified, the factors influencing faculty members’ behavioral intent to accept and apply the new technologies are addressed as part of the instructional activities and addressed during the four following scheduled faculty development workshops.

During the observing phase of each action research cycle, the researcher will collect data based on observations of the participants during the faculty development activities. Recording the observational data while facilitating the workshop requires the researcher to post entries retrospectively. Although, upon the conclusion of each of the first three workshops, the researcher will appoint a faculty member participant to lead an open, collaborative discussion with the participants. The researcher will provide the facilitator with a list of questions to be used to prompt the open discussion and focus the discussion on the research purpose. The researcher will observe the end of workshop discussions and manually collect data based on an observation guide that lists the interactions, processes, and behaviors to be observed that are associated with the research purpose and research questions. The data collected during the observation phase will be analyzed and the results, in part, will be used as a formative evaluation of the workshop.
activities and, after reflecting on the participants’ responses, make any required adjustments to the action being taken, i.e., elements of the training.

Upon the conclusion of the acting phase of the fourth and final action research cycle, the researcher will conduct semi-structured interviews with the participants. The interviews will be transcribed, and the text reviewed several times as a whole. The observational data collected through observing participants during the acting phases of the workshop activates, and elements of the end of workshop discussions also will be reviewed and included in the data analysis.

This study uses a deductive process during data analysis. Thus, the conceptual framework provides a list of priori codes based on the nine sub-constructs that influence the four core constructs of the conceptual framework for this study. A thematic analysis technique also is used to identify themes that may emerge while analyzing the data. After coding, the data will be compressed into a display that facilitates the drawing of implications. The population for the study consists of 15 full-time AMT program faculty members \(N = 15\) of varying ranks, including two instructors, four assistant professors, six associate professors, and three full professors.

**Summary**

This action research study will determine factors that influence faculty member attitudes and behavioral intentions to integrate CMCD technologies into a blended learning format as a result of participating in a series of faculty professional development workshop activities. Action research strategies are used to help facilitate the identification of problems, collect data, design steps to address the problems, and develop a reflective practice to effect positive change. The action research process utilizes four
cycles, each collecting data to be analyzed to inform the planning for the next cycle. After the fourth and final cycle of the action research process, the study utilizes qualitative methods to collect and analyze interview data from the participants.

Chapter II presents the literature review of topics related to factors affecting faculty adoption of blended learning in higher education, specifically career and technical education. The literature review explores the history of how technology has influenced teaching and learning in higher education. Past faculty professional development’s role in solving the problems of faculty’s reluctance to accept the integration of technologies into his or her instruction in a blended learning format also are reviewed.
CHAPTER II: REVIEW OF THE LITERATURE

Introduction

The purpose of this action research study is to determine factors that influence faculty member attitudes and behavioral intentions to use CMCD technologies to implement a programmatic change in the provision of technical education offered by SKYCTC. The implications of the findings from this study may be used to develop practical recommendations for facilitating a successful adoption and implementation of a blended learning approach that may include program areas other than AMT programs. Additionally, the outcomes of this study may help ensure a more efficient use of scarce resources used to sponsor faculty development activities designed to foster faculty members’ acceptance and integration of new CMCD technologies into the AMT program curriculum.

The literature review for this study focuses on the faculty professional development required to develop and implement a programmatic change to the institution’s series of technical education courses with the intentions of replacing the face-to-face modality of content delivery with CMCD. The content delivery for the class is currently facilitated in a traditional lecture format. The new format utilizes a hybrid scheduled, incorporating the tenets of a blended learning approach. The objective of the literature review was to address the teacher's acceptance and usage behavior of instructional technologies, to include the TAM framework that guided this work and on which the conceptual framework of this study is based.

The literature is divided into six main sections: (a) influence of technology on teaching and learning, (b) postsecondary career and technical education, (c) factors
affecting faculty adoption of blended learning, (d) faculty professional development, (e) theoretical and conceptual framework of this study, and (g) summary that ties the elements of this action research study together.

**Influence of Technology on Teaching and Learning**

The internet made its debut in 1969 connecting a few major U.S. universities and military institutions, but it was not until the mid-1990s the internet became widely available to the general public. In the early days, online education was confined to the corporate sector for software training to improve employee job skills and performance (Tastle, White, & Shackleton, 2005). Allen and Seamen (2007) reported that in just a few years (2001-2006) online enrollment had outpaced traditional higher education enrollments. In the fifth year of the study, Allen and Seamen reported that 3.5 million students were taking at least one online course during Fall 2006, a nearly 10% increase over the number reported the previous year and comprised nearly 20% of all higher education students. Also, the 9.7% growth rate for online enrollments surpasses the 1.5% growth of the overall higher education student population. Boettcher and Conrad (2004) proposed the attraction of the online environment is that it removes the physical and time constraints for the students and the instructors. The online environment also provides a new context for teaching and learning. The transition from traditional face-to-face to the online environment presents a perfect opportunity to re-examine and revise the pedagogical framework necessary to facilitate a successful transition to the new teaching and learning context.

Baepler, Walker, and Driessen (2014) suggested that, as economic pressures demand that colleges produce more graduates, the demand for classroom space also
increases. The online environment has somewhat reduced the pressure on the request for classroom space. While the demand for more physical space has escalated, the technologies to produce online curricula have matured and been made more available and easier to use. In some cases, the didactic lectures are on the web and face-to-face time is used to build conceptual understanding and cognitive skills (Baepler et al., 2014). As of 2010, two thirds of students enrolled in a degree-seeking program in higher education had received instruction with online tools (Radford, 2011). According to Brown (2016), instructors are increasingly incorporating online tools into face-to-face teaching approaches, such that these sorts of instructional blends are forecasted to become “the new traditional model” (p. 1). In a recent survey, the Higher Education Research Institute reported that nearly 50% of the instructors surveyed were using online tools to supplement face-to-face instruction of undergraduate courses. Blended learning is a part of this growth, and in a study conducted by Kim and Bonk (2006), respondents indicated there would be a greater emphasis on blended learning over purely online learning, and respondents also suggested that nearly all courses would have some type of web component by the end of the decade. Therefore, to navigate successfully this learning environment combines tenets of traditional face-to-face and online instruction. Instructors must assume a new role in the design and delivery of this educational process the literature refers to as blended learning.

**Traditional Face-to-face**

Traditional face-to-face learning environments that incorporate the lecture modality of content presentation have long dominated higher education. Instructors use the traditional face-to-face instruction to convey knowledge of a complex and changing
content (Rosenberg, 2006). The most profound advantage of the traditional face-to-face classroom environment is the connection that is enabled by the personal and physical interaction between students and instructor to student. This form of bonding creates a fertile environment where spontaneous chains of associated ideas and discoveries may be developed (Graham, 2006). No less important is the role of communication in the traditional face-to-face modality; students have the immediate chance to ask specific questions and receive immediate answers even with limited discussion. Along with the advantages, there are challenges with the traditional face-to-face method that include potential participation limitations if individual students choose to dominate and others pull back. Discussion time also is limited because of schedules and allocated course time (Graham, 2006).

**Online Modality**

In a survey of college faculty at 69 colleges, Picciano, Seaman, and Allen (2010) examined a number of issues related to faculty attitudes, including their perception of the quality of online learning. Among all the faculty respondents, 70% view online learning as inferior or somewhat inferior to face-to-face learning. Although a high percentage of faculty view online learning as inferior or somewhat inferior, 56% of the respondents reported recommending online courses to their students. Picciano et al. (2010) contributed this paradox to the faculty members holding mixed feelings about the benefits of online learning. Faculty state that it is more important to provide students with access to the course, even if the class is perceived as inferior to face-to-face courses.

Course accessibility and scheduling flexibility are main advantages of online delivery technologies. Access is assured, regardless of location, employment, family
obligations, and other factors that may impact one’s access to higher education.

Geography or time do not constrain online learning as with traditional face-to-face modalities. According to Allen and Seaman (2011), more than 90% of all academic leaders from over 2,500 institutions indicate that the flexibility provided in online course scheduling is superior to that of face-to-face course scheduling. The need for this flexible scheduling is undeniable when more than 6.1 million students are reported as having taken at least one online course during the Fall 2010 term. Ubiquitous access to the internet and learning management system technologies have paved the road for higher education’s distant learning efforts. Allen and Seaman (2007) reported all types of institutions cited improved student access to courses as the primary reason to participate in online education.

While all institutions of higher education report a growth in online enrollment, two-year associate’s institutions had the highest growth rates and accounted for over half of all growth for the years 2002-2007, while baccalaureate institutions had the lowest growth rates. Community colleges have embraced the online environment, and community college students have come to expect online teaching and learning as associated with the mission of the community college to provide increased access to members of the community (Garza Mitchell, 2017). Studies conducted by the National Center for Education Statistics showed that community colleges accounted for the highest participation rate in distance education (22%) for undergraduate students, and 96% of community colleges offered at least one online course (Garza Mitchell, 2017).

The continued growth of online enrollment has not come without issues. The online environment is heavily dependent upon the use of technologies to deliver and
access the content material. The skill and experience level of the faculty designing and delivering the online course is of most importance. The Dahlstrom (2012) research that surveyed more than 100,000 students at 195 institutions from around the world reflected that, in 2010, less than 50% of those students agreed their instructors used technology efficiently and suggested it is more important that technology be used to complement and support the learning, rather than consist of the latest gadgets hyped to improve computer-mediated communication which, in reality, often impede the student’s success by exceeding the average student’s capacity in either understanding or access. Therefore, the use of computer-mediated communications in the online environment must provide a media reach experience for the student while not straying from the sense of connectedness and humanness that are essential aspects of communication.

**Online Pedagogy**

Technology is changing our world. Events that were not possible two decades ago are everyday occurrences today. Education also has had its share of change due to the technological revolution. Pedagogies have been developed over the last 30 years in an attempt to accommodate the technology-enhanced classroom. Jackson, Helms, and Gum (2011) conducted a 10-year comparison study of student expectations of technology-enhanced pedagogy. The authors simulated a 1996 study of college students’ expectations of technology to be used in the classroom. The 1996 study used a student survey designed to measure the responses of 714 students at a small southeastern private college concerning the students’ expectations of multimedia pedagogy. Ten years later in 2006, the authors used the same instrument to survey 639 students at three southeastern colleges in two southern states (Georgia and Tennessee) and included two public
institutions and one private institution. The demographics were similar in both samples, although there were significant differences in the two sample age groups. The 2006 group was significantly younger than the 1996 group. However, after analysis of the data, the researchers determined the age played no significant role in the results of the study and, thus, not considered further in the analysis.

Jackson et al. (2011) conducted the 10-year comparison study to answer two research questions: (1) What are students’ expectations regarding technology-enhanced pedagogical techniques in a college classroom, and have these expectations changed over the past ten years (1996-2006)?; and (2) What type of technology-enhanced pedagogical techniques do students want in their ideal classroom, and have these desires changed over the past 10 years (1996-2006)? The results indicated that, although student desires have changed, the perception of the ideal classroom still shows a strong desire for a face-to-face lecture with class discussion and exercises, written handouts, and outlines. Students desire to be engaged in an active learning environment (Khan, Egbue, Palkie, & Madden, 2017). According to Khan et al. (2017), student engagement is key to successful teaching and learning and is a challenge regardless of the delivery modality. Engaging students with active learning pedagogical strategies is a challenge in traditional face-to-face classrooms, and is more so in online courses.

Typically, active learning is not associated with web-based learning environments. The spontaneous student-to-student and student-to-instructor interaction are difficult to duplicate in an environment where students are physically isolated from the instructor and each other. The online environment may incorporate pedagogical strategies to medicate the lack of physical presence in the online classroom. Khan et al.
(2017) suggested using well-conceived discussion, group work, and collaborative environment that encourage and foster a community of learning to enhance student engagement. Integrating active learning pedagogical strategies into the online course content is essential for student engagement.

In a recent survey conducted by Khan et al. (2017), 66% of the faculty polled ($n = 29$ and the number of replies for each question ranged from 23 to 29) have taught an online course. In the same survey, 33% of respondents indicated they had been teaching online courses for three to five years, while another 33% have taught online courses for six to 10 years. Twenty-two percent and 4% also have been teaching web-based classes for two years and 10 years or more, respectively. The survey results also indicated 67% of the respondents have engaged in some type of training for teaching online classes, including training at the national and institutional level, and had a degree or credential in online education; the rest of the respondents had no formal training. All the faculty polled indicated they were very concerned or somewhat concerned about student engagement in online learning. From this inquiry, it is evident that student engagement is a primary concern for faculty regardless of the number of years he or she has been teaching. Therefore, online pedagogical strategies designed to enhance student engagement must start with course design.

The quality of an online course in comparison to its traditional face-to-face equivalent is the most significant issue that impacts the design and development of an online course. Unlike traditional face-to-face courses, online courses must be developed before the actual delivery of the content. The design process must allow for adequate time and resource management on the part of faculty as well as students (Khan et al.,
The methods that encourage students to communicate must be explored, along with the efficient implementation of teaching tools used to deliver and facilitate an active learning online environment. The support instructors require to accomplish the active learning online environment is a challenge for postsecondary institutions. Instructors must have broad technical and pedagogical skills that come only via experience. Institutions offering online courses have instructors that have little if any experience in online course delivery and others with highly developed abilities with sufficient experience and technological skills to successfully blend technology and online pedagogies. This disparity in instructors’ experiences, expertise, and knowledge result in a gap in ability.

Scoppio and Luyt (2017) suggested that the gap in technological and pedagogical skills aforementioned may be shortened by employing selective approaches to support instructors when transitioning to online courses. Scoppio and Luyt considered two models of course design support from different higher education institutions in the United States and Canada. Each of the two models requires course designers to work together in building active learning experiences. The research considered instructor’s individual needs, teaching styles, and goals related to his or her course. Therefore, the study asks three questions: (1) What are some potential gaps in skills, knowledge, or experience that may influence how instructors transition to online learning?; (2) To what extent can a flexible approach to course design support and enable instructional designers and instructors to work together to select relevant pedagogies, learning strategies, and technologies when developing online courses?; and (3) In what ways can flexible models
of course design support assist more efficiently those instructors transitioning to online settings?

The two institutions studied are significantly different in size and in geography (Scoppio & Luyt, 2017). One institution is located in Northern New York State and the other is based in Kingston, Ontario. Each shares unique similarities and differences. Both models support a nonlinear approach to online course development to provide instructors with a flexible approach to course design. A flexible approach to course design support helps all parties to appreciate the value of technology and adopt guiding principles regarding course design. Both models also demonstrate the need to assist the instructor at his or her learning level. Furthermore, both models offer the instructor to select course-specific tools that promote active learning. According to Scoppio and Luyt (2017), three key lessons from this study can be applied to other institutions. First, design goals must be clear and efficiently communicated between both instructors and instructional designers. Second, there is an overwhelming need for collaboration. Instructors and instructional designers must collaborate across disciplines and with other groups across the campus. Third, flexible course design support also is essential. While instructional designers have practical knowledge and skills that enable them to perform complex tasks quickly and easily, instructors may be anywhere on the skills spectrum. Therefore, instructors should have an online location that is readily available to retrieve course-specific resources that pertain to his or her needs.

While many concerns regarding student engagement in online courses have been discussed, one of the most prominent challenges to overcome is the lack of appreciation of the time that is needed to design and administer online courses effectively. Moving a
traditional face-to-face course into an online environment can be a challenging process because online course development requires much planning and specialized training (Khan et al., 2017). Furthermore, a significant amount of time is needed for developing an online course. The online learning environment requires the instructor to assume a new role as a manager of technology and pedagogical strategies.

**Blended Learning Environment**

The blended learning environment is being used more frequently in academics. According to Graham (2006), in 2003 the American Society for Training and Development identified blended learning as one of the top 10 emerging trends in education. Blended learning environments can provide a more flexible opportunity for more students to contribute to discussion topics. Removing or minimizing time constraints allows a learner extra time to consider responses and encourages critical thinking. What is blended learning? Blended learning is difficult to define because all learning in a broad sense is blended learning.

If blended learning is defined by multiple instructional methods and multiple delivery media, then it would be difficult to find a modern learning environment that would not be defined as blended learning. Therefore, Graham (2006) held a position on blended learning that reflects the historical emergence of blended learning and the technologies that are available to facilitate the blended learning environment. Graham’s conceptual view of blended learning takes into account the two historically separate models of teaching: traditional face-to-face and distributed learning technologies that include learning management systems and computer-based technologies. As with many learning models, the blended learning environment uses multiple instructional methods.
using multiple delivery media; in addition, the modern concept of blended learning has evolved due to the rapid emergence of technological innovations that have made it possible to develop an affordable and viable distributed learning environment to complement the traditional face-to-face environment. The technology revolution has provided instructors new digital learning technologies that may be used to develop and integrate instructional media into the blended learning environment (Kirkley & Kirkley, 2005). Digital alternatives are available for instructional use, like screencasting, web-based video, and learning management systems to provide significant instructor-student cueing (Beldarrain, 2006).

According to Brown (2006), as faculty members continue to blend their instructional practice, institutions need to rethink and reorganize the systems that support instruction. Blending, on the course, program, and institutional levels, is a dynamic process which includes potential changes to curricular content, pedagogy, network infrastructure, student behavior, faculty attitudes, and organizational conditions (Ocak, 2011). A better understanding of how and why teachers blend face-to-face and online components could contribute to the scholarship of teaching in higher education.

**Postsecondary Career and Technical Education**

Career and Technical Education (CTE) began as a result of 1917 federal legislation to fund secondary technical and vocational programs. The funding for postsecondary technical education programs began modestly in the 1960s (Bragg, 2012). The central goal of the 1917 legislation was to support job training programs for high school students that would help the student secure a good paying job and, consequently, add to the local economic growth. Some community college leaders see the expansion of
career and technical education programs into the postsecondary realm of education as an intrinsic threat. The threat is perceived to be the preoccupation politicians have placed on the importance of economic development above the individual’s pursuits to achieve an education regardless of the reason (Levin, 2001). Irrespective of the concerns of educational leaders in the past, the expansion of CTE programs into the community colleges has continued, along with the political pressure to provide postsecondary CTE programs that provide students with opportunities to obtain necessary skills to support local economic growth.

**Need for Accountability**

In an article titled “Employment Outcomes in the Two-Year Sector: The Witch Hunt for College Programs that Don’t Pay Off,” Kelly and Whitfield (2014) reported that, due to the high demand for scarce resources, policymakers in the Commonwealth of Kentucky are scrutinizing community college programs that, in their opinion, do not have a reasonable return on investment for the state and federal taxpayers. The policymakers intend to use data from the Kentucky Community and Technical College System, along with the Kentucky Office of Employment and Training, to measure the accountability of the public community and technical colleges within the Commonwealth. Kelly and Whitfield suggested a warning for the community and technical college leaders. There may be problems with future curriculum, program development, and growth if policymakers take a “knee-jerk” (p. 60) reaction to the data. The decisions that affect community colleges and their associated program curriculum should not be at the mercy of educational policies derived from data that do not take into account the local economic
and regional disparities that impact the social and economic values assigned to occupations (Kelly & Whitfield, 2014).

The current state of concern expressed by policymakers about the return on investment of community college programs has trickled down to the local college leadership. Local leaders are asked to develop programs that provide the taxpayers with a reasonable return on investment. The charge is to develop new programs or transform current programs to meet the accountability measures of the current political and economic situation in the Commonwealth. Therefore, leaders within the community and technical college system of Kentucky must not only rely on leadership skills and characteristics of old, but must embrace a new set of characteristics and competencies.

**New Leadership Paradigm**

The tremendous impact of technology on education has added to the list of characteristics and skills that should be considered to be an effective leader in postsecondary education (Viviano, 2012). According to Viviano (2012), to facilitate the change to a more technological driven educational system of program development, access, and delivery, leaders should stay abreast of emerging technologies and empower instructors to do the same and lead the way in the reform. Due to the fast-paced nature of technology integration into the educational landscape, instructors must feel free to explore and take chances without fear of reprisal. If students are to succeed, our instructors also must succeed. Teachers can perform better in an organizational leadership culture that values unconditional positive regard, where the new leadership paradigm places the instructor at the forefront of change by emphasizing a bottom-up approach to program improvement (Hoyle, 2002).
Online Learning and CTE

Community colleges throughout the United States are actively involved in the online delivery of career and technical education (CTE) curriculum. In a study to discover the future trends of online learning in postsecondary CTE programs, Benson et al. (2005) sought to compare student achievement in face-to-face courses to online courses. In this mixed-methods study of equivalent online and face-to-face CTE courses, the population consisted of students enrolled in CTE courses in 2002 and 2003. To limit the influence of confounding variables to the validity of the study, Benson et al. also chose only model courses offered during the same time frame and developed by the same instructor. Based on the selection criteria, five courses at three community colleges with a total of 112 face-to-face students and 81 online students participated in the study. The study concluded there was no significant difference in the performance of CTE students in the face-to-face modality to the online methods of instruction. The courses chosen for this study had one other thing in common: the hands-on component of the course regardless of the face-to-face or online modality depended on the student to obtain the hands-on experience in the workplace at an external site.

In a later study, Benson et al. (2008) again sought to identify the current status and future trends in online teaching and learning in postsecondary CTE. Benson et al. (2008) stated the study had as a purpose to answer three questions concerning online education in postsecondary CTE: How prominent, what are the institutional drivers and outcomes, and which institutions and students participate? The results showed that community colleges are actively involved in the delivery of CTE via online learning to meet the needs of their diverse student body, but are offering few CTE programs entirely
Benson et al. (2008) stated the possible reasons for the lack of entirely online offerings could be a result of the hands-on nature of many of the courses within the program, making them more easily conducted face-to-face. Second, faculty members are not interested in expending the time and effort to develop fully online courses in postsecondary CTE programs.

The student perceptions of online vs. face-to-face learning in CTE programs were explored by Carver and Kosloski (2015) during a study of Washington state schools. The study used a Mann-Whitney U test to measure variability and compare mean scores for a series of psychosocial learning environment scales between online and traditional face-to-face teaching and learning environments to determine the differences if any. Analysis of the data showed that, in the areas of active learning, students perceive online education as offering more benefit than face-to-face education. In the areas of student interaction, collaboration, and enjoyment, student perceptions favor the face-to-face environment. To improve on the student satisfaction for interaction, Carver and Kosloski recommended adding means for student-to-student and instructor-to-student collaboration to the online learning environment.

**Blended Learning and CTE**

While a significant amount of research has been conducted on blended learning in higher education, little research has been carried out on blended learning in postsecondary CTE programs. The existing research has focused on the online versus the face-to-face modalities of educational environments. As reported in the previous section of this paper, online education has its positive and negative attributes for delivering CTE curriculum. Meanwhile, the face-to-face environment also has positive attributes and
suffers some shortcomings. There is a third option, blended learning for postsecondary CTE course delivery, which often is overlooked. According to Auster (2016), to satisfy the need for flexibility in course offerings, student interaction, and collaboration, and the ability to perform hands-on training in an actual laboratory environment, the blended learning approach to CTE programs would take advantage of the positive attributes of face-to-face and online learning.

Many CTE faculty express a problem with teaching online technical programs, and it is not just because they are accustomed to the traditional face-to-face methods of teaching technical education curriculum and resist the online “alternative.” The instructor may be correct. In some cases it may be impossible to achieve the mastery of competencies required to be successful in a particular skilled trade (Benson et al., 2008). For example, the hands-on components of a welding curriculum must be taught traditional face-to-face in a physical laboratory with the guidance of a trained welding instructor; the student must experience the sound, sight, feel, and smell of the process. The online alternative could explain only the process and theories to the student.

Although there is not as much research available that has discussed the barriers faculty use as reasons to resist the adoption of blended learning in postsecondary CTE programs (Ertmer & Ottenbreit-Leftwich, 2013), there is significant research that has discussed the factors that affect the adoption of blended learning in higher education.

Factors Affecting Faculty Adoption of Blended Learning

Blended learning in higher education has and remains to be well represented in the research literature, although most studies have focused on students’ experiences, perspectives, and outcomes. Torrisi-Steele and Drew (2013) discovered that less than 5%
of the literature has explored the academic practices (e.g., teaching, curriculum design, and faculty development for instructors) on how blended instruction comes together as a practice. Brown (2016) reviewed the empirical literature on instructors’ adoption of blended learning approaches. The goals and scope of the study were to synthesize the current literature about instructional practice. The study used the instructors as the unit of analysis. Brown sought to discover what factors shape faculty members’ adoption of blended learning tools. The following questions guided the study: “What is blended instructional practice?”; “How has it been researched in higher education literature?”; “What are the strengths and limitations of the literature?”; and “What are future directions for research indicated by the identified emerging factors shaping blended instruction practice in higher education?” (p. 2).

Brown (2016) collected literature on blended instructional practices in undergraduate programs applying inclusion criteria to identify significant results across scholarly research. The inclusion criteria required the document to focus on undergraduate students, to be peer-reviewed, and the article must provide a full accounting of the research process. After applying the inclusion criteria, the initial 758 documents were reduced to 58 articles. Brown’s study of the literature identified six significant influences affecting faculty adoption and use of blended learning technologies: current workload, the support of the institution, interactions with students, instructor attitudes and beliefs about blended learning, instructor interactions with the technologies required to facilitate blended learning in the classroom, and instructor opportunities for professional development.
Faculty Workload

Oh and Park (2009) conducted a study of 151 faculty members from 34 institutions of higher education; 133 faculty members from 33 universities responded to the survey. While most responded positively to the benefits of blended learning and believed the blended learning approach would improve the quality of instruction, 70.6% considered the additional workload required to develop blended learning courses to be an issue in the adoption of the technological and pedagogical changes required to implement blended learning. Also, 61.8% of respondents reported motivation and enthusiasm as a barrier to blended learning implementation.

In a 2016 qualitative analysis of institutional drivers and barriers to blended learning adoption in higher education, Porter, Graham, Bodily, and Sandberg (2016) interviewed 39 faculties at a school in the adoption and early implementation stage of a blended learning approach to higher education. During the analysis of the data, several themes developed that influenced faculty motivation to adopt blended learning. The most notable barrier to adoption was identified as faculty workload, specifically workload reduction. Fourteen of the 39 interviewees identified the need for more time to develop blended learning. One interviewee noted, “That would give me more time to implement and understand better what I want to do to make blended learning successful.” Eleven interviewees pointed out that a course load reduction would be influential because they valued their time or needed additional time. These interviewees made comments such as “Time is the big factor for just about anything” or “There's just always a feeling of being extremely busy and having a hard time getting to things that you want to get to” (p. 23). When interviewees were asked whether financial stipends would offset the workload
required to develop blended learning courses, 14 of the 39 interviewees explicitly stated
the stipends would not be influential because they need time more than money.

**Institutional Support**

Researchers and academics consistently stress the importance of higher education
institutions providing a high level of support to the blended learning development and
adoption process (VanDerLinden, 2014). According to Carbonell et al. (2013), when
changing from face-to-face to blended learning, the administration should not attempt to
have the change process driven from the top. The faculty should be empowered to create
the change. Carbonell et al. interviewed five administrators, one student, and 13 faculty
members involved in a large-scale, bottom-up change process to a blended learning
format. Policies were perceived as the most prominent barrier by the interviewees to the
successful switch to a blended learning format. The stated reason for this perception was
that the people creating institutional policies are not the same individuals involved in the
day-to-day teaching activities. Thus, change is not perceived as essential to the
institution’s goals. Making changes to the program or institutional level of course
delivery is risky. Thus, the risk must be shared between the administration and faculty
who engage in the change process. The interviewed teachers expressed overwhelmingly
the importance of the institution creating an environment that rewards innovative action,
such as experimentation with new content delivery technologies (Carbonell et al., 2013).

Institutional support encompasses many facets of the process of changing to a
blended learning format in higher education. As aforementioned, supporting the change
process through policies that expedite and support the change is essential, but not
sufficient to accomplish a successful institutional programmatic change from face-to-face
to blended learning format. The institution also must contribute to the change process by providing financial and sufficient and appropriate infrastructure (Oh & Park, 2009).

Responses from 133 faculty members across 33 institutions of higher learning indicated that 26.5% of the interviewees considered the financial support to be insufficient, and only 11.8% considered the infrastructure to be lacking. While the same study found the most significant barriers to the adoption of a blended learning format was the faculty’s perception of the increased workload required and the lack of motivation and enthusiasm, 70.6% and 61.8%, respectively (Oh & Park, 2009).

**Faculty Interaction with Students**

Instructors’ relationships with students may shift in the transition to blended learning. Blended learning requires the students to rely on instructors less as the source of knowledge and more as the facilitators of learning (Cheung & Vogel, 2013; Holley & Oliver, 2010). In the modern age of technology, instructors must understand how to incorporate emerging technologies into the instructional process, along with adjustments to the traditional face-to-face pedagogical convention. The changes brought forth in education by the emergence of technology is an uncomfortable process for some instructors finding it difficult to resist the concept of merely imparting knowledge rather than facilitating the course (Beck & Ferdig, 2008). Beck and Ferdig (2008) suggested that, in the role of an online instructor, the most challenging aspect is that the teacher must serve as the coach, counselor, and mentor of the student while continually evaluating the process of peer interactions, as well as providing thought-provoking questions and facilitateing well-considered discussions that bring the students and
instructor together in a learning community. Consequently, the role of the online instructor shifts from teacher-centered to student-centered.

While the role of the instructor differs in many ways, there are similarities that are significant and worth mentioning. Regardless of the modality of instruction, instructors must possess acquired knowledge in the subject matter being taught, required credentials and certifications, and professional training (Oyeleke, Olugbenga, Oluwayemi, & Sunday, 2015). However, there are differences between face-to-face and online learning. The online environment significantly changes the instructor’s role in one overarching way. Online instructors are no longer in place just to impart knowledge, but to enable learners to engage in active learning and to allow attainment of shared knowledge. In other words, student-centered learning has replaced transmissive, didactic learning (Holley & Haynes, 2003).

**Faculty Beliefs about Blended Learning**

The use of technology to facilitate blended learning courses requires the faculty to change the way they view pedagogy (Oh & Park, 2009). However, studies have shown that many teachers are unwilling to accept and adapt to the new pedagogy associated with blended learning in preference of the traditional methods of content delivery. According to Kim and Baylor (2008), when faculty members express concern about teaching using technology for lecture delivery, the concern often is born from a value judgment of the technology and his or her abilities to incorporate the appropriate pedagogical strategies successfully. Furthermore, the faculty believe that delivering lecture content online would decrease the quality of the instruction, making it difficult for students to attain
their educational goals. Some teachers even perceive that online instruction threatens their academic freedom by designating the way the course is to be taught.

The literature concerning faculty's attitudes and beliefs about blended learning demonstrate that they have their own ideas and value judgments regarding the use of technology to facilitate teaching and learning (Brown, 2016). As they begin to integrate technology into the classroom, there are barriers to consider. According to Ertmer and Ottenbreit-Leftwich (2013), two orders of barriers impede the successful integration of technology into the classroom. The first are external to the instructor and are institutional support, resources, and professional development. The second are considered internal to the instructor and are the faculty’s: attitudes, beliefs, and skills to use technology efficiently. Due to the ubiquitous nature of technology, the first order barriers are becoming less significant than the second order barriers in the current literature. Therefore, faculty attitudes about the usefulness and skills required to integrate technology into the classroom remain as significant barriers that affect the adoption of blended learning (Buchanan, Sainter, & Saunders, 2013).

**Faculty Interaction with Content Delivery Technologies**

Technologies that make it possible to deliver course content when the instructor and students are remote are not new. In fact, as early as 1840 technologies existed to allow higher education to offer college courses via distance learning. At that time, the mail delivery system was the technology that made correspondence study possible (Hofmann, 2006). During the late 19th century, Thomas Edison proclaimed his invention of moving pictures would eventually replace the in-class lecture with recorded lectures, thereby students could attain an education without attending class. According to
Hofmann (2006), every subsequent technology innovation has been accompanied by similar predictions, but the distance learning landscape remained functionally unchanged until the World Wide Web became available to the general public in the 1990s. As the World Wide Web continued to evolve over the next two decades, online access to higher education also became more prolific.

In a six-year study, Picciano et al. (2010) found that online learning in higher education has been impacted significantly by the prolific expansion of internet access. The study reported a growth (2002-2008) of 3 million students taking at least one class online in higher education out of a total population of 16 million in 2002 to 18 million in 2008. The demand for flexible online offerings from institutions of higher education continues to grow. The growth requires that appropriate infrastructure is in place to handle the request, and teachers must be prepared to acquire and utilize the skills needed to facilitate courses using the modern computer-mediated online environment (Baepler et al., 2014; Buchanan et al., 2013). The advancements in technology over the past few years have alleviated much of the concerns for the need of appropriate infrastructure. While infrastructure is no longer at the top of the list of obstacles to online access, faculty internet self-efficacy remains as a significant barrier for faculty as to the adoption of technologies to facilitate a blended learning environment (Buchanan et al., 2013; Nhu, 2016).

The content delivery technologies, as well as the time it takes to be proficient in their use, can be intimidating to faculty members. According to Lee et al. (2013), computer self-efficacy is an influence on the faculty members perception of the ease of use, and, to a lesser extent, the usefulness of the CMCD technologies. Furthermore, the
teacher's perceptions of the ease of use and usefulness of the technologies are predictive of the faculty member’s intentions to use the content delivery technologies. Buchanan et al. (2013) conducted an online survey in a United Kingdom university; 114 faculty members responded. A regression analysis was performed, and the results indicated that internet self-efficacy is positively associated with the ease of use and, by extension, the faculty’s intention to use the content delivery technologies for blended learning. While the ease of use is positively associated with the faculty member’s computer and internet self-efficacy, it is not as important as the perceived usefulness of the technologies to enhance the learning experience for the student. Regardless of how easy a technology is to use, Buchanan et al. found that, if the faculty member does not perceive it to be useful for the purpose intended, adoption was reported to be low. Therefore, when considering the adoption of a blended learning program in higher education, careful consideration must be given to the type and amount of faculty development needed to develop faculty members’ computer skills and knowledge to enhance their computer and internet self-efficacy. Also, to assure the technologies will be used, the faculty development activities must provide training and examples of the usefulness associated with the technologies selected to deliver the computer-mediated content.

**Faculty Professional Development Opportunities**

The recorded lecture, computer-mediated content, and learning management systems have contributed in recent years to the viability of the online delivery of course content in higher education. The internet has replaced the mail system as a more responsive and speedier method of communication between the instructor and student (Tastle et al., 2005). The internet with all its attributes is just another form of
communication media. Without the recorded lecture, computer-mediated content, and learning management systems, the internet would merely be a faster form of course correspondence. Consequently, as with the mail delivery system, teachers need not possess intimate knowledge of the workings of the medium being utilized. On the other hand, the time and effort it takes one to become efficient with the tools needed to facilitate blended learning over the internet remains a concern with faculty members considering converting face-to-face courses to the blended learning format.

As reported in a previous section, Oh and Park (2009) discovered that 71% of faculty surveyed considered the extra workload as the most salient obstacle to the faculty adopting blended learning. The extra workload was directly related to the time it takes to learn and deploy new content delivery technologies, as well as the pedagogical changes to adapt to the new technologies. While increased faculty workload is the main obstacle to technology integration, the main reason for the extra workload is the time it takes to discover and learn to apply easy-to-use and useful new technologies to existing face-to-face courses to create an effective blended learning environment. Consequently, the most cited reason for the lack of adoption of new content delivery technologies is lack of professional development opportunities (Ertmer et al., 2012).

**Faculty Professional Development**

Faculty professional development is vital to teacher effectiveness and, by extension student achievement. Therefore, educational institutions must set continual improvement of teaching practices as a high priority goal. According to Guskey (2000), quality faculty professional development that is supported as part of a systematic change effort drives notable improvements in educational practices. A review of the available
literature shows six models of faculty professional development (workshop, development of curriculum, immersion, collaborative partnership, peer coaching and mentoring, and inquiry models). The workshop, development of curriculum, and immersion models are controlled by outside sources, while the current study is internally sourced. The collaborative partnership, and coaching and mentoring methods, are not considered because they deal with not only collaboration among teachers, but also include students as participants (Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003; Sparks & Loucks-Horsley, 1989). The current study uses the inquiry model for faculty development. A review of the available literature shows that only one model (inquiry model) of professional development applies to the current study.

The Inquiry Model

Faculty professional development based on the inquiry model differs from the other models in that it is not designed for discovery but to identify problems in educational practices and then take action toward favorable results. Inquiry-based professional development is a form of action research (Loucks-Horsley et al., 2003). According to Guskey (2000), as new initiatives arise, as often do in education, it benefits the effort to involve the faculty members in the research before implementation. Guskey suggested that systemic change exist if teachers are engaged in the critical examination of teaching practices in a bottom-up approach. The teacher is motivated to perform at a higher level and finds the activity more meaningful if he or she is involved in the decision-making process (Castle & Aichele, 1994).
Effective Faculty Professional Development

Faculty professional development comes in two categories: traditional and reform. Traditional professional development includes the traditional workshops, college-level courses, and conferences. If the teacher desires to develop curriculum, he or she may participate in the traditional method of faculty professional development. On the other hand, reform methods of faculty professional development engage in collective participation structures. Study groups, internally sponsored workshops, can be adapted to the inquiry model of action research (Desimone, Porter, Garet, Yoon, & Birman, 2002; Garet, Porter, Desimone, Birman, & Yoon, 2001; Penuel, Fishman, Yamaguchi, & Gallagher, 2007).

Hawley and Valli (1999) offered specific criticism of the traditional externally controlled workshop as professional development, stating, “Because this training is fragmented, piecemeal, and often based on current instructional fads, it is viewed as a frill, easily dispensed with during tough financial times” (p. 134). Rogers et al., (2007) looked at both the views of teachers and the views of facilitators when considering why there seems to be a disconnect between what is believed to be the ideal professional development and what occurs. Both facilitators and teachers agree that professional development must be immediately applicable to the classroom; it must be conducted in ways similar to how students should learn the material, and support systems or collegial networks need to be put in place as part of the scheme. Guskey (2000) suggested the inquiry model of faculty professional development in the form of action research entails a bottom-up rather top-down view of professional development, hence putting educators in a stronger position to influence what counts as valid educational knowledge and practice.
Guskey (2000) contended the central concept of action research is that educational problems and concerns are best recognized and investigated where the action is taking place: in the classroom, teacher-to-student, and student-to-student. By integrating research methods into the classroom, and engaging those who work at this level in research activities, findings can be applied immediately, and problems solved more quickly, and systemic change can be achieved. Research on effectiveness based on the input of participants in professional development has supported the previously mentioned findings as well. Specifically, Garet et al. (2001), in a study which analyzed the self-report surveys of over 400 teachers at all different levels, and Desimone et al. (2002) conducted a longitudinal study over a three-year period to look for evidence of teacher change; in both cases key features of professional development were considered effective by the study participants. Both studies found that professional development spread out over a more extended period is better for learning than condensed professional development, even if the amount of contact time is the same. Both also found the need for a focus on active learning and connections to make integration adoption smoother. The two studies also agreed that professional development should foster collective participation within professional communities of teachers.

**Professional Development Through Action Research**

Action research is a type of a research study used by practitioners to solve an immediate problem. Action research as a strategy may use a variety of research methods to identify and diagnose a real problem in education. Action research strategies use the process of inquiry by teachers for teachers. Unlike other research strategies, the purpose of action research is to take immediate action to improve or change educational practices.
Action research is typically used in the field of education and studies are generally conducted by educators who also act as participants. The researcher-practitioner identifies a problem, examines its causes, tries to arrive at a solution, evaluates the results, and formulates a new plan of action. The action research process involves the following:

- Identify a problem
- Clarify theories
- Identify research questions
- Collect data
- Interpret the data
- Create an action plan
- Implement the action plan
- Evaluate the results of the actions taken

Action research is conducted in multiple iterations if necessary; the cycle of inquiry process will keep repeating until the desired solution is uncovered.

Action research in its many forms is considered as a method of professional development. Sagor (2000) suggested it is a form of professional development that involves teachers in making decisions about topics of direct relevance to the teachers and their students. Kang (2007) also examined the value of using action research as a vehicle to improve the conceptual understanding of teachers involved in the process of action research. The tenets of action research also fit well with many of the ideas set forth by Wiske (1998) dealing with research on teaching for understanding. Action research encourages teachers to adjust their curriculum to fit the situation, set clear goals, demonstrate their understanding of student learning by using his or her knowledge, and
offer an ongoing assessment of their performance. Piggot-Irvine (2006) further supported this idea through a review of the literature on effective professional development that pointed directly to action research as being one of the models to meet these criteria best. Garet et al. (2001) stressed the need for a longer time frame, active learning, connections, collective participation, immediate applicability, and discovery-based learning strategies. Each of these can be justified as critical components of action research for professional development.

Dana and Yendol-Hoppey (2008) stated that teachers who conduct action research or become members of professional learning communities can come together to identify the problem, examine the problem, and make a commitment to do something about the problem. The material is directly relevant to the teachers and their given situation, so connections are more easily made to other members of the team. The teachers make up the research team, which makes collective participation a requirement for completion of the project. Again, since the teachers have decided on the topic to be researched, the topic is immediately applicable. Finally, the teachers are discovering the answers for themselves, which is one of the strategies that should be employed with students. To effectively use the principles of an inquiry model in action research, the responsibility for professional learning is controlled by the faculty participant (Piggot-Irvine, 2006).

Research on the characteristics of what makes up effective faculty professional development has been conducted, and the characteristics include professional development that is structured for active learning and collaboration, which is immediately applicable to the classroom. Action research fits these criteria as a form of professional development, as well as having the advantage of direct teacher participation, which
increases teacher buy-in to the research (Castle & Aichele, 1994). What is missing from the research on action research as a form of professional development is the effect it has on the teachers themselves and their sense of efficacy. One must wonder, however, about how participation in action research impacts the teachers. Does teacher efficacy and positive attitude increase as a result of participation in action research? Are the teachers’ behavioral intent to apply best practices in the classroom increased? These questions need to be answered to more completely address the value of action research. This research study explores the overarching question of how action research functions as a form of professional development to improve teachers’ likelihood of accepting and adopting CMCD in a blended learning environment.

**Theoretical and Conceptual Framework of This Study**

The TAM was developed by Fred Davis in 1985 as part of his Ph.D. program at MIT. The TAM was developed specifically for the information systems industry to improve understanding of user acceptance processes and to provide a theoretical basis for a user acceptance testing methodology. The primary goal was to demonstrate system prototypes to potential users and measure their motivations to use the alternative system. The testing could be done early in information system development when feedback is most valuable. This, in turn, could reduce development costs and identify likely user adoption and necessary user support. Davis investigated the significant motivational variables that mediate between system characteristics and actual use of computer-based systems by end users. The conceptual framework looked at how system features and capabilities affect a user's motivation or intent to use a system and to what degree the intent resulted in actual use.
The TAM is founded on the Fishbein and Ajzen (1975) Theory of Reasoned Action (TRA) and the Ajzen (1985) Theory of Planned Behavior (TPB). Both theories suggest individuals’ intention to perform a given behavior is the immediate causal determinant of their overt performance of that behavior, and their intention is jointly determined by their attitude toward performing the behavior and the perceived social influence of those that are important to them. Thus, individuals perform an action based on their belief that the action will bring positive consequences or be viewed positively by those who are important to them. Actions also may be perceived to improve one’s social status. While the TAM is used most frequently in the literature to explain behavior and user attitudes toward the adoption and use of technology (Fagan, Neill, & Wooldridge, 2008). The TRA and the TPB continue to influence the use and development of the TAM. With each iteration, TAM has improved on the prior model by incorporating the influence of the TRA and TPB model that has a causal link to the two main sets of constructs of the TAM: perceived usefulness, and perceived ease of use (Chen, Chen, & Yen, 2011; Kamhawi, 2008). Thereby, the relationship between the TRA, TPB, and TAM form the theoretical framework for this study.

**Theory of Reasoned Action (TRA)**

The TRA was established in 1975 by Fishbein and Ajzen as a framework for understanding human usage behavior. Fishbein and Ajzen (1975) suggested that one’s attitude and subjective norms combined are what motivate one’s behavioral intentions to engage in the behavior. The actual use of innovation is determined by behavioral intentions to use the new innovation. The TRA model has been used successfully to predict human behavior for drug use, voting, and marketing (Ajzen, Timko, & White,
Researchers have discovered that the TRA does not contextualize behaviors. TRA has proven to be limited as a framework to identify the specific beliefs that will be important in certain contexts such as technology adoption. Attitudes and norms are often confused in the application of the TRA, resulting in false predictions due to the actual use of the innovation being indicated as the predictive variable instead of behavioral intentions. (Chen, Shih, & Yu, 2012; Fagan et al., 2008; Fishbein & Ajzen, 1975). An overview of the TRA model is presented in Table 1.

Table 1

*Theory of Reasoned Action (TRA)*

<table>
<thead>
<tr>
<th>Originated by:</th>
<th>Fishbein and Ajzen (1975)</th>
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<tbody>
<tr>
<td>Dependent Constructs:</td>
<td>Behavioral Intention, Actual Behavior</td>
</tr>
<tr>
<td>Independent:</td>
<td>Attitude Toward Behavior, Subjective Norms</td>
</tr>
<tr>
<td>Associated Theories:</td>
<td>The Theory of Planned Behavior (TPB)</td>
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<td></td>
<td>The Technology Acceptance Model (TAM)</td>
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</table>
**Theory of Planned Behavior (TPB)**

Developed by Ajzen (1985) as an extension of the theory of reasoned action. TPB holds true to the assumption that an individual’s behavioral intentions are directly related to an individual’s attitude toward the behavior. Ajzen’s TPB includes constructs that affect an individual’s intention to change by addressing the attitudes and perceptions that enable or impede change. The addition of the perceived behavioral control construct is the primary distinction between the TRA and the TPB. Figure 2 represents an adaptation of the TPB developed by Ajzen in 1985.

![Diagram of TPB](image)

*Figure 2. Theory of Planned Behavior (TPB).*

As a result of adding the perceived behavioral control construct, the TPB now assumes that when one exerts self-control, he or she also has maximum control of the expected behavior and actual behavior (Fogarty & Shaw, 2010; Teo, 2011). The four core constructs of Ajzen’s TPB developed in 1985, 10 years after his work on the TRA, are represented in Table 2. Table 2 is an overview of the TPB and depicts the four core constructs of the TPB (attitude toward the behavior, subjective norms, perceived behavioral control, and behavioral intent.)
Table 2

*Theory of Planned Behavior (TPB)*

<table>
<thead>
<tr>
<th>Originated by:</th>
<th>Ajzen (1985)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Constructs:</td>
<td>Behavioral Intention, Actual Behavior</td>
</tr>
<tr>
<td>Independent:</td>
<td>Attitude Toward Behavior, Subjective Norms, Perceived Behavioral Control</td>
</tr>
<tr>
<td>Associated Theories:</td>
<td>The Theory of Reasoned Action (TRA)</td>
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<tr>
<td></td>
<td>The Technology Acceptance Model (TAM)</td>
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</tbody>
</table>

**The Technology Acceptance Model (TAM)**

The TAM differs from the TRA and TPB in that Davis (1985) theorized that social norms do not directly affect attitude or behavior about system use. Instead, attitude toward using a system is the function of perceived usefulness and perceived ease of use. Davis conducted an extensive review of literature related to human factors, information technology, and psychometrics and discovered two main constructs or beliefs that consistently influence technology adoption: perceived usefulness and perceived ease of use. The emphasis placed on each construct is determined by various external variables such as training, the design of the technology, or even popularity of the device. Davis contended that perceived ease of use would have a causal effect on perceived usefulness. The two core constructs that make up the TAM, perceived usefulness which is defined as “the degree to which an individual believes that using a particular system will enhance his or her job performance” (Davis, 1985, p. 26), and perceived ease of use which refers to “the extent to which an individual believes that using a particular system will be free of physical and mental effort” (Davis, 1985, p. 26). Perceived ease of use was hypothesized to have a direct effect on usefulness and that a system that is easier to use would make an individual more productive and more likely to use a system. Studies have provided
conflicting results in this area; when it comes to actual use, users place more emphasis on obtaining desired outcomes from a system and use a less user-friendly system if outcomes are more consistent, valid, and help one reach his or her goals or objectives or improve their job performance. Figure 3 represents the TAM as confirmed by Davis et al. (1989).

![Diagram of Technology Acceptance Model (TAM)]

Figure 3. Technology Acceptance Model (TAM).

Most references to the technology acceptance method referred to the 1989 study when Davis et al. (1989) theorized that behavioral intention is the primary determinant of user behavior. Additionally, Davis et al. (1989) found that attitude has less of an effect on behavior than previously thought. Mathieson (1991) compared the TAM with the theory of planned behavior by asking students about their intent to use various spreadsheets to complete assignments and how important it was to students to have approval from employers, professors or other students. Findings were that both models are reliable in predicting behavior, also fully supporting Davis' previous findings that reflected the TAM was parsimonious. Table 3 is an overview of the TAM and depicts the three core constructs of the TAM (behavioral intent, perceived ease of use, and perceived usefulness).
Table 3

*Technology Acceptance Model (TAM)*

<table>
<thead>
<tr>
<th>Originated by:</th>
<th>Davis, Bagozzi, and Warshaw (1989)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Constructs:</td>
<td>Behavioral Intent to Use, Actual Use</td>
</tr>
<tr>
<td>Independent Constructs:</td>
<td>Perceived Ease of Use, Perceived Usefulness</td>
</tr>
<tr>
<td>Associated Theories:</td>
<td>The Theory of Reasoned Action (TRA)</td>
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<td></td>
<td>The Theory of Planned Behavior (TPB)</td>
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</table>

Hartwick and Barki (1994) conducted a study on user participation in information system development; they found subjective norms play a role in mandatory system use, while usefulness and ease of use are more critical for voluntary use or continued use of a compulsory system for an extended period of time. Taylor and Todd (1995) compared the theory of planned behavior and the TAM. Both the TAM and the decomposed theory of planned behavior were found to be parsimonious. Taylor and Todd also found the decomposed theory of planned behavior and the TAM were both sound predictors of one’s intention to use a new technology. Hartwick and Barki further stated the decomposed theory of planned behavior provides a better understanding of user behavior, but the TAM is preferred if only usage is being evaluated. One key addition to this study was the finding that computer self-efficacy plays a direct role in behavioral intentions.

Venkatesh and Davis (2000) added some explicit theoretical constructs to the TAM; the revised model is referred to as TAM2 and includes interrelated social influence processes and cognitive instrumental processes. Figure 4 represents the TAM2 with the addition of six new constructs (Venkatesh & Davis, 2000).
Figure 4. Technology Acceptance Model (TAM2).

**Social influence processes.** The social influence processes are defined by subjective norms of voluntariness and image. Subjective norms are a person's perception that most people who are important to them think they should or should not perform a specific behavior. This is important; the individuals may choose to perform behaviors they would not otherwise perform if they fear consequences of not performing the behavior or if someone important to them thinks they should. Voluntariness refers merely to the extent that potential adopters view the system as non-mandatory, which goes back to previous studies noting that behavior intentions differ when users are mandated to use a system versus being able to make a choice and whether to use a system. Image is the degree to which use of an innovation is perceived to enhance one's status in one's social system, or give them a higher social status. These social constructs bring in more parts of the theory of reasoned action and the decomposed theory of planned behavior.
Cognitive instrumental process. The cognitive instrumental processes include job relevance, output quality, and result demonstrability. Venkatesh and Davis (2000) argued the individuals form perceived usefulness judgments by cognitively comparing what a system is capable of doing to what they need to get done in their job. Job relevance is defined as how well an individual regards the system as essential to their job. People also will take into account how well the system performs tasks and the quality of output; Is the quality good and does it do what they needed it to do?; i.e., Are the results demonstrable? Table 4 is an overview of the TAM2 and depicts the nine central constructs of the TAM2 (behavioral intent, perceived ease of use, perceived usefulness, voluntariness, subject norm, image, job relevance, output quality, results in demonstrability).

Table 4

<table>
<thead>
<tr>
<th>Technology Acceptance Model (TAM2)</th>
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<tbody>
<tr>
<td>Originated by: Venkatesh and Davis, 2000</td>
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<tr>
<td>Dependent Constructs: Behavioral Intent to Use, Actual Use</td>
</tr>
<tr>
<td>Independent Constructs: Perceived Ease of Use, Perceived Usefulness, Voluntariness, Subjective Norm, Image, Job Relevance, Output Quality, Result Demonstrability</td>
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</tbody>
</table>

Many studies have been conducted using the TAM in the past 30 years and span many industries, including education, healthcare, business communication, transportation, manufacturing, and others; each study reviewed links perceived usefulness
with behavioral intentions. There are studies that have conflicting results linking the perceived ease of use to behavioral intentions, but often it is a mediated link to perceived usefulness. Some of the most common arguments directed toward the TAM are that it needs to take into account systems cost and features, social norms, culture, gender, alternative systems, and that it focuses on individual users rather than groups of users. Some of those conflicts or arguments were addressed with the additional social constructs that Venkatesh and Davis (2000) added to the TAM2.

Dasgupta, Granger, and McGarry (2002) conducted a study to determine whether the TAM could reliably evaluate behavioral intentions and acceptance of an e-collaboration technology. Dasgupa et al. studied students who are required to use a collaboration tool called prometheus, and they had to use it to work with peers on projects to submit assignments and communicate with instructors. The group found that previous user experience has an initial effect on perceived ease of use and perceived usefulness. However, increased use does not have a positive effect on system usage. It seems students simply learned when and how they need to access the system and used it only as needed for classes (Dasgupta et al., 2002).

McCoy, Galleta, and King (2007) cautioned against using the TAM across cultures without further research. They used Hofstede's research to define cultures using uncertainty avoidance, power distance masculinity, femininity and individualism, and collectivism. They found that cultures low in uncertainty avoidance, high in masculinity, and high in collectivism did not follow the previous results of the TAM principles where it linked behavioral intentions with perceived ease of use and perceived usefulness.
Perceived usefulness is unaffected by perceived ease of use by those not trying to avoid uncertainty. In the power distance cultures, systems are used because individuals were told to use them, so perceived usefulness and perceived ease of use does not affect behavioral intentions in those cultures. McCoy et al. (2007) found cultures high in masculinity tend to believe in their abilities and are less concerned with ease of use as they are in reaching their goals. Therefore, the perceived ease of use had little to no effect on perceived usefulness and intentions in collectivist groups. Collectivism groups are not as concerned with the ease of use because they are more concerned with reaching goals that are valued by others, and they will use a system that is less user-friendly if those around them are using the system.

The TAM has been well received and utilized by those developing information systems as well as those developing and introducing technologies in other industries. The model is successfully used to evaluate a system’s likely adoption in today’s world where technology changes rapidly and is being introduced and used in all aspects of our lives. Developers would be wise to use the TAM during development to increase user adoption and create technology that users find easy to use while meeting their performance goals and objectives and accommodating social norms. Many end-users are more familiar with a variety of technology platforms likely reducing the importance of the perceived ease of use. Additionally, this model may be helpful in developing acceptance of technology by audiences who are less comfortable with the rapid changes taking place.

**Conceptual Framework**

The first two iterations of the TAM concentrated more on the perceived usefulness variables than the perceived ease of use. TAM 2 identified antecedents of the
perceived usefulness, with little attention to the perceived ease of use. Venkatesh (2000) sought to determine the antecedents of the perceived ease of use construct. Venkatesh identified determinants that have been as a result of previous research (Davis et al., 1989; Venkatesh & Davis, 2000). Venkatesh created TAM3 by extending TAM2 to include the new antecedents to the perceived ease of use construct.

The conceptual framework for this study encompasses four interrelated core constructs and nine sub-constructs identified as “Priori-coding Categories” (see Figure 5 to review the conceptual framework diagram). The core constructs are: (a) perceived usefulness, (b) perceived ease of use, (c) attitude toward use, and (d) behavioral intent. The nine sub-constructs are: (a) subjective norms, (b) image, (c) job relevance, (d) output quality, (e) results demonstrability, (f) external variables, (g) perception of external control, (h) objective usability, and (i) computer self-efficacy. The four core constructs are influenced by the nine sub-constructs to form a faculty member’s intentions to use the CMCD technologies; intentions are predictive of whether a faculty member will do so. Figure 5 represents the Conceptual Framework for this study.
Figure 5. Conceptual framework for this study.

Summary

This chapter presented relevant research literature on the influence of technology on teaching and learning, postsecondary career and technical education, factors affecting faculty adoption of blended learning, and faculty professional development. The TAM this study used as a theoretical and conceptual framework also was explored. The following chapter presents the methods used to conduct this action research, as well as justification for the research design decisions.
CHAPTER III: METHODOLOGY

Restatement of Purpose

The purpose of this action research study was to determine factors that influence faculty member attitudes and behavioral intentions to use the CMCD technologies as a result of participating in a series of faculty professional development activities. The implications of the findings from this study may be used to develop practical recommendations for facilitating a successful adoption and implementation of a blended learning approach that may include program areas other than AMT programs. Additionally, the outcomes of this study may help ensure a more efficient use of scarce resources used to sponsor faculty development activities designed to foster faculty members’ acceptance and integration of new CMCD technologies into the AMT program curriculum.

Research Questions

The research problem was concerned with faculty members’ experiences with the acceptance and adoption of an innovative CMCD modality to replace the traditional face-to-face lecture in AMT programs. As such, the study addressed the following questions:

Q1: What are faculty members’ perceptions regarding the usefulness of CMCD technologies?

Q2: What are faculty members’ perceptions regarding the ease of use of CMCD technologies?

Q3: Which external variables do faculty members perceive as aiding the integration of CMCD technologies?
Q4: What attitudes do faculty members perceive to support the integration of CMCD technologies?

Q5: What are faculty members’ perceptions regarding what influences the behavioral intentions necessary to facilitate the integration of CMCD technologies?

Research Design

Action research strategies were used to collect qualitative data for analysis for this study. Action research employ the methodological approach of inquiry-based research activities to collect qualitative data for analysis. The inquiry approach to qualitative research is not designed for discovery but to identify problems in educational practices and take action to effect satisfactory results (Loucks-Horsley et al., 2003). The qualitative data collected in this study were used to answer to what extent the strategies employed through a series of faculty professional development workshop activities influenced the faculty member’s attitudes and behavioral intentions to accept and adopt the CMCD technologies.

Participants

Faculty members from the AMT division of SKYCTC were purposefully selected and represented the total population ($N = 15$) for this study. Criteria for selection were faculty members involved in the innovative transformation process of converting traditionally face-to-face technical education lecture courses to a blended learning model relating to a CMCD system. The population for the study consisted of 15 full-time AMT program faculty members ($N = 15$) of varying ranks, including two instructors, four assistant professors, six associate professors, and three full professors. The participant
names were replaced with a number to protect anonymity. While participation in the action research project (data collection and analysis) was voluntary, the involvement in the faculty professional development workshops was mandatory. All 15 faculty members volunteered to participate in the action research project and signed an informed consent form.

**Research Setting**

This action research study was conducted over a five-week period during regular working hours (9:00 am – 4:00 pm). One faculty professional development workshop was conducted each of the first four weeks on Friday. The workshop dates were May 26, 2017, June 2, 2017, June 9, 2017, and June 23, 2017. Individual one-on-one interviews with all 16 participants were scheduled and conducted at the participant’s convenience during the week of June 25, 2017. Friday was chosen to carry out the faculty professional development workshops because the AMT division does not conduct regularly scheduled classes on Fridays, thereby allowing all AMT faculty to participate in the activities. The location of the workshops and interviews was the SKYCTC Transpark Center campus. The workshops were conducted in a computer lab (room 102) to allow participants access to computers to perform hands-on activities, while the individual interviews were carried out in a private room isolated from external sounds and interruptions from spectators.

**Data Collection**

This study utilized a researcher authored questionnaire (see Appendix A for an example of the initial planning questionnaire) during the initial planning phase of the process to identify the disposition of each faculty member’s behavioral intent to accept
and implement CMCD technologies into their curricula. Once identified, the factors influencing each faculty member’s behavioral intent to accept and apply the new technologies were included as part of the instructional activities and addressed during the four following scheduled faculty development workshops.

During the acting and observing phase of each action research cycle, the researcher collected data based on observations of the participants during the faculty development activities. Recording the observational data while facilitating the workshops required the researcher to post entries retrospectively. Although, upon the conclusion of each workshop’s training activities, the researcher appointed a faculty member participant to lead an open, collaborative discussion with the participants. The researcher provided the discussion facilitator with a list of guiding questions (see Appendix B for an example of the end of workshop guiding questions) used to prompt the open discussion and focus the discussion on the research purpose and research questions. The researcher observed the end of workshop discussions and manually collected data based on an observation guide (see Appendix C for an example of the observation guide) that listed the interactions, processes, and behaviors to be observed that were associated with the research purpose and research questions.

The data collected during the observation phase was analyzed and the results, in part, were used as a formative evaluation of the workshop activities. After reflecting on the participants’ responses, the researcher made any required adjustments to the action being taken, i.e., elements of the training. At the end of the final action research cycle (cycle four), the formative evaluation data were not required. Therefore, upon completion of the fourth and final cycle, the researcher scheduled and then conducted
semi-structured interviews with the participants (see Appendix D to review the interview protocol and questions used at the conclusion of cycle four).

**Data Analysis**

Lindlof and Taylor (2011) suggested several challenges face the researcher during this phase of the research. First, processing the data collected into a useful, understandable contribution is the most formidable challenge facing the researcher. Second, often there are multiple reasonable interpretations of the data. The “forks in the road” (p. 242) that are often presented require the researcher to make choices concerning coding. The data analysis of this study utilized a deductive process. Thus, the conceptual framework provided a list of priori codes based on the nine sub-constructs that influence the four core constructs of the conceptual framework. A thematic analysis technique also was used to identify themes that emerged while analyzing the data.

The interviews were transcribed, and the text reviewed several times as a whole. The observational data collected during the end of workshop discussions, along with journal entries collected through observing participants during the acting phases of the workshop activates, also were reviewed and included in the data analysis. The researcher used NVivo 11 Pro qualitative data analysis software to manage the data and to aid in coding the data accordingly. After coding, the data were compressed into a display that facilitated implications drawn. The display allowed one to interpret what all findings meant, to help answer the research questions, and to draw implications from the findings.

**Trustworthiness**

This research study exhibited the necessary rigor to ensure trustworthiness (termed validity and reliability in quantitative research) according to qualitative research
methods; safeguards must be in place as it applies to credibility, dependability, confirmability, and transferability (Stringer, 2007).

**Credibility.** The qualitative research methods used in this action research study were conducted in such a way as to ensure the researcher of the truth and accuracy of the data gathered. Credibility is making sure that documentation of all participants’ observations and interview data are accurate (Bloomberg & Volpe, 2012). The data collected before, during, and after each workshop were compiled and presented to each participant in the study during a debriefing session at the end of the fourth and final scheduled workshop as a form of “member checking.” Member checking was used to ensure the information gathered provided an accurate representation of the participant’s perspectives regarding the faculty professional development activities that he completed. Triangulation also was in this qualitative action research study in the form of collecting different types of data. In this study, the researcher collected qualitative data with researcher authored questionnaires, journal entries based on workshop activities, and semi-structured interviews with the participants at the conclusion of the fourth and final workshop activities. The result of triangulation ensured that conclusions were drawn from each of the data sources individually (Bloomberg & Volpe, 2012).

**Dependability.** Dependability is an assessment of the quality of the integrated processes of collecting data, data analysis, and grounding theories. According to Yilmaz (2013), a research study has dependability when the research design and methods and procedures used are explained clearly. This study provided an extensive description of the research design, methods, and procedures associated with conducting this qualitative action research project. Thereby, describing the methodology that can be used by future
researchers to conduct similar studies to replicate the improvement practices discovered in this study to improve teaching and learning in another context.

**Transferability.** The study was comprised of individual interviews with the participants. The interviews resulted in thick descriptions of the perceptions (Stringer, 2007) of the effectiveness of the processes employed that should make the findings applicable to other contexts, situations, and programs associated with SKYCTC. Therefore, transferability of process was demonstrated.

**Confirmability.** The researcher created an audit trail of all forms of the data collected (Stringer, 2007). To confirm the action research occurred as described in this study, interviews, questionnaire, and observational data, along with email communications concerning the study, were archived. The archived data are available for review to confirm the rationale for the decisions made and procedures. The review of the data in all formats will establish that the study’s findings accurately portray the participants’ responses.

**Instrument Development and Deployment**

This action research study deployed one researcher authored initial action research planning questionnaire, four versions of the end of workshop guiding questions, and one list of semi-structured interview questions with the protocol. All the instruments were designed and written to directly or indirectly address the research questions guiding this study. The questionnaire instrument was sent to all participants the day before the first faculty development workshop to assess each faculty member’s disposition and experience with using technologies in the classroom. The end of workshop questions were used to facilitate four participant lead discussions. The discussions were conducted
immediately following each of the four workshops and designed to address the research questions; in the case of the first three workshops, the end of workshop discussions also informed the planning stage for the next scheduled workshop. One week after the conclusion of the fourth and final workshop, the semi-structured interview protocol was employed and interviews were conducted.

**Role of the Researcher**

In this qualitative action research study, the researcher was the responsible party for the collection and analyzing of data (observations, questionnaire, and interviews). The researcher also assumed the role of instructor during the four scheduled faculty development workshops, reviewed participants’ questionnaire responses, and observed feedback to develop learning activities to address the participants’ learning needs for the upcoming workshops.

**Ethical Consideration**

Ethics are vital when conducting meaningful and useful qualitative research. Researchers can encounter ethical issues throughout a study when humans are the subjects. According to Lindlof and Taylor (2011), the investigator must anticipate any ethical issues that might arise. Also, it is essential for the investigator to work proactively to minimize or stop any matter that may occur. The WKU Institutional Review Board (IRB) focused on the protection of human subjects and approved this research study (see Appendix E to view a copy of the IRB approval) before the recruitment process. It is vital that study participants be acutely aware of what will take place. Each participant signed the informed consent (see Appendix F to view a copy of the approved informed consent form) outlining the research study. Therefore, all efforts
were made to guarantee the participants were protected from harm when consent was received before the beginning of this study. Participants were advised they could withdraw from the study without consequences. As the researcher in this study, my primary goal was to ensure that all participants were protected. To keep the integrity of the participants’ intact, therefore, only factual information based on their responses was used in this study. Participants’ privacy and confidentiality were ensured throughout the study. All documentation (signed consent forms, participant identities, questionnaire, observational data, and interview data) are locked away in a file cabinet for a period of seven years. At the end of that period, the data will be destroyed.

**Rationale for Action Research for This Study**

The current study’s research design required faculty participation in an examination of underlying assumptions and beliefs about faculty acceptance and use of CMCD technologies. The faculty are participants in the action research process to determine the professional development strategies most effective at positively affecting their behavioral intentions to accept and adopt the use of CMCD technologies to facilitate a blended learning environment at a program level of postsecondary AMT technical education. Thereby, the appropriate research design for this study was action research.

The researcher as participant characterizes action research and facilitator for problem solving, immediate applicability of findings to practice, and a research design that emerges as a part of the research process (Merriam & Simpson, 1995). Therefore, the current study’s action research strategies engaged AMT faculty members as participants in a collaborative and meaningful process of discovery focused on the acceptance and adoption of blended learning CMCD technologies to convert the face-to-
face lecture content to a more media-rich, web-based presentation for postsecondary AMT programs’ curricula.

**Application of Action Research for This Study**

This action research approach, along with qualitative methods to collect and analyze data, related to technical program faculty members’ experiences with the adoption of CMCD technologies associated with a blended learning modality of instruction within a single site community and technical college context. The research problem was concerned with faculty members’ experiences with the acceptance and adoption of an innovative CMCD modality to replace the traditional face-to-face lecture in AMT programs. Action research methods in education are employed to help educators identify problems, collect data, design steps to address the problems, and develop a reflective practice to effect positive change. Essentially, action research is a learn-by-doing method of research.

**Action Research as an Iterated Process**

Each of the four iterations of this study was designed to follow the widely used four-phase process postulated by Kurt Lewin in 1948; namely, plan, act, observe, and reflect (Adelman, 1993). Action research uses an iterative process that provides a framework for learning and progressive problem solving. The progression of the action research cycles was advanced through a series of reflective phases that informed the plan of action for the upcoming cycle. In this study, there were four cycles of planning, acting, observing, and reflecting. Figure 6 illustrates the progression of this study through time.
Figure 6. This action research study’s iterated progression through time.

**Initial reflection.** An initial action plan was employed that was derived from the review of the literature and the core constructs and variables that made up the conceptual framework of this study (see Figure 6). A questionnaire also was sent to all participants the day before the first workshop (see Appendix A to review the initial action planning questionnaire). The questionnaire was delivered through survey monkey, the responses were analyzed, and the findings were used to inform the initial action plan for the first workshop’s activities.

**Planning phase.** During the planning phase of each cycle, the researcher used the data collected during the previous observation phase to design workshop activities to appropriately address the issues discovered as a result of the previous reflection phase.

**Acting phase.** During the acting phase, the researcher as workshop facilitator worked collaboratively with the participants to present and discuss the specific activities identified in the planning phase to be performed in the upcoming workshop activities.
**Observing phase.** During the acting and observing phases of the action research process, the role of the facilitator and researcher overlap. The facilitator/researcher conducts the observations of the participants as they progress through the workshop activities. Upon the conclusion of each of the first three action research cycles, the researcher appointed a faculty member participant to lead an open, collaborative discussion with the participants. The researcher provided the facilitator with a list of guiding questions used to prompt the open discussion and to focus the discussion on the research purpose and research questions. The researcher observed the end of workshop discussions and manually collected data based on an observation guide (see Appendix C for an example of the observation guide) that lists the interactions, processes, and behaviors to be observed that are associated with the research purpose and research questions.

**Reflecting phase.** Elements of the end of workshop discussion’s observational data collected during the faculty member participant led discussions were analyzed and used as a formative evaluation. The findings were used to inform the upcoming planning phase of any required adjustments to the action being taken, i.e., elements of the training.

Upon the completion of the cycle four observation phase, the action research process changed from a cyclic nature of formative evaluation to a more traditional qualitative approach and summative evaluation. The data collected and analyzed to this point were primarily designed to inform the iterated process of continuously improving the effectiveness of workshop activities collaboratively intended to foster the participant’s positive behavioral intent to use the new CMCD technologies. Upon completion of cycle four of the action research study, interviews were conducted with
each participant (see Appendix D to review the interview protocol and questions). Along
with the data collected from the interview sessions, the observational data gathered
during each workshop also were included for analysis.

Summary

The methods and design of this action research study were planned to solve a
practical problem and research. This study relied on qualitative analysis conducted in the
context of action research process that utilized four cycles of workshop activities. The
study was conducted at SKYCTC’s Transpark Campus. The participants were all
SKYCTC faculty assigned to teach in the AMT division. The theoretical and conceptual
framework of the study was based on the TAM. The theoretical and conceptual
framework of the study provided the foundation for the development of the research
questions and data gathering instruments. Chapter IV presents the findings of this
qualitative, action research study that investigated faculty members’ perceptions of the
factors that facilitate the integration of CMCD into their instruction.
CHAPTER IV: FINDINGS

Introduction

The purpose of this chapter is to report the findings of this qualitative, action research study that investigated faculty members’ perceptions of the factors that facilitated the CMCD into their instruction. The conceptual framework that guided the collection and analysis of the data was derived from combining the constructs and sub-constructs from the first two iterations of TAM to the third iteration, TAM3. TAM 2 identified antecedents of the perceived usefulness, with little attention to the perceived ease of use. Venkatesh (2000) sought to determine antecedents of the perceived ease of use construct.

The conceptual framework for this study encompassed four interrelated core constructs and nine sub-constructs identified as “Priori-coding Categories” (see Figure 5 to review the conceptual framework diagram). The core constructs were: (a) perceived usefulness, (b) perceived ease of use, (c) attitude toward use, and (d) behavioral intent. The nine sub-constructs are: (a) subjective norms, (b) image, (c) job relevance, (d) output quality, (e) results demonstrability, (f) external variables, (g) perception of external control, (h) objective usability, and (i) computer self-efficacy. The four core constructs were influenced by the nine sub-constructs to form a faculty member’s intentions to use the CMCD technologies; intentions were predictive of whether a faculty member would do so.

This chapter includes a brief overview of the study and research design; a description of the study participants; and the results of the initial action planning questionnaire, in-class observations, and in-person interviews. The findings are
presented in tabular and narrative format, along with quotes that are representative of the priori-coding categories and the themes that emerged through analysis. A summary of the significant findings concludes each analysis report when appropriate.

**Overview of Study and Research Design**

The purpose of this action research study was to determine factors that influence faculty member attitudes and behavioral intentions to use the CMCD technologies as a result of participating in a series of faculty professional development activities. The implications of the findings from this study may be used to develop practical recommendations for facilitating a successful adaptation and implementation of a blended learning approach in other programs beyond AMT. Additionally, the outcomes of this study may help ensure a more efficient use of scarce resources used to sponsor faculty development activities designed to foster faculty members’ acceptance and integration of new CMCD technologies into the AMT program curriculum.

Action research strategies were used to collect qualitative data for analysis for this study. Action research employ the methodological approach of inquiry-based research activities to collect qualitative data for analysis. The inquiry approach to qualitative research is not designed for discovery but to identify problems in educational practices and take action to effect satisfactory results (Loucks-Horsley et al., 2003). The qualitative data collected in this study were used to answer to what extent strategies employed through a series of faculty professional development activities would influence the faculty member’s attitude and behavioral intentions to accept and adopt the CMCD technologies.
Data Analysis

Lindlof and Taylor (2011) suggested several challenges face the researcher during this phase of the research. First, processing the data collected into a useful, understandable contribution is the most formidable challenge facing the researcher. Second, often there are multiple reasonable interpretations of the data. The “forks in the road” (p. 242) that often are presented require the researcher to make choices concerning coding. The data analysis of this study utilized a deductive process. Thus, the conceptual framework provided a list of priori codes based on the nine sub-constructs that influenced the four core constructs of the conceptual framework.

According to Lindlof and Taylor (2011), there are three critical areas of concern during the data analysis phase: data management, data reduction, and conceptual development. The data starts to accumulate at a rapid rate; therefore, it is imperative to develop tools (software, manual organization, etc.) to aid in the management of the collected data. Not all data can be used in the study and should be removed from the analysis. By reducing the amount of data not relevant to the analysis, the researcher is relieved of the data’s consideration, thus reducing the demand on the researcher’s cognitive resources. The researcher used NVivo 11 Pro qualitative data analysis software to manage the data and to aid in coding the data accordingly.

Conceptual development is the process of data analysis that attempts to make sense of the data by forming a conceptual framework for the data that can be coded and categorized into useful elements. The interviews were transcribed and the text reviewed several times as a whole. The initial action planning questionnaire, along with data
collected through observing participants during the acting and observation phases of the workshop activities also were reviewed and included in the data analysis.

While coding the data, the process began with the researcher identifying, labeling, and categorizing the data. A line-by-line analysis was employed to identify words or statements that described features of the topic being studied. After identifying and labeling the codes, the researcher consolidated the codes into related code categories. The categories and sub-con structs were based on Davis’ TAM, with consideration given to later revisions of the TAM model (TAM2 and TAM3) posited by (Venkatesh & Davis, 2000). Next, the current code categories were examined in an attempt to find relationships among the code categories and sub-con structs and to identify specific connections among the priori categories guided by the conceptual framework of this study. After coding, the data were compressed into a display that facilitated conclusion drawing. The display allowed one to interpret what all of the findings mean, help answer the research questions, and draw implications from the findings.

**Participants’ Descriptions**

Faculty members from the AMT division of SKYCTC were purposefully selected and represented the total population (N = 15) for this study. Criteria for selection were faculty members involved in the innovated transformation process of converting traditionally face-to-face technical education lecture courses to a blended learning model relating to a CMCD system. The population for the study consisted of 15 full-time AMT program faculty members of varying ranks (all 15 were male), including two instructors, four assistant professors, six associate professors, and three full professors. The faculty member participants’ teaching experience ranged between one and 31 years, with
moderate to no online teaching experience. Table 5 represents an overview of the faculty member participants’ descriptions.

### Table 5

*Faculty Member Participant’s Descriptions*

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Years Teaching</th>
<th>Current Online Classes Spring 2017</th>
<th>Experience Online Teaching</th>
<th>Scheduled 100% Transition to BL</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>13</td>
<td>0</td>
<td>Minimum</td>
<td>Fall 2018</td>
</tr>
<tr>
<td>P2</td>
<td>3</td>
<td>0</td>
<td>None</td>
<td>Fall 2018</td>
</tr>
<tr>
<td>P3</td>
<td>6</td>
<td>0</td>
<td>None</td>
<td>Fall 2017</td>
</tr>
<tr>
<td>P4</td>
<td>13</td>
<td>1</td>
<td>Minimum</td>
<td>Fall 2017</td>
</tr>
<tr>
<td>P5</td>
<td>1</td>
<td>0</td>
<td>None</td>
<td>Fall 2018</td>
</tr>
<tr>
<td>P6</td>
<td>15</td>
<td>0</td>
<td>Moderate</td>
<td>Fall 2017</td>
</tr>
<tr>
<td>P7</td>
<td>6</td>
<td>0</td>
<td>None</td>
<td>Fall 2017</td>
</tr>
<tr>
<td>P8</td>
<td>10</td>
<td>0</td>
<td>None</td>
<td>Fall 2018</td>
</tr>
<tr>
<td>P9</td>
<td>11</td>
<td>0</td>
<td>None</td>
<td>Fall 2017</td>
</tr>
<tr>
<td>P10</td>
<td>10</td>
<td>1</td>
<td>Minimum</td>
<td>Fall 2018</td>
</tr>
<tr>
<td>P11</td>
<td>11</td>
<td>0</td>
<td>None</td>
<td>Fall 2017</td>
</tr>
<tr>
<td>P12</td>
<td>14</td>
<td>0</td>
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<td>Fall 2018</td>
</tr>
<tr>
<td>P13</td>
<td>2</td>
<td>0</td>
<td>None</td>
<td>Fall 2017</td>
</tr>
<tr>
<td>P14</td>
<td>20</td>
<td>0</td>
<td>None</td>
<td>Fall 2018</td>
</tr>
<tr>
<td>P15</td>
<td>31</td>
<td>0</td>
<td>None</td>
<td>Fall 2018</td>
</tr>
</tbody>
</table>

None = Has never taught an online or hybrid class.  
Minimum = Has taught 1-3 online or hybrid classes.  
Moderate = Has taught 3–5 online or hybrid classes.  
Extensive = Has taught more than five online or hybrid classes

While required to participate in the training, not all participants were required to transition to the blended learning format in Fall 2017; eight faculty participants are transitioning over the next year and are scheduled for completion for the Fall 2018
semester. Numbers were used to protect anonymity of the participants during this study. The number or “faculty member” will be used as a substitute for the name when the data are reported in a narrative or tabular format. While participation in the action research project (data collection and analysis) was voluntary, the AMT faculty involvement in the professional development workshops was mandatory. All 15 faculty members volunteered to participate in the action research project and signed an informed consent form.

Findings for the Initial Action Planning Data

An initial action plan was employed that was derived from the review of the literature and the core constructs and sub-constructs that made up the conceptual framework of this study (see Figure 6). A questionnaire also was sent to all participants the day before the first workshop. The questionnaire was delivered through survey monkey, the responses were analyzed, and the findings were used to inform the initial action plan for the first workshop’s activities. This section of the study reports the initial disposition of the faculty member participants concerning the integration of CMCD technologies into instruction. The initial action planning questionnaire was designed to draw general responses to inform the qualitative study of the initial perceptions each participant held concerning the advantages and disadvantages of having AMT course materials online. The findings were used to aid the planning of the first scheduled faculty development workshop’s activities.

Advantages

During the initial action planning questionnaire, each participant was asked to describe in detail the advantages of having course material online. The participants’
responses were aggregated, analyzed, and reported in tabular and narrative format. The codes derived from the data analysis were: (a) flexibility, (b) student success, and (c) accessibility. Table 6 reports the findings in tabular format, followed by a narrative report of the findings.

Table 6

<table>
<thead>
<tr>
<th>Codes</th>
<th>Participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15</td>
</tr>
<tr>
<td>Student Success</td>
<td>- - - - - - X - - X - - - -</td>
</tr>
<tr>
<td>Student Accessibility</td>
<td>X - X X X - X - X X X X X -</td>
</tr>
</tbody>
</table>

*Note*. A dash indicates participant did not mention the code in the response.

**Finding advantage 1.** Two of the participants described that flexibility for the student to schedule classes around work schedules was an advantage. One participant stated that, if a student missed a class, he or she would have the “opportunity to revisit and understand better.”

**Finding advantage 2.** Four of the participants mentioned student success as an advantage. One shared, “As an instructor I have access to the content no matter where I am in the event that a student has a question.” He also stated that “the ability for a student to perform practice exercises repeatedly to master the content” as an advantage. Another participant explained that student success is enhanced with the student’s ability to spend more time on tasks.

**Finding advantage 3.** Student accessibility topped the list of the advantages of integrating CMCD technologies into instruction with 10 of the participants, mentioning it
as a significant advantage. All comments on student access were similar; e.g., a senior faculty member shared, “they are always available to students, students that are unable to attend class can view the material.” Another faculty member similarly stated, “students will always have access to the material, and could re-watch a lecture if needed.”

**Disadvantages**

During the initial action planning questionnaire, each participant also was asked to describe in detail the disadvantages of having course material online. The participants’ responses were aggregated, analyzed, and reported in tabular and narrative format. The codes derived from the data analysis were (a) workload, (b) student success, and (c) technical issues. Table 7 reports the findings in tabular format, followed by a narrative report of the findings.

Table 7

*Reports of the Disadvantages of Integrating CMCD Technologies*

<table>
<thead>
<tr>
<th>Codes</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workload</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Student Success</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Technical Issues</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Note.* A dash indicates participant did not mention the code in the response.

**Finding disadvantage 1.** Six of the participants expressed concern about the additional workload for the faculty and considered the extra workload as a disadvantage to integrating CMCD into their instruction. A faculty member shared, “Learning new technologies to put content and appropriate instructional design models will potentially have a steep learning curve.” Similarly, other faculty members explained that it will take
time to develop a proper instructional design to match the new technologies to implement course materials. One faculty added that training is needed because “communication and engagement strategies differ for online delivery of content.” He also stated it “adds a layer of complexity for both students and teachers.” Another faculty member believed building the content for the classes will take much time and added, “I think it will be worth it.”

Finding disadvantage 2. Eight of the participants expressed concerns of how the integration of CMCD technologies into their instruction may disadvantage student success in the AMT program. One faculty shared, “Students with little computer knowledge may be at a disadvantage.” He was concerned that students with weak computer skills will need additional time to complete his or her work. A majority of the faculty expressed concern that students will be at a disadvantage if the material of the course is not engaging enough to maintain the students’ interest. Two faculty members shared a concern that there will be less student interaction if CMCD technologies replace the lecture as the content delivery modality.

Finding disadvantage 3. Three of the participants mentioned technology issues as a disadvantage to the integration of CMCD technologies into their instruction. All three participants expressed the same concern. There are going to be problems with the technology, and internet access is a must for the student and instructor.

Summary of the Data Analysis for the Initial Action Planning Data

Finding advantage 1. Two of the participants described that flexibility for the student to schedule classes around work schedules was an advantage.
Finding advantage 2. Four of the participants mentioned student success as an advantage.

Finding advantage 3. Ten participants mentioned that an important feature of integrating CMCD technologies into instruction was student accessibility.

Finding disadvantage 1. Six of the participants expressed concern about the additional workload for the faculty and considered the extra workload as a disadvantage to integrating CMCD into their instruction.

Finding disadvantage 2. Eight of the participants expressed concerns of how the integration of CMCD technologies into their instruction may disadvantage student success in the AMT program.

Finding disadvantage 3. Three of the participants mentioned technology issues as a disadvantage to the integration of CMCD technologies into their instruction.

Action Research Cycle Findings

This section reports the findings of the data analysis for each of the four action research cycles (ARC) that comprised this study’s action research process. The purpose of collecting and analyzing the action research observational data was two-fold. First, the observational data was analyzed and the findings were immediately considered (reflected upon) in the planning phase of the next iteration of the process (next cycle). Second, relevant observational data were included in the summative qualitative analysis in support of findings reported from the in-depth interviews conducted one week after the conclusion of the final ARC (cycle four).

After reviewing and reflecting on the findings at the end of each ARC, the researcher selected relevant elements to use as a formative evaluation of the previous
The relevant findings were considered in the planning phase of the upcoming ARC (only cycles one, two, and three required a formative evaluation) and consequently, used to develop the next scheduled workshop’s agenda. The findings in this section are reported in the context of each ARC. Only the relevant findings are reported in this chapter. A detailed discussion of why and how the findings were applied to each iteration of the ARCs is explained in chapter V of this study.

Observational data were collected using a researcher-developed list of questions (see Appendix B to review an example of the end of workshop guiding questions) to guide the open discussions that were scheduled upon the conclusion of each workshop’s activities. The researcher selected a faculty member participant to facilitate the discussions. A different participant was chosen for each cycle to perform the facilitation of the discussion. To collect the data, the researcher utilized a pre-formatted observational guide, which was formatted to coordinate with the list of questions provided to the facilitator and used to guide the end of workshop discussions. By coordinating the two documents, the note-taking tasks were simplified. The researcher observed and manually recorded the facilitator-participant and the participant-participant interactions for analysis.

As aforementioned, the observational findings were utilized to accomplish two goals: first to inform the formative evaluation and planning of the next workshop agenda. Second, to support the findings that resulted from the qualitative data analysis of the in-depth interviews conducted with each of the 15 faculty member participants taking part in this study. Accordingly, the end of workshop guiding questions were comprised of two sets of questions to serve the two purposes. The first set was the same for each end of
workshop cycle and was constructed to elicit responses to inform the formative evaluation. The second set of questions was different for each cycle and was constructed to collect data to support or refute the findings associated with the data analysis of the in-depth faculty member participant interviews (see Appendix B to view a list of the questions).

What follows are the findings associated with the data collected for the formative evaluations during the acting and observing phases of the ARCs. The formative evaluation was conducted to inform the planning phase of ARCs two, three, and four. As a consequence of being the final ARC, cycle four did not require the collection of data during ARC four’s acting and observing phase for a formative evaluation and, therefore, not included in this section. The questions used to lead the participants’ discussions were:

**Formative evaluation question one.** What were the things from today’s activities most helpful to you?

**Formative evaluation question two.** What were you looking for in today’s workshop but didn’t get?

**Action Research Cycle One**

As a consequence of being the first, ARC one’s workshop agenda was constructed and facilitated partly based on the findings associated with the initial action planning questionnaire. Upon the conclusion of ARC one’s workshop, the following questions were posed to the workshop participants to guide the discussion. The interactions were observed by the researcher and analyzed promptly about informing the formative evaluation and planning phase of ARC two.
Formative evaluation question one. What were the things from today’s activities most helpful to you?

During the data analysis of ARC one, question one, three themes emerged as the most significant activities that benefited the participants: (a) setting design goals, (b) instructional design process, and (c) the AMT learning Module.

Finding ARC 1.1. Setting the design goals for creating the CMCD model was mentioned as one of the most essential and beneficial activities included in workshop one. According to the consensus of the participants, it was essential to understand the scope of the CMCD model. One faculty member said he was relieved now that he had a better understanding of what the CMCD course design was going to look like. Others agreed, adding they were worried about this CMCD approach until today, they just did not know where they were headed; now it was clear.

Finding ARC 1.2. Introducing and demonstrating an instructional design process to consider for creating media-rich lessons for CMCD. As a group, the participants agreed the instructional design process used to demonstrate how pedagogy is used with CMCD to facilitate the lessons was important. One faculty member commented, the instructional design using Gagne’s nine events of instruction puts it all together for me. “I can see how my lessons can be designed to match the CMCD approach.”

Finding ARC 1.3. The AMT learning module to be facilitated through the Blackboard learning management system. The participants’ consensus was the design and demonstration of the AMT learning module format was necessary for them to understand how the content of the course was going to be presented to the student. One faculty remarked, seeing the learning modules and how efficient and consistent the
format will be for the student, the instructor has made it more clear how this can be accomplished with less effort than first thought.

**Formative evaluation question two.** *What were you looking for in today’s workshop but didn’t get?*

During the data analysis of ARC one, question two, a single theme emerged as the most significant activity missing from the workshop. According to the consensus of the participants, they were eager to see a demonstration of various software programs to be used to facilitate the CMCD in Blackboard.

**Finding ARC 1.4.** During the class discussion facilitated by one of the participants, the group discussion began to focus entirely on the need for them to choose, and start learning to use, the software packages needed to facilitate CMCD. One faculty shared that he had little experience with computer software, and thought we should spend more time practicing with the software.

**Action Research Cycle Two**

ARC two’s workshop agenda was constructed and facilitated partly based on the findings observed during the observation phase of ARC one. Upon the conclusion of cycle two’s workshop, the same formative evaluation questions were once again used to guide the end of workshop discussion. The interactions were observed by the researcher and analyzed promptly about informing the formative evaluation and planning phase of ARC three.

**Formative evaluation question one.** *What were the things from today’s activities most helpful to you?*
During the data analysis of ARC two, question one, two themes emerged as the most significant activities that benefited the participants: (a) Microsoft mix, and (b) Screencast-O-Matic. Microsoft mix is a presentation software that operates inside MS PowerPoint presentation software as an add-on and is used to record and publish voice narrated PowerPoint presentations and videos. MS mix also is used to consolidate an entire lessons content into one single file. Screencast-O-Matic is computer screen recording software.

**Finding ARC 2.1.** According to a consensus of the participants, working with MS mix to create lessons was the most significant activity of the workshop. All faculty members expressed how easy MS mix is to use to create a lesson for CMCD, remarking that the program does a lot more than MS PowerPoint, but it is not any harder to learn and use.

**Finding ARC 2.2.** The participants agreed as a group that working with Screencast-O-Matic also was a significant learning experience. One faculty shared that screencast-O-Matic does things MS mix does not do, and vice versa, they complement each other and both are very easy to learn to use.

**Formative evaluation question two.** *What were you looking for in today’s workshop but didn’t get?*

**Finding ARC 2.3.** According to the consensus of the participants, they were interested in spending more time using the software (MS mix and Screencast-O-Matic) actually to produce lessons to present to students through Blackboard. All faculty members expressed they should spend their time next workshop on actually creating the lessons using the software and posting the lessons in Blackboard. The faculty as a group
agreed they would work on creating lessons out of class (workshop) and bring a lesson in next class. All of the participants agreed to bring in a lesson for review for the next workshop.

**Action Research Cycle Three**

ARC three’s workshop agenda was constructed and facilitated partly based on the findings observed during the observation phase of ARC two. Upon the conclusion of cycle three’s workshop, the same formative evaluation questions were once again used to guide the end of workshop discussion. The interactions were observed by the researcher and analyzed promptly about informing the formative evaluation and planning phase of ARC four.

**Formative evaluation question one.** What were the things from today’s activities most helpful to you?

During the data analysis of ARC three, question one, a single theme emerged as the most significant activity that benefited the participants: working together using and learning the software.

**Finding ARC 3.1.** According to the consensus of the participants, they thought the time spent in the workshop working as a group, sharing best practices, and learning the software was the most important activity so far from any workshop they had attended. One faculty member shared that they all worked together and decided how best to use the software to create lessons; everyone participated and brought a lot to the table, it was very productive. Similarly, another participant commented, that it was easier to use than first thought. “I have learned a lot form the other guys here today.”
**Formative evaluation question two.** *What were you looking for in today’s workshop but didn’t get?*

During the data analysis of ARC three, question two, a single theme emerged as the most significant activity missing from the workshop: creating assessments in Blackboard.

**Finding ARC 3.2.** According to the consensus of the participants, they were interested in spending more time learning how to create tests and post the grades on Blackboard. Up to this point, the workshops’ activities have focused on content creation for CMCD. The group wished to have the next and final workshop spend all the time on assessments. One faculty member suggested, having a Blackboard expert come to the next workshop and spend some time with them. Another participant replied, “I have not been teaching much online, but I have been using Blackboard’s grade book for my face-to-face classes for years, I’ll work with the group next workshop.”

**Interview and Observational Findings**

This section reports the findings of the qualitative data analysis for the faculty member participants who were interviewed post-intervention (four faculty development workshops). Along with interview data, additional data were collected through observing participants during the acting and observation phases of the workshop activities. The observational data were analyzed using the same coding protocol as the interview data. The significant and relevant observational findings are reported only in the narrative section of each data analysis to reduce a level of complexity for the reader.

The participant's confidentiality, in part, was maintained in this study by identifying each participant using the letter P and a number when the findings were
presented in a tabular format; when the findings were presented as a narrative, the related participant number or “faculty member” was used to supplement the readability of the text. The findings in this section are reported in the context of each research question. A brief explanation of the research question and how it related to the conceptual framework (see Figure 5) of this study is presented. A tabular view of the findings is presented first, followed by a narrative account of the faculty member participants’ responses to interview questions, strengthened by findings derived from the analysis of the observational data. The major themes relevant to the priori coding categories, along with codes that emerged as a result of the data analysis, are presented in a table view that displays the codes each participant reported. The analysis report proceeds with illustrative quotations that reflect many of the participants’ significant responses. Finally, a summary of the important findings concludes each analysis report.

**Research Question One**

*What are faculty members’ perceptions regarding the usefulness of CMCD technologies?*

Perceived usefulness is one of the core constructs of the TAM. Research has shown that faculty members are less likely to accept and adopt technology integration into instruction if the technology does not prove useful in meeting their goals (Davis, 1986). The conceptual framework of this study provided priori coding categories (sub-constructs) based on the TAM, TAM2, and TAM3 to organize and aggregate the participants’ responses. Research Question One is directly associated with four of the sub-constructs: (a) subjective norms, (b) image, (c) job relevance, and (d) output quality.
Table 8 contains the priori coding categories used to aggregate the participants’ responses.

Table 8
Reports of the Perceived Usefulness of Integrating CMCD Technologies

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<thead>
<tr>
<th>Priori Coding Categories</th>
<th>Participant Number</th>
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<tr>
<td>Subjective Norms</td>
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<td>Image</td>
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<td>Output Quality</td>
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<td>Results Dem.</td>
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*Note.* A dash indicates participant did not mention an element of the priori coding category in his interview responses.

**Finding 1.1.** Nine of the participants mentioned 12 references to subjective norms. During data analysis, four themes emerged, which were combined into a single priori coding category identified as “Subjective Norms.” Subjective norms are one of the five sub-categories that influence one’s perception of the usefulness of integrating CMCD technologies into instruction. Subjective norms are defined for this study as a person’s perception that most people who are important to them think he or she should or should not perform the behavior in question. The four themes that emerged were: (a) administration approval, (b) peer support, (c) peer approval, and (d) student approval.

One faculty member mentioned the possibility that the administration would view the innovation underway favorably and worthy of promotion:

I think it would be something that could help in a promotion process. I don't think a specific award, but the fact that they're advancing, they're using new
technologies, they're promoting their program in different ways, would make them more likely to be respected by their peers, as well.

While responding to an end of workshop discussion question during ARC two (workshop two), another faculty member offered support. He answered with, “It is a great idea. The president of the college personally commended our division just today at lunch. He stated that it would make an impact throughout our system. He said he was proud of our efforts.”

Another faculty member added, “I kinda think it would be a good outcome on your promotion.” Faculty members expressed peer support as a significant subjective norm.

One faculty member stated:

> When we come together in those workshops, there were folks within the division which may have had more experience in one technology over the other, so there was a good opportunity to share among each other and to help each other and to look at how all the different technologies work together and help each other through that way

Three others asserted the significance of peer support. One faculty member shared, “We all need to collaborate and work together to figure out the best way to utilize the technology to get more familiar with it.”

Two faculty members mentioned peer approval as being significant as a subjective norm.

A faculty member shared:

> I've had no concerns. I think that we're doing what we're supposed to be doing at this time. This is just like I mentioned before, this is what's new out there, and this is where everything's going. This is what we're supposed to be doing.
Only one faculty member expressed student approval as a significant element of subjective norms. Another participant went on to say, “The support that we're getting from the students is starting to be good, once we explain to them what we're doing.”

Subjective norms are a person's perception that most people who are important to them think they should or should not perform a specific behavior. This is important; the faculty may choose to perform behaviors they would not otherwise perform if someone important to them thinks they should and they are motivated to comply. Along with subjective norms, voluntariness was included in the social influence process of the conceptual framework of this study. Voluntariness refers to the extent that faculty members’ viewed the blended learning transition as non-mandatory, which goes back to previous studies noting that behavior intentions differ when users are mandated to integrate new technologies versus being able to make a choice whether to use CMCD technologies. Under voluntary conditions, subjective norms play a more significant role in influencing faculty members in the usefulness of integrating technologies into a CMCD blended learning format for AMT programs. While under non-voluntary conditions, faculty members’ perceptions of usefulness play a lesser role in their behavioral intentions to integrate CMCD technologies (Hartwick & Barki, 1994).

While responding to an end of workshop discussion question during ARC two (workshop two), the facilitator asked the group, “Would you do this if it was not mandatory? If yes, why, if no, why not?” The consensus of the group was no. The reasons given for their negative response to the question are important to note. The faculty members agreed that the effort was worth it, but they would not have taken the initiative to incorporate blended learning into their courses. Concern about the scale of
the change was mentioned by several of the faculty members during the discussion. One faculty member explained, “I think it is the thing to do, I don’t think I would have changed, at least at this scale.” Others mentioned the extra workload required by the faculty to facilitate a large-scale program level change.

**Finding 1.2.** Eleven of the participants explained that integrating CMCD technologies into instruction would enhance their image or status within the college system. The image was defined for this study as the degree to which use of innovation is perceived to enhance one’s image or status in one’s social system. One faculty member saw the implementation of CMCD as enhancing the status of his program and shared:

If my program is very successful in this style of blended learning, then obviously my program is going to be looked at in a different way as far as how much enrollment and different employers are going to be more. The status of my program will be looked at across the state as one of the leading premier technology programs.

Another participant also saw the change as enhancing his program’s image. He stated, “I think it would definitely allow us to be a more premier system because we're bringing this to a new level.” Two faculty members expressed a level of pride in being among the first to use CMCD technologies in their instruction to benefit the program, students, and industry. One faculty member stated, “Yeah, pride in what you're doing. Understanding that we helped start something that's gonna be used to help the industry locally and nationally, and help folks doing the same kinds of things.” One faculty member, while responding to an end of workshop discussion question during ARC two (workshop two), explained that the college president made the statement to him that others would be
surprised that a technical education division is leading the way to blended learning at SKYCTC. The current image is that they are not computer people.

**Finding 1.3.** Ten of the participants mentioned 18 references to job relevance. During data analysis, two themes emerged, which were combined into a single prior coding category identified as “Job Relevance.” Job relevance is one of the five sub-categories that influences one’s perception of the usefulness of integrating CMCD technologies into instruction. Job relevance was defined for this study as the capabilities of a system to enhance an individual’s job performance. The two themes that emerged were: (a) improved teaching style, and (b) more efficient use of time.

Five faculty member participants explained that the CMCD integration into instruction would improve their teaching styles. One faculty member shared his thoughts on how changing his teaching style with the integration CMCD technologies would benefit the new generation of students:

> You know, the different types of Screencast-O-Matic and the different things and resources that we're using to do this to develop this type of course and this blended type style of learning for our students is actually going to give us the ability to teach the students in a way that these newer Generation of students are coming up with these days, it is the way they learn.

In support, two faculty members asserted:

> Oh well, as a faculty, I'm always looking for a better way to get the material to my students. And I feel like that being showed the technologies that I've been shown; it's just excited me. And I think that I can get this new technology to work with
this new generation of students. get the information to them better, faster, more efficient.

Another participant saw the new CMCD technologies as an opportunity to improve his teaching style to accommodate different learning styles. He explained, “Prepares us to address our teaching in multiple styles, whether it be set up the mixes or the various types of videos, so we can use different approaches to get the material across since there are different learning styles.” While responding to an end of workshop discussion question during ARC two (workshop two), one faculty member expressed his thoughts on how the CMCD would improve his teaching style, He said, “Once we get the hang of it, we can continuously improve the CMCD presentations and test. We should have more time after we do the first semester courses. At that point, we are just making them better each semester.”

Two faculty members considered the change to CMCD as providing them with more time to do the needed task. One faculty member shared:

It's gonna give me the time that I've lacked for shop maintenance, taking care of students that are falling behind. I’ll have time to actually address things that are needing addressing during a regular semester, which I usually don't have time to do.

In support, a faculty member added, “Once we get it going, it's going to benefit me where I can have more office time actually to meet with other students that need help.”

While responding to an end of workshop discussion question during ARC two (workshop two), three faculty members expressed that it would allow them more time to do other things. One faculty member said, “I’ll have more time to setup labs.” Another explained
it would give more time to work with the students with advising and helping them with their job searches. One faculty member considered using the extra time saved as a result of converting to CMCD as an opportunity to continually improve his classes.

**Finding 1.4.** All 15 of the participants mentioned output quality as significant. The combined responses totaled 73 references. During data analysis, three major themes emerged, which were combined into a single prior coding category identified as “Output Quality.” Output quality is one of the five sub-categories that influence one’s perception of the usefulness of integrating CMCD technologies into instruction. Output quality was defined for this study as a person’s perception of how well the system performs tasks that match with job goals. The three themes that emerged were: (a) accessibility, (b) student support, and (c) student success. According to all study participants, the perceived output quality of the use of CMCD technologies can be measured by the level of student success associated with the accessibility and support the new format provides. One faculty member asserted, “We have other people that are able to take classes now that we can work with their schedules.” One faculty member viewed accessibility as an opportunity for the student to master the content. He explained, “The student gets the opportunity to constantly have the information in front of them, to constantly have the opportunity to use it, to have the ability to go back and look at things.” In support, one faculty member shared:

This stuff is really good compared to what it used to would’ve been. They are being able to access it from anywhere, not having to come to the school, being able to get it from the library or fast food restaurant, stuff like that, and being able
to view these videos and go through this material more than one time. I think that’s going to help out a whole lot.

All participants viewed increased accessibility as critical to student success. Many also perceived the level of student support the new CMCD approach to instruction will provide the student as significant to the students’ success. When asked how the new system provided additional student support, a faculty member explained, “We decided to build in a day of support for the students. On Mondays, we have no classes so we can be available to assist them with the online and lab assignments.” In support, another participant shared:

Students will also be better off because they can meet with me on the scheduled support day. Mondays. I think building in time in the new program to meet with students is very important. I can help them with labs and online stuff...

Student success was mentioned numerous times during the data analysis. Often accessibility and additional student support were expressed as key elements of the CMCD delivery of AMT programs. One faculty member shared his perceptions of how the CMCD approach would help his students succeed:

Most effective is the ability to increase the students' success by having more time in the labs. Students were able to integrate this type of technology into the classroom will give students the capability to spend more time on their own, learning the skills and the terminology and the resources needed. The time spent with me in a lab atmosphere will be more beneficial to them and more time on task.
One faculty member viewed student success as measured by the program’s ability to train the student to be prepared for the workplace. He stated, “The ultimate goal would be the student’s success. To make sure the student gains the information and that when they go to work or they go to use those skills after graduation, that they’re better prepared for the workforce.”

Finding 1.5. Five of the 15 participants indicated the ability to share and demonstrate the CMCD approach to instruction as an essential aspect of perceived usefulness of the technology integration into instruction. “Results Demonstrability” is one of the five sub-categories that influences one’s perception of the usefulness of integrating CMCD technologies into instruction. Results demonstrability was defined for this study as the degree to which the results of adopting and using the innovation are observable and communicable to others.

According to a faculty member, the success of the CMCD approach was necessary for our programs and the image of the AMT division. He shared:

We have to be successful because a lot of other people are going to look to us to find out how they need to move in this direction. I think we’ll end up being a resource for other folks whether it’s things to look at not to do or things to do.

Another faculty member viewed the successful implementation of CMCD as a source of pride. He shared:

Well, I think it's good anytime, locally, we come up with anything that's modeled anywhere. There's a source of pride, and there's an opportunity there to understand that we're doing something that very few people have done or that they're not doing well elsewhere. But if it's something that we can pilot across
our system, across the state, across the country, it'd be an excellent opportunity to go from there.

A faculty member similarly expressed, “The teachers would represent our schools statewide, and other teachers can use that stuff, our content.” Another faculty member added, “I feel like it will be a premier way. I think people will see it and they'll say well you know what? You're right. This is the way.” While responding to a class discussion question during ARC two (workshop two), a faculty member said, “CMCD should work with any course, we will probably have to demonstrate our process of converting face-to-face classes to hybrid, especially on a large scale to others.” Similarly, two faculty members expressed that they should share the process of converting face-to-face classes to CMCD with other programs.

**Summary of data analysis for Research Question One.** *What are faculty members’ perceptions regarding the usefulness of CMCD technologies?*

**Finding 1.1.** Nine of the participants mentioned 12 references to subjective norms that they perceived as facilitating the usefulness of CMCD technologies. The subjective norms identified were: (a) administration approval, (b) peer support, (c) peer approval, and (d) student approval.

**Finding 1.2.** Eleven of the participants explained that integrating CMCD technologies into instruction would enhance their image or status within the college system.

**Finding 1.3.** Ten of the participants mentioned 18 references to factors associated with CMCD technologies that enhance their job performance. The 18
references were distributed among two categories: (a) improved teaching style, and (b) more efficient use of time.

**Finding 1.4.** All 15 of the participants mentioned output quality as a significant influence on their perceived usability of CMCD technologies.

**Finding 1.5.** Five of the participants indicated the ability to share and demonstrate the CMCD approach to instruction was an essential aspect of perceived usefulness of the technology integration into instruction.

**Research Question Two**

*What are faculty members’ perceptions regarding the ease of use of CMCD technologies?*

Perceived ease of use refers to “the extent to which an individual believes that using a particular system will be free of physical and mental effort” (Davis, 1985, p. 26). Perceived ease of use was hypothesized to have a direct effect on usefulness and a system that is easier to use would make an individual more productive and more likely to use it. The conceptual framework of this study provided priori coding categories (sub-constructs) based on the TAM, TAM2, and TAM3 to organize and aggregate the participants’ responses. Research Question Two is directly associated with three of the sub-constructs: (a) perception of external control, (b) objective usability, and (c) computer self-efficacy. Table 9 contains the priori coding categories used to aggregate the participant’s responses.
Table 9

*Reports of the Perceived Ease of Use of Integrating CMCD Technologies*

<table>
<thead>
<tr>
<th>Priori Coding Categories</th>
<th>Participant Number</th>
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<td>1  2  3  4  5  6  7  8  9  10  11  12  13  14  15</td>
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<td>Perception of External Control</td>
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</tr>
<tr>
<td>Objective Usability</td>
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<tr>
<td>Computer Self-efficacy</td>
<td>X  X  X  X  X  X  X  X  X  X  X  X  X  X  -  X</td>
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*Note.* A dash indicates participant did not mention an element of the priori coding category in his interview responses.

**Finding 2.1.** Eleven of the participants mentioned their perception of the technologies being used for CMCD was influenced by the level of external control. Perception of external control is one of the three sub-constructs that affect one’s perception of the ease of use of integrating technology into instruction. Perception of external control was defined for this study as a person’s perception or beliefs relating to resources such as time and money and IT compatibility issues that may constrain usage. During that data analysis, IT issues were not mentioned. The participants (*n* = 11) mentioned some aspect of institutional support as a factor in their perception of the technology’s ease of use.

Two faculty members expressed that the college should support future training. They viewed training as an essential aspect of making the CMCD technologies easy to use. One faculty member said, “Support for future training, I think it is the biggest factor.” By an overwhelming consensus, the participants in the study found the four workshops the participants attended made a significant impact on their perception of the CMCD technologies ease of use. The workshops were considered by the participants as
an example of the appropriate level of institutional support for the transition to CMCD.

One faculty member shared:

The way that we're going about it such that we have these workshops, it shows that we have support in the change. It's not like we're being told something to do without having the tools to do it, so workshops are helping us in the way it's supporting the change. The workshops are.

Another faculty member explained:

The workshops that were provided to us on the different forms of technology for the development and hybrid style forces and blended style learning for students. This additional training has indeed assisted me in working on this type of style of training because, in the past, I've never really worked a lot with Blackboard and other styles of online and enhanced training for students. The workshops and the time being provided to me to work with these technologies in different forms has really been beneficial for me.

One participant also was pleased with the institution's support for the training. He said, “I'm very pleased. I'm excited. I want to do the best job that I can and just learning these technologies that I've learned, and the training that we've had on them so far has been excellent. I really enjoyed.”

Finding 2.2. Six of the participants expressed a level of surprise at the difference between what their initial perceptions were concerning the ease of use of CMCD technologies and the actual ease of use they experienced during the workshop’s activities. Objective usability is one of the three sub-constructs that influences one’s perception of a technologies ease of use. Objective usability was defined for this study as one’s
comparison of a system based on the actual level (rather than the perception) of effort required to complete specific tasks. Three faculty members presented examples of their objective usability. They explained how the reality of the software’s ease of use was different from their initial perception. One participant stated, “I think the programs we've looked at are very easy to use, now that we have had time to practice with them.” In support, one faculty member shared:

As a faculty, we came together in those workshops and looked at the pros and cons of different software and different pieces of training. Things we’ve been exposed to, things we've seen, and narrowed them down to what we felt like the student would succeed best with and what we could use and implement the easiest. I found Mix and screencasting to be much easier to use than I first thought. I'm having fun with it.

Another concurred, sharing:

After the training, I think you saw a transformation on me during the training. I was kind of... I don't wanna say reluctant, but I couldn't see how it was gonna work for me on my program. But it's kind of exciting in a way when I start thinking of the ways it can be used, and just how easy the software is to use.

**Finding 2.3.** Fourteen of the participants found the training to be a valuable experience for changing their perception on the ease of use of integrating CMCD technologies into their instruction, thereby positively altering his computer self-efficacy. Computer self-efficacy was defined for this study as the degree to which an individual believes he or she has the ability to perform specific tasks or jobs using a computer. “Computer Self-efficacy” is one of the three sub-constructs that influence one’s
perception of a technology’s ease of use. There was a noticeable trend discovered during the data analysis. All 14 participants who mentioned computer self-efficacy as positively changing their perception of the ease of using CMCD focused their comments on the software selected to transform face-to-face classes to a CMCD approach to blended learning. The software packages demonstrated during the workshops were Microsoft Mix (software to combine material into a single lesson), Screencast-O-Matic (computer screen recording), and Microsoft Visio (for drawing diagrams). The participants made references to these software packages. For example, one faculty member shared:

I think the software that has been introduced to us, Visio, Screencast-O-Matic, and My Mix; all those have been very easy to pick up on, to use. The hardest one is Blackboard, and we've been using it for years now, and there's just so many things in there that you could use. I feel like the new software is very user-friendly.

Similarly, two explained:

Before the training, definitely, I had no idea really what most of the tools that we've covered in the workshops, how easy they were to use and some didn't really even know that they existed, I guess, or I probably would have been using them long time ago but

Another participant also considered the software as key to his change in perception of the CMCD technology’s ease of use. He explained:

I don't think I have the expertise in Blackboard and these other types of forms in technology such as Microsoft Mix and stuff that to be able to develop a course like this, but after the training and after seeing how easy it is to use and how easy
it is to develop a short video lecture and post it on Blackboard, I think just about anybody could do it if they've got the willingness to learn it and want to do it.

A faculty member viewed the software demonstrated and chosen to facilitate CMCD as easy to use and stated, “I don't think that the skill level that it takes to do it is very high. Someone with minimal skills would be able to complete this task very easily with just a little bit of instruction.” While responding to a class discussion question during ARC three (workshop three), one faculty member expressed similarly” The software is easy to use, much easier than I imagined; anyone can do it with a little practice.”

**Summary of data analysis for Research Question Two.** *What are faculty members’ perceptions regarding the ease of use of CMCD technologies?*

**Finding 2.1.** Eleven of the participants mentioned their perception of the technologies being used for CMCD was influenced by the level of external control.

**Finding 2.2.** Six of the participants expressed a level of surprise at the difference between what their initial perceptions were concerning the ease of use of CMCD technologies and the actual ease of use they experienced during the workshop’s activities.

**Finding 2.3.** Fourteen of the participants found the training to be a valuable experience for changing their perception on the ease of use of integrating CMCD technologies into their instruction, thereby positively altering his computer self-efficacy.

**Research Question Three**

*Which external variables do faculty members perceive as aiding the integration of CMCD technologies?*

“External variables” is one of the nine sub-constructs that directly or indirectly influence one or more of the four core constructs. External variables were defined for this study as factors that could affect a faculty member’s perceptions of the technology.
innovation being considered: faculty development process, past experiences with computer
technologies, etc. Prior to conducting the interviews, the researcher read the definition of
external variables to each participant and further explained that these factors are either
within or beyond a faculty member’s control, inside or outside his college environment.
The salient codes derived from the data analysis included: (a) professional development,
(b) consistency, and (c) prior experience. Table 10 contains the codes derived from
analyzing the participants’ interview responses.

Table 10

<table>
<thead>
<tr>
<th>Codes</th>
<th>Participant Number</th>
<th>1</th>
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<th>12</th>
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<tbody>
<tr>
<td>Professional Development</td>
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<td>X</td>
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<td>Consistency</td>
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</tbody>
</table>

*Note.* A dash indicates the participant did not mention the code in his
interview responses.

**Finding 3.1.** Thirteen of the participants reported the faculty development
workshops to be a significant factor in their ability and desire to integrate CMCD
technologies into their instruction. Most indicated the workshops and the strategies
employed during the workshops made the experience essential to the successful
implementation of CMCD in AMT programs. One participant explained:

Yeah, I think the workshops were a good strategy because it wasn’t a lot of
information overload. It was actually throwing stuff at us, a little bit of
information at a time like we try to teach our technical classes and tell folks a
little bit and then let them try it. The workshops helped out a whole lot. It was a lot better to do that than it was to say, “Here this is. Go do it on your own

In support, one faculty member shared:

I felt like the workshops help build an infrastructure to the development of content. There was a framework, and that helped to basically show that there was a way actually to accomplish this. Then we also had a workshop where the presenter had extensively taught hybrid classes before, and things to prepare for, and gave us a timeline. There's a lot I could say about that.

Another explained with specificity:

He showed us exactly how to do it and how he'd previously done it, and described it to us. And we actually went. And installed the software together, went through the software, and he showed us what all tools you could use, and how to use them through it. We all worked together to make our own like that. That helped us out a whole lot.

One faculty member summed it up: “Without the workshop training I don't think I could do this change.”

**Finding 3.2.** Eight of the participants stressed the importance of consistency of design for CMCD courses. The consistency of design was one of the strategies intentionally employed during the faculty development workshops. The strategy was to bring the faculty together to reach an agreement on the format to be implemented. All of these individuals expressed similar appreciation for conformity in design as a result of the workshop participants insisting on and developing a consistent format for CMCD course delivery. One faculty member shared, “In the training, we worked on the way we would
design the courses. You know, make them all the same basically so we can work as a team and help each other out.” Another said, “The technology we covered was a great experience. The one thing I think we all liked most about the workshops was how we worked together to make a consistent format for our courses.” One faculty member added:

   Well, first thing is the faculty are all on the same page, and we can help each other out. The students won't have to learn a new format every time they start a class. Saves the student’s time from not knowing what to expect.

While responding to a class discussion question during ARC one (workshop one), one faculty member’s comment supported the previous quote. He said, “By all of our AMT courses being the same format, we can work together, and support each other.”

   **Finding 3.3.** Two of the participants indicated that their level of prior experience was significant as an external factor in their perception of integrating CMCD technologies into their instruction. Both individuals concluded their experience with the learning management system, Blackboard, “Is a help to them in this process of converting their face-to-face courses to a CMCD format.” One faculty member shared, “For me, one external factor is I’ve been using Blackboard specifically for quite a few years now in other courses. I have some experience with creating the tests and other content online.”

   **Summary of data analysis for Research Question Three.** Which external variables do faculty members perceive as aiding the integration of CMCD technologies?

   **Finding 3.1.** Thirteen of the participants reported the faculty development workshops to be a significant factor in their ability and desire to integrate CMCD technologies into their instruction.
**Finding 3.2.** Eight of the participants stressed the importance of consistency of design for CMCD courses. The consistency of design was one of the strategies intentionally employed during the faculty development workshops.

**Finding 3.3.** Two of the participants indicated that their level of prior experience as significant as an external factor in their perception of integrating CMCD technologies into their instruction.

**Research Question Four**

*What attitudes do faculty members perceive to support the integration of CMCD technologies?*

The TAM is founded on the Fishbein and Ajzen (1975) Theory of Reasoned Action and Ajzen’s (1985) Theory of Planned Behavior. Both theories suggest an individual's intention to perform a given behavior is the immediate causal determinant of his or her overt performance of that behavior, and their intention to use the technology is jointly influenced by the perceived usefulness, perceived ease of use, and his or her attitude toward performing the behavior. Attitude toward use was defined for this study as an individual’s positive or negative feeling about performing the target behavior. The research question aimed to uncover the strategies that promote a positive attitude toward the use of the CMCD technologies. During data analysis, four themes emerged and were coded: (a) optimism, (b) enthusiasm, (c) confidence, (d) open mind, and (e) realistic. Table 11 contains the codes derived from the data analysis.
Table 11

*Reports of the Attitudes Needed to Integrate CMCD Technologies*

<table>
<thead>
<tr>
<th>Codes</th>
<th>Participant Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimism</td>
<td>X  X  X  X  -  -  X  X  X  -  X  -  -  -  -  -  -</td>
</tr>
<tr>
<td>Enthusiasm</td>
<td>-  X  -  -  -  -  -  -  -  -  -  -  -  X  -  -  X</td>
</tr>
<tr>
<td>Confidence</td>
<td>-  X  -  X  -  -  -  -  X  X  -  X  X  -  -  -  -</td>
</tr>
<tr>
<td>Open Mind</td>
<td>-  -  -  -  -  X  -  X  -  -  -  -  -  -  X  -  -</td>
</tr>
<tr>
<td>Realistic</td>
<td>X  X  X  X  X  -  -  X  -  -  -  -  -  -  -  -  -</td>
</tr>
</tbody>
</table>

*Note.* A dash indicates participant did not mention an element of the priori coding category in his interview responses.

**Finding 4.1.** Eight of the participants suggested that optimism is a critical attitude to have for integrating CMCD technologies into instruction. According to the individuals, one must have an attitude to want to improve a system for the benefit of the students. One faculty member shared:

> The attitudes. Well, it has to be a positive attitude. It has to be an attitude that it's gonna benefit your students. If you want an instructor to do something, and you want him to buy into it, if they're a good instructor, their number one question is, "How is it gonna affect my students?" Not, "How is it gonna affect my time," or "How is it gonna affect me?" It's how it's... Because ultimately, the students and their success are the success of your program.

While recognizing the extra work involved, one faculty member expressed his optimism saying, “It will take a little time and effort to make it all come together, but it will happen.”

**Finding 4.2.** Three of the participants mentioned the importance of one having an enthusiastic attitude toward the integration of CMCD technologies into instruction.
According to the participants, the CMCD approach to teaching is new and exciting, and they cannot wait. One faculty member shared:

I feel like that this is a great thing. I feel like that ... All right, I had looked forward to doing this because merely with lack of experience in technologies available for the training that we received, now we have the methods and modalities to present the curriculum, the content to the students. And so I'm really looking forward to doing this.

Another faculty member similarly expressed:

All the faculty that I've dealt with, the attitude seems to be really great. I say they're kind of excited about getting started. It's a new technology. It takes away from, like I say, repetition in the classroom, and it releases more to lab time. It gives more flexibility on equipment, so I think it's gonna work great.

One faculty member expressed excitement to be first saying, “I think you should be excited about the new program, the way we are doing this is all new and it is not done anywhere in our school.”

**Finding 4.3.** Six of the participants suggested a faculty member who desires to integrate CMCD technologies into his or her instruction must have a confident attitude. Four of the participants directly contributed the workshops they attended to the reason for their high level of confidence. One faculty member explained:

I was mentioning before, I was worried that we couldn't get it what we needed, but I feel like the training has exposed us to the ways and abilities to get this to the students. So I think it's gonna be a great thing. And so going forward I feel
like the college is taking the approach that we can do this. I feel like I can do this now because of what I've been exposed to.

In support of this quote, one faculty member said, “Yes, I know it will. I'm convinced it will work. At first, I had my doubts, but after the training and see what can be done and how easy it is to do, I can do it, no problem.” Another expressed confidence that the CMCD technologies integration will be successful, stating, “I know we are going to make a difference in the increased access for our students. I know I will like the change because it will make me a better teacher.”

**Findings 4.4.** Two of the participants suggested keeping an open mind is an excellent attitude to have in the integration of new teaching technologies. One faculty member stated, “Well I think a teacher should look for new ways to instruct their classes. I know I will have to accept new ideas. I think I can do that.” Another expressed a similar view about a productive attitude. He said, “Open to learning new things. Open to basically changing the way that they communicate, and the way that they teach a class. They need an open attitude.”

**Findings 4.5.** Six of the participants reported one must be realistic about the benefits and cost of integrating CMCD technologies into instruction. According to three participants, while the school, faculty, and students will benefit from the change, there will be a cost in time and effort to develop the new CMCD technologies for their courses. One faculty member said, “Well, one more thing, it is going to take time and a lot of work. you need to know that going in, so you know what to expect. But it will be worth it.” Three of the participants suggested the faculty must be realistic in order to not be disappointed. Faculty must have a realistic attitude recognizing that patience will be
required in the transformation process of converting the face-to-face courses to a CMCD format. One faculty member explained, “Yeah, be patient, it may not be perfect at first, but we will get there eventually. It will take a little time and effort to make it all come together, but it will happen.”

**Summary of data analysis for Research Question Three.** *What attitudes do faculty members perceive to support the integration of CMCD technologies?*

**Finding 4.1.** Eight of the participants suggested optimism is a critical attitude to have for integrating CMCD technologies into instruction.

**Finding 4.2.** Three of the participants mentioned the importance of one having an enthusiastic attitude toward the integration of CMCD technologies into instruction.

**Finding 4.3.** Six of the participants (*N* = 15) suggest that a faculty member that desires to integrate CMCD technologies into his or her instruction must have a confident attitude.

**Findings 4.4.** Two of the participants suggested keeping an open mind is a good attitude to have in the integration of new teaching technologies.

**Findings 4.5.** Six of the participants reported one must be realistic about the benefits and cost of integrating CMCD technologies into instruction.

**Research Question Five**

*What are faculty members’ perceptions of what influences the behavioral intentions necessary to facilitate the integration of CMCD technologies?*

Most references to the technology acceptance method referred to the 1989 study by Davis et al. (1989), who theorized that behavioral intention is the primary determinant of user behavior. Behavioral intention was defined in this study as a measure of the
strength of one’s willingness to perform a specific behavior. Behavioral intention is one of the four interrelated core constructs of the TAM. The three linked core constructs (perceived usefulness, perceived ease of use, and attitude toward use) are influenced by the nine sub-constructs (subjective norms, image, job relevance, output quality, results in demonstrability, external variables, perception of external control, objective usability, and computer self-efficacy) to form a faculty member’s behavioral intentions to use the CMCD technologies.

As discussed so far, a faculty member’s intentions to integrate CMCD technologies in his instruction is a result of the influences indirectly exerted from the nine sub-constructs and more directly exerted from the three interrelated constructs. Therefore, the answer to Research Question Five can be found as a result of the amalgamation of the data analysis previously reported in this section of this study. Table 12 presents the most salient coding categories reported for each research question (Q1, Q2, Q3, and Q4) as a result of the previous data analysis, followed by a summary of the data analysis for Research Question Five.
Table 12

*Reports of the Influences on Behavioral Intentions for Integrating CMCD Technologies*

<table>
<thead>
<tr>
<th>RQ</th>
<th>Code Categories</th>
<th>Participant Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Output Quality</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15</td>
</tr>
<tr>
<td></td>
<td>Image</td>
<td>X X X X X X X X X X X X</td>
</tr>
<tr>
<td></td>
<td>Job Relevance</td>
<td>X - - X - - - X X X X X X X</td>
</tr>
<tr>
<td>Q2</td>
<td>Computer Self-efficacy Perceived Control of External</td>
<td>X X X X X X X X X X X - X</td>
</tr>
<tr>
<td></td>
<td>Perception</td>
<td>X X - - X X X X - X X X X X</td>
</tr>
<tr>
<td>Q3</td>
<td>Professional Development Consistency</td>
<td>- - X X X X X X X X X X X X</td>
</tr>
<tr>
<td></td>
<td>Consistency</td>
<td>X X - - X X - - X X X X</td>
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<tr>
<td>Q4</td>
<td>Optimism</td>
<td>X X X - - X X X - X - - - -</td>
</tr>
<tr>
<td></td>
<td>Confidence</td>
<td>- X - X - - - - X - X X - -</td>
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<tr>
<td></td>
<td>Realistic</td>
<td>X X X X X - - X - - - - - -</td>
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*Note.* A dash indicates participant did not mention an element of the coding category in his interview responses.

**Summary of data analysis for Research Question Five.** What are faculty members’ perceptions of what influences the behavioral intentions necessary to facilitate the integration of CMCD technologies?

**Finding 5.1.** As a result of the data analysis, faculty members indicated they perceived output quality, image, and job relevance as the most prominent factors that indirectly influenced their perception of the CMCD technologies usefulness, and directly influencing their attitude and behavioral intentions to integrate the CMCD technologies.
into their instruction. All 15 of the participants indicated output quality was the most influential factor.

**Finding 5.2.** As a result of the data analysis, faculty members indicated they perceived computer self-efficacy and perception of external control as the most prominent factors that indirectly influenced their perception of the CMCD technology’s ease of use, and directly influencing their attitude and behavioral intentions to integrate the CMCD technologies into their instruction. All 15 indicated computer self-efficacy was the most influential factor, although participants also stressed perception of external control as significantly influential concerning attitudes and behavioral intentions to integrate CMCD into instruction.

**Finding 5.3.** External variables had a direct influence on the faculty participants’ perceived usefulness and perceived ease of use of integrating CMCD technologies into instruction. The sum of that influence had a direct effect on the attitude and behavioral intent of a faculty member to integrate CMCD technologies into his instruction. As a result of data analysis, faculty members reported professional development as the most significant factor that influenced their perceptions of the CMCD technologies usefulness and ease of use. According to 14 participants, professional development activities were an essential element indirectly increasing their level of computer self-efficacy. Eight participants also concluded the resulting design of the CMCD training modules had a significant and direct impact on their perceptions of the usefulness and ease of use of integrating CMCD technologies into instruction, thereby exerting an indirect influence on their attitude and behavioral intent to integrate the CMCD technologies into their instruction.
Finding 5.4. In addition to the factors that indirectly affected the participants’ perceptions of the CMCD technology’s usefulness and ease of use, three prominent factors emerged that exerted a direct influence on the participants’ attitudes and, therefore, their behavioral intent to integrate CMCD technologies into their instruction. The additional attitudinal factors were optimism, confidence, and being realistic. As a result of data analysis, eight participants mentioned optimism as the most significant factor that directly influenced one’s behavioral intentions to integrate CMCD technologies into their instructional activities.

Summary

This chapter presented 35 findings that resulted from the data analysis. An initial action planning questionnaire, interview, and observational data were analyzed and categorized using priori coding and open coding techniques. The methods utilized in this chapter complied with the methodology described in Chapter III. The action research iterated process was addressed, along with the five research questions that focused on dealing with the purpose of this study. The purpose of this chapter was to report the findings of this qualitative action research study that investigated faculty members’ perceptions of the factors that facilitated the integration of CMCD technologies into their instruction. Chapter V presents a discussion of the findings along with implications and recommendations for future research.
CHAPTER V: DISCUSSION AND RECOMMENDATIONS

Introduction

Implementing a blended learning course for the first time is a complicated process. Transforming a course from a face-to-face format to a blended learning format requires the instructor to integrate CMCD technologies significantly into the instructional design. Therefore, an instructor must re-examine course goals, develop new online and face-to-face learning activities, use new types of assessment, and interact with students in new ways. Designing a practical blended learning course and learning to teach in new ways involves significant pedagogical changes that require instructors to gain new skills and assume multiple roles. The change from the traditional face-to-face lecture content delivery to CMCD requires the faculty members to have a working knowledge of a specific set of software packages designed to produce and deliver media-rich computer-mediated content.

While research has supported the benefits of implementing blended learning courses in higher education, many faculty members have hesitated to apply the blended learning approach due to their reluctance to face the challenges of integrating CMCD technologies into their course curricula (Ocak, 2011). According to Oh and Park (2009), faculty expressed a poor attitude and lack of motivation to accept and adopt the integration of new teaching and learning technologies. Along with external factors, the faculty’s perception of the usefulness and ease of use of technology in the instructional design process and delivery is what drives the behavioral intentions to use the new technologies (Lee et al., 2013). Thus, faculty development efforts must consider the
necessary components needed for a successful blended learning program, especially in the realm of technical education (Garrison & Vaughan, 2008).

Technical education programs historically have followed the master-apprentice training model. Therefore, technical faculty default to the face-to-face lecture modality of training. Changing to a blended learning modality requires the faculty members to move out of their comfort zone and embrace the advantages the blended learning model brings to the institution, students, and faculty. This action research study will add to the understanding of faculty experiences with the adoption of technological innovations in the delivery of technical program curricula. The results will also aid in understanding the process of integrating blended learning technologies into the delivery of technical education programs. With limited and diminishing resources, the careful planning of innovations adoption is necessary to sustain viability as an educational resource to meet the economic growth needs of the Commonwealth.

The purpose of this action research study was to determine factors that influence the faculty members’ attitudes and behavioral intentions to use CMCD technologies to implement a programmatic change in the provision of technical education offered by SKYCTC. The implications of the findings from this study may be used to develop practical recommendations for facilitating the successful adoption and implementation of a blended learning approach that may include program areas other than AMT programs. Additionally, the outcomes of this study may help ensure a more efficient use of scarce resources used to sponsor faculty development activities designed to foster faculty members’ acceptance and integration of new CMCD technologies into the AMT program curricula.
The research problem was concerned with faculty members’ experiences with the acceptance and adoption of an innovative CMCD modality to replace the traditional face-to-face lecture in AMT programs. As such, the study addressed the following questions:

Q1: What are faculty members’ perceptions regarding the usefulness of CMCD technologies?

Q2: What are faculty members’ perceptions regarding the ease of use of CMCD technologies?

Q3: Which external variables do faculty members perceive as aiding the integration of CMCD technologies?

Q4: What attitudes do faculty members perceive to support the integration of CMCD technologies?

Q5: What are faculty members’ perceptions regarding what influences the behavioral intentions necessary to facilitate the integration of CMCD technologies?

Action research strategies in education are employed to help educators identify problems, collect data, design steps to address the problems, and develop a reflective practice to effect positive change. This study utilized action research strategies along with qualitative methods to collect and analyze data related to AMT program faculty members’ experiences with the adoption of CMCD technologies associated with a blended learning modality of instruction within a single site community and technical college context. The action research process characterizes the researcher as participant and as a facilitator for problem solving and the immediate applicability of findings to practice (Merriam & Simpson, 2000). Therefore, the current study’s action research
strategies engaged AMT faculty as participants in a collaborative and meaningful process of discovery focused on the acceptance and adoption of blended learning CMCD technologies to convert the face-to-face lecture content to a more media-rich, web-based presentation for postsecondary AMT program curricula.

This study employed a researcher authored questionnaire (see Appendix A for an example of the initial planning questionnaire used) during the initial planning phase of the process to identify the disposition of each faculty member’s behavioral intentions to accept and implement CMCD technologies into their curricula. Once identified, the factors influencing each faculty member’s behavioral intentions to accept and apply the new technologies were included as part of the instructional activities and addressed during the four scheduled faculty development workshops.

During the acting and observing phase of each ARC, the researcher collected data based on observations of the participants during the faculty development activities. Recording the observational data while facilitating the workshop required the researcher to post entries retrospectively, although upon the conclusion of each workshop’s training activities, the researcher appointed a faculty member participant to lead an open, collaborative discussion with the participants. The researcher provided the discussion facilitator with a list of guiding questions (see Appendix B for an example of the end of workshop guiding questions) to prompt the open discussion and focus the discussion on the research purpose and research questions. The researcher observed the end of workshop discussions and manually collect data based on an observation guide (see Appendix C for an example of the observation guide) that listed the interactions,
processes, and behaviors to be observed that are associated with the research purpose and research questions.

The data collected during the observation phase were analyzed and the results, in part, were used as a formative evaluation of the workshop activities and, after reflecting on the participants’ responses, made any required adjustments to the action being taken, i.e., elements of the training. At the end of the final ARC (cycle four), the formative evaluation data were not required. Therefore, upon completion of the fourth and final ARC, the researcher scheduled and then conducted semi-structured interviews with the participants (see Appendix D to review the interview protocol and questions used at the conclusion of cycle four).

Discussion of Findings

The following discussions are derived from the findings reported in Chapter IV of this study; implications of the findings, limitations, and recommendations for future research also are presented. Discussions based on the findings are organized in this section to accomplish two interrelated objectives. The first objective is to discuss the findings associated with the four ARCs that comprise the action research process used during this study respectively. Furthermore, the findings that guided the planning phase of each ARC, and the resulting workshop agenda that was developed for each of the four associated faculty development workshops, are discussed (see Figure 6). The second objective is to discuss the findings that were reported as a result of the qualitative data analysis for the faculty member participants’ interviews and observations during and after the faculty development workshops.
Discussion and Application of Action Research Findings

Each of the four iterations of this action research study is designed to follow the widely used four-phase process postulated by Kurt Lewin in 1948, namely, plan, act, observe, and reflect (Adelman, 1993). This study used an iterative process that provided a framework for learning and progressive problem solving. The progression of the ARCs was advanced through a series of reflective phases that informed the plan of action for the upcoming cycle. This section discusses the findings reported as a result of the data analysis for each of the four ARCs that comprised the action research process.

The purpose of collecting and analyzing the action research observational data was two-fold. First, the observational data was analyzed, and the findings were immediately considered (reflected upon) for implications that were applied to the planning phase of the next iteration of the process (next cycle). Second, relevant observational data were included in the summative qualitative analysis in support of findings discussed regarding the in-depth interviews conducted one week after the conclusion of the final ARC (cycle four). Detailed discussions of how and why the findings were applied to each iteration of the ARC are explained in the remainder of this sub-section.

Initial Action Planning

Each participant completed an initial action planning questionnaire before participating in the first ARC (cycle one). The questionnaire was designed to draw general responses to inform the qualitative study of the initial perceptions each participant held concerning the advantages and disadvantages of having AMT course materials online. The findings were used to aid the planning of the first scheduled faculty
development workshop’s activities. Accordingly, the first workshop’s activities were adjusted to accommodate the participants’ expressed concerns of the advantages and disadvantages of integrating CMCD technologies into instruction. A discussion of the findings reported in Chapter IV relating to the participants’ perceptions of the advantages and disadvantages follows:

Student success was mentioned as an advantage and disadvantage, with two participants placing student success in both categories. Two participants indicated the advantages, while six were concerned with only the disadvantages. The salient reason for concern expressed in the findings of disadvantages was that the lack of face-to-face interaction will not be engaging for the student. The disadvantages of integrating CMCD that were expressed by the participants are supported in the literature. According to Graham (2006), the most profound advantage of the traditional face-to-face classroom environment is the connection that is enabled by the personal and physical interaction between student-to-student and instructor to student. Graham added, communication plays a significant role in the traditional face-to-face modality; students have the immediate chance to ask specific questions and receive immediate answers. Therefore, the use of computer-mediated communications in the online environment must provide a media reach experience for the student.

While student accessibility topped the list of advantages indicated in the findings, course accessibility and scheduling flexibility often have been mentioned in the same sentence in the literature and considered as significant advantages of online delivery of course material. Access is assured regardless of location, employment, family obligations, and other factors that may impact one's access to higher education (Allen &
Seaman, 2011). The findings also reveal the concerns of faculty about the increased workload that accompanies the integration of CMCD in instruction. Oh and Park (2009) conducted a study of 151 faculty members from 34 institutions of higher education, and the results support the findings of the current study. Oh, and Park found that 70.6% considered workload required to develop blended learning courses to be an issue in the adoption of the technological and pedagogical changes required to implement blended learning.

The findings that resulted from the analysis of the initial action planning questionnaire responses were considered in the development of ARC one workshop activities. After reflecting on the findings, an action plan was developed and implemented in the acting and observing phase of the ARC one. The ARC one action plan’s objectives were to involve the faculty participants in collaborative workshop activities that demonstrated how and why the blended learning approach would promote student success by providing a higher degree of course accessibility with flexible scheduling opportunities. Also, the action plan’s objectives addressed the faculty concerns relating to the disadvantages of using CMCD to facilitate blended learning courses. The disadvantages expressed in the findings included increased workload and student success. Consequently, the action plan for each ARC included collaborative workshop activities demonstrating the design, ease of use, and usefulness of CMCD technologies.

**Action Research Cycle One**

**Planning phase.** ARC one’s workshop agenda was constructed and facilitated partly based on a reflection of the findings associated with the initial action planning
questionnaire. ARC one’s agenda was developed to demonstrate how the ease of use and usefulness of CMCD help with student accessibility and impact the faculty workload. The agenda included three session topics: design goals, instructional design, and the AMT learning module format.

**Acting phase.** The workshop’s agenda items were implemented.

**Observing phases.** Upon the conclusion of the cycle one’s workshop activities, the following questions were posed to the workshop participants to guide the discussion: (a) *What were the things from today’s activities most helpful to you?*; and (b) *What were you looking for in today’s workshop but didn’t get?* The interactions were observed by the researcher and analyzed promptly about informing the formative evaluation and planning phase of ARC two. The findings reported in Chapter IV relating to the observational data collected and analyzed to inform the ARC two planning phase are as follows:

- Setting the design goals for creating the CMCD model was mentioned as one of the most essential and beneficial activities included in workshop one. According to the consensus of the participants, it was essential to understand the scope of the CMCD model.

- Introducing and demonstrating an instructional design process to consider for creating media-rich lessons for CMCD. As a group, the participants agreed the instructional design process used to demonstrate how pedagogy is used with CMCD to facilitate the lessons was important.

- The AMT learning module to be facilitated through the Blackboard learning management system. The participant consensus was, the design and
demonstration of the AMT learning module format were necessary to understand how the content of the course was going to be presented to the student.

- During the class discussion facilitated by one of the participants, the group discussion began to focus entirely on the need for them to choose, and start learning to use, the software packages needed to facilitate CMCD.

**Reflecting phase.** The workshop agenda items included in cycle one were considered by consensus to accomplish the workshop’s objectives to demonstrate how the ease of use of CMCD helps with student accessibility and impact the faculty workload. The consensus of the faculty was to focus cycle two’s workshop activities on the software they will be using to develop blended learning courses.

**Action Research Cycle Two**

**Planning phase.** ARC two’s workshop agenda was constructed and facilitated partly based on a reflection of the findings observed during the observation phase of ARC one. The objective for cycle two’s workshop was to demonstrate how the CMCD technologies will be used to make the process of conversion to online media-rich content easy and, most important, useful in accomplishing program goals. To further demonstrate the ease of use and usefulness of the technologies chosen, cycle two’s workshop agenda included: Microsoft Mix (voice narrated PowerPoint presentations), Screencast-O-Matic (computer screen recording), and Microsoft Visio (used to design technical diagrams).

**Acting phase.** The workshop’s agenda items were implemented.
Observing phases. Upon the conclusion of cycle two’s workshop, the same formative evaluation questions were once again used to guide the end of workshop discussion. The interactions were observed by the researcher and analyzed promptly about informing the formative evaluation and planning phase of ARC three. The findings reported in Chapter IV relating to the observational data collected and analyzed to inform ARC three planning phase are as follows:

- According to a consensus of the participants, working with MS Mix to create lessons was the most significant activity of the workshop.
- The participants agreed as a group that working with Screencast-O-Matic was also a significant learning experience.
- According to the consensus of the participants, they were interested in spending more time using the software (MS mix, and Screencast-O-Matic) to produce lessons to present to students through Blackboard.

Reflecting phase. The workshop’s agenda items included in cycle two were considered by consensus to accomplish the workshop’s objectives to demonstrate how the CMCD technologies will be used to make the process of conversion to online media-rich content easy and, most important useful in accomplishing program goals. The consensus of the participants was to focus cycle three’s workshop activities on how to present the media content created with the use of CMCD software packages to the students.

Action Research Cycle Three

Planning phase. ARC three’s workshop agenda was constructed and facilitated partly based on a reflection of the findings observed during the observation phase of ARC
two. The objective for cycle three’s workshop was to demonstrate the ease of use and usefulness in presenting to the student the media rich content created using the software chosen for developing AMT blended learning modules. Along with further practice sessions with the CMCD software, activities on how to present the CMCD in Blackboard were included in the workshop’s agenda.

**Acting phase.** The workshop’s agenda items were implemented.

**Observing phases.** Upon the conclusion of cycle three’s workshop, the same formative evaluation questions were once again used to guide the end of workshop discussion. The interactions were observed by the researcher and analyzed promptly about informing the formative evaluation and planning phase of ARC four. The findings reported in Chapter IV relating to the observational data collected and analyzed to inform the ARC three planning phase are as follows:

- According to the consensus of the participants, they thought the time spent in the workshop working as a group, sharing best practices, and learning the software was the most important activity so far from any workshop they have attended.

- According to the consensus of the participants, they were interested in spending more time learning how to create tests and post the grades on Blackboard. Up to this point, the workshop’s activities have been focused on content creation for CMCD. The group wished to have the next and final workshop spend all the time on assessments.

**Reflecting phase.** The workshop’s agenda items included in cycle three were considered by consensus to accomplish the workshop’s objectives to demonstrate the
ease of use and usefulness in presenting to the student the media rich content created using the software chosen for developing AMT blended learning modules. According to the consensus of the faculty, the next and final workshop agenda should include activities that demonstrate how to assess blended learning courses using the Blackboard learning management system.

**Action Research Cycle Four**

**Planning phase.** ARC four’s workshop agenda was constructed and facilitated partly based on a reflection of the findings observed during the observation phase of ARC three. The objective of cycle four’s workshop was to demonstrate the ease of use and usefulness in assessing AMT blended learning courses in the Blackboard learning system. Consequently, three session items were included in cycle four’s workshop agenda: application of the AMT learning module format, creating assessments, and grade book.

**Acting phase.** The workshop’s agenda items were implemented.

**Observing phases.** At the end of the final ARC (cycle four), the formative evaluation data were no longer required. Instead, the researcher scheduled and then conducted semi-structured interviews with the participants. The action research process changed from a cyclic nature of formative evaluation to a more traditional qualitative approach and summative evaluation.

**Reflecting phase.** The discussion and implications of the in-person interview findings are addressed in the next section of this study.

**Discussion of Observational and Interview Findings**

This section discusses the findings reported in Chapter IV of the qualitative data analysis for the faculty member participants who were interviewed post-intervention
(four faculty development workshops). Along with interview data, additional data were collected through observing participants during the acting and observation phases of the workshop activates. The observational data were analyzed using the same coding protocol as the interview data. The significant and relevant observational findings were reported in the narrative section of each data analysis report. The findings are discussed in the context of each research question. A brief explanation of the research question and how it relates to the conceptual framework (see Figure 5) of this study is presented in order of research question number.

**Research question one.** *What are faculty members’ perceptions regarding the usefulness of CMCD technologies?*

Perceived usefulness is one of the core constructs of the TAM. Research has shown that faculty members are less likely to accept and adopt technology integration into his or her instruction if the technology does not prove useful in meeting their goals (Davis, 1986). A discussion of the findings reported in Chapter IV relating to the participants’ perceptions of the usefulness of integrating CMCD technologies into instruction are as follows:

- The support of administration, students, and peers during this transition to blended learning is essential to faculty members’ willingness to use the CMCD technologies. All three groups (administration, students, and peers) combine to exert social influences on the faculty member. The social influences are defined as subjective norms, which are one of the five sub-constructs that directly influenced the faculty perceptions of the CMCD technology’s usefulness. This is important; the faculty may choose to perform
behaviors they would not otherwise perform if they fear consequences of not performing the behavior or if someone important thinks they should.

- Faculty believe their image or status within the college will be enhanced due to their involvement in the transition of AMT program curriculum into a blended learning format. Along with subjective norms, the faculty members’ perceptions of how they will be viewed by others (image) is part of the social influence process. The image is one of the five sub-constructs that directly influenced the faculty’s perception of the usefulness of the CMCD technologies used to develop blended learning content.

- The faculty view the AMT program’s transition to blended learning as an opportunity for the AMT faculty members to improve their teaching style and make efficient use of their time. The faculty believe CMCD technologies are useful as a method of exploring innovative teaching and learning styles, while allowing more time for lab preparation and student support is relevant to their job as an instructor. Job relevance is defined as how well an individual regards the system as essential to enhancing their job performance.

- All the faculty members of this study consider the quality of the output as a result of the transition to blended learning as essential to the success of the project. The current study’s participants are concerned with how well the CMCD technologies will perform tasks that match with their job goals of providing increased access and support to increase the probability of student success. Thus, the faculty members of the current study believe the increase in output quality of the blended learning transition reinforces their perception.
that the CMCD technologies are useful.

- The faculty believe the ability to share and demonstrate the CMCD approach to instruction to others is an essential aspect of perceived usefulness of the technology integration into instruction. Along with job relevance and output quality, results demonstrability is the cognitive instrumental process and one of the five sub-constructs that directly influenced the faculty members’ perceptions regarding the usefulness of integrating CMCD technologies into blended learning instruction.

Research Question Two. What are faculty members’ perceptions regarding the ease of use of CMCD technologies?

Perceived ease of use refers to “the extent to which an individual believes that using a particular system will be free of physical and mental effort” (Davis, 1985, p. 26). Perceived ease of use is hypothesized to have a direct effect on usefulness, and a system that is easier to use would make an individual more productive and more likely to use a system. A discussion of the findings reported in Chapter IV relating to the faculty’ perceptions of the ease of use of integrating CMCD technologies into instruction are as follows:

- Faculty consider the administration’s support in providing and conducting the workshops for faculty professional development in blended learning an excellent example of what the faculty consider as positive external control. Perception of external control was defined for this study as a person’s perceptions or beliefs relating to resources such as time and money and IT compatibility issues that may constrain usage. External control is one of the
three sub-constructs that directly influenced the faculty perception of how easy the CMCD technologies are to use and apply to the blended learning format.

- Objective usability is another of the three sub-constructs that influenced the participants’ perceptions of the ease of use of integrating CMCD technologies into blended learning instruction. Objective usability was defined for this study as one’s comparison of a system based on the actual level (rather than the perception) of effort required to complete specific tasks. Faculty expressed a level of surprise at the difference between what their initial perceptions were concerning the ease of use of CMCD technologies and the actual ease of use they experienced during the workshop’s activities.

- Computer self-efficacy is an influence on the faculty members’ perceptions of the ease of use, and to a lesser extent the usefulness of the CMCD technologies. Computer self-efficacy is another one of the three sub-constructs that influenced the participants’ perceptions of the CMCD technologies ease of use. Computer self-efficacy was defined for this study as the degree to which an individual believes he or she can perform specific tasks/jobs using a computer. Faculty members found the faculty development workshops provided them a valuable experience using the software for the transition that changed their perception on the ease of use of integrating CMCD technologies into their blended learning instruction, thereby positively altering their level of computer self-efficacy.
Research Question Three. Which external variables do faculty members perceive as aiding the integration of CMCD technologies?

External variables comprise one of the nine sub-constructs that directly or indirectly influenced one or more of the four core constructs of the conceptual framework of this study. External variables were defined for this study as factors that could affect a faculty member’s perceptions of the technology innovation being considered: faculty development process, past experiences with computer technologies, etc. A discussion of findings reported in Chapter IV relating to the faculties’ perceptions of which external variables aid the integration of CMCD technologies into instruction is as follows:

- Faculty indicate the workshops and the strategies employed during the workshops positively influenced their behavioral intentions to implement CMCD technologies to develop AMT blended learning courses, along with improving their level of computer self-efficacy. The faculty development workshops’ activities required the faculty to agree on and create a consistent design for the AMT blended learning courses. The consistency of design was one of the strategies intentionally employed during the faculty development workshops. The strategy was to bring the faculty together to reach an agreement on the format to be implemented.

Research question four. What attitudes do faculty members perceive to support the integration of CMCD technologies?

The TAM suggests that an individual's intention to perform a given behavior is the immediate causal determinant of his or her overt performance of that behavior, and their intention to use the technology is jointly influenced by the perceived usefulness,
perceived ease of use, and attitude toward performing the behavior. Attitude toward use was defined for this study as an individual’s positive or negative feeling about performing the target behavior. A discussion of the findings reported in Chapter IV relating to the faculties perceptions of what attitudes support the integration of CMCD technologies into instruction is as follows:

- Faculty suggest that optimism is a critical attitude to have for integrating CMCD technologies into instruction. The conversion of AMT face-to-face lecture content to a CMCD system will require an attitude to want to improve a system for the benefits of the students, college, and faculty. CMCD of technical programs is not as prolific in the literature as other programs in higher education. Although there are many examples of a course or a lesson being converted to blend learning, CMCD is not represented in the literature as being implemented at the institutional or even the program level. Therefore, the faculty members are enthusiastic at the prospect of creating something new and exciting.

- While optimistic and enthusiastic attitudes play a significant role in the success of the AMT programs transformation to CMCD, the faculty realize they also must be realistic about the situation and maintain an open mind and the confidence it will take to make the transformation a success. While the school, faculty, and students will benefit from the change, there will be a cost in time and effort to develop the new CMCD technologies for their courses. The workshop activities the faculty helped create and participated in are
considered by all faculty in this study as the key factor that fostered those attitudes in themselves.

**Research Question Five.** *What are faculty members’ perceptions of what influences the behavioral intentions necessary to facilitate the integration of CMCD technologies?*

Most references to the technology acceptance method referred to the 1989 study in which Davis et al. (1989) theorized that behavioral intention is the primary determinant of user behavior. Behavioral intention was defined in this study as a measure of the strength of one’s willingness to perform a specific behavior. Behavioral intention is one of the four interrelated core constructs of the TAM. The three linked core constructs are influenced by the nine sub-constructs (see Figure 5) to form a faculty member’s behavioral intentions to use the CMCD technologies.

As discussed thus far, a faculty member’s intentions to integrate CMCD technologies in his instruction is a result of the influences indirectly exerted from the nine sub-constructs and more directly exerted from the three interrelated core constructs. Therefore, the findings for Research Question Five are discussed in the context of an amalgamation of the findings previously discussed in this section. A discussion of the findings reported in Chapter IV relating to the participants’ perceptions of what influences the behavioral intentions necessary to facilitate the integration of CMCD technologies into instruction is as follows:

- Faculty members indicate they perceive output quality, image, and job relevance as the most prominent factors that indirectly influence their perception of the CMCD technologies usefulness, and directly influencing
their attitude and behavioral intentions to integrate the CMCD technologies into their instruction. All 15 participants indicate that output quality is the most influential factor.

- The participants concluded they perceive computer self-efficacy, and perception of external control, as the most prominent factors that indirectly influence their perception of the CMCD technology’s ease of use, and directly influencing their attitude and behavioral intentions to integrate the CMCD technologies into their instruction. All 15 of the participants indicated computer self-efficacy is the most influential factor, although 11 also stressed perception of external control as significantly influential concerning attitudes and behavioral intentions to integrate CMCD into instruction.

- External variables had a direct influence on the faculty participants’ perceived usefulness and perceived ease of use of integrating CMCD technologies into instruction. The sum of that influence had a direct effect on the attitude and behavioral intentions of the faculty to integrate CMCD technologies into instruction. Faculty participants reported professional development as the most significant factor that influenced their perceptions of the CMCD technology’s usefulness and ease of use. According to 14 participants, professional development activities are an essential element indirectly increasing their level of computer self-efficacy. Eight participants also concluded the resulting design of the CMCD training modules has a significant and direct impact on their perceptions of the usefulness and ease of use of integrating CMCD technologies into instruction, thereby exerting an
indirect influence on their attitude and behavioral intentions to integrate the CMCD technologies into their instruction.

- In addition to the factors that indirectly affect the participants’ perceptions of the CMCD technology’s usefulness and ease of use, three prominent factors emerged that exert a direct influence on the participants’ attitude and, therefore, their behavioral intentions to integrate CMCD technologies into their instruction. The additional attitudinal factors are optimism, confidence, and being realistic. Eight participants mentioned optimism as the most significant factor that directly influenced their behavioral intentions to integrate CMCD technologies into their instructional activities.

**Implications of the Findings**

This action research study discovered factors that influence faculty members’ attitudes and behavioral intentions to use CMCD technologies to implement a programmatic change in the provision of technical education offered by SKYCTC. The implications of the findings from this study may be used to develop practical recommendations for facilitating a successful adoption and implementation of a blended learning approach that may include program areas other than AMT programs.

The success of a blended learning implementation initiative depends upon administrators, faculty members, and students realizing the reasons to transition to blended learning and why their role is essential in the process. It is the proverbial three-legged stool. All three share a symbiotic relationship that combine to impact the success or failure of the institution’s mission and goals. This study’s focus was on faculty perceptions; the findings indicate that faculty perceptions are influenced directly and
indirectly by the perceptions and actions of students and administrators involved in the transition. The current study’s findings demonstrate that faculty members’ perceptions are derived from the sum of the interactions to which they are subject during the process of transitioning to a blended learning modality. Therefore, this study draws inferences from the findings and suggests there are implications to be considered for the administrators, faculty members, and students.

**Implications for the Administrators**

Total buy-in from the institution’s leaders is required to successfully transition to blended learning at the program level. Unlike an individual deciding to convert one or two classes to blended learning, a programmatic change could require institutional change. Additional funding may be required for equipment and training; therefore, it is critical to have transparency and understanding to avoid conflict and promote the benefits of the transition to blended learning. The findings from this study, along with the literature, are explicit on the importance of institutional support. Implications for the administrators to consider are as follows:

- Faculty members’ perceptions are that it is not enough for an administration to support the transition process through policies alone. The institution must contribute to the change process by providing financial, sufficient, and appropriate infrastructure, as well as regular faculty professional development.

- Administrators should recognize the importance of creating an environment that rewards innovative action, such as experimentation with new content delivery technologies.
• The faculty members must not fear reprisals. Making changes at the program level of course delivery is risky. Thus, the risk must be shared between the administration and faculty who engage in the transition to blended learning.

• To avoid the perception of another initiative being adopted without faculty input, faculty assigned with tasks to implement blended learning must have ownership and feel blended learning is improving their instruction, not working against it.

• The change must be communicated to all stakeholders that the blended learning approach is the best option to increase accountability and accessibility of the programs and is essential to the institution’s mission and goals.

**Implications for the Faculty**

The transition from a face-to-face modality of course delivery to the blended learning approach requires a shift in the faculty member’s role in the teaching and learning process. Blended learning requires the role of the instructor to shift from teacher-centered to student-centered. The instructor is responsible for creating a media-rich environment to enable learners to engage in active learning and allow the attainment of shared knowledge. The findings from this study, along with the literature, are explicit on the importance of faculty members possessing positive attitudes and behavioral intentions to implement a blended learning approach to technical education.

The transition to CMCD for blended learning at a program level requires the associated faculty members to work together in a collaborate environment. Often the courses that make up the program's curriculum are interlaced, and multiple faculty are
responsible for the delivery and student outcomes across the program. Therefore, a
learning community should be intentionally developed that promotes collective
responsibilities and the alignment of the program and institutional goals. All program
students benefit from the interactions that occur among all instructors and students in the
learning community.

The faculty members who comprise the learning community work together and
are accountable to one another to achieve the shared goals of the program. Faculty
members exchange ideas and the feedback they receive from students to improve their
instructional practices. The creation of a learning community addresses and nurtures
what this study’s findings revealed as salient influences on the faculty members’ attitudes
and behavioral intentions to utilize blended learning strategies in their course offerings.
Thus, peer approval and support, output quality, job relevance, consistency of design, and
computer self-efficacy are implications of this study’s findings for the faculty to consider
in the context of the learning community.

- The peer interactions necessary to maintain a learning community should
  serve to build cohesion among the faculty members.
- Output quality was defined in this study as how well the new system performs
tasks that match with program goals. The collaboration among the faculty
members sharing best practices promotes a high level of improvement and
continuity in a presentation of the program for the students.
- Job relevance was defined for this study as the ability of a system to enhance
  program performance. The collaborative environment of a learning
community provides opportunities for the faculty members to discuss, debate, and make decisions regarding best practices for the program.

- Related to job relevance, consistency of design is a strategy that should be employed to improve the performance of the faculty and the outcomes for the students. The standardized format of the blended learning delivery should provide the faculty and student with a consistent and familiar interface regardless of the course. The consistency of the design lessens the anxiety of starting a new course for the faculty and students. Also, if all courses are designed in a similar way, the faculty and students can more easily collaborate; speak the same language, so to speak.

- Computer self-efficacy is the degree to which the faculty member believes he or she has the ability to perform a specific task using a computer. The transition from face-to-face to blended learning requires new or improved computer skills. As a function of the learning community, regular faculty professional development activities must be viewed as routine and conducted internally in collaboration with all faculty members involved.

**Implications for the Students**

This study’s findings suggest the benefits of blended learning should be communicated to the students in such a way as to emphasize why and how the new modality will provide quality curricula with enhanced course accessibility, scheduling flexibility, and student support. The blended learning format assures increased accessibility and flexibility regardless of location, employment, family obligations, and other factors that may impact one’s access to higher education. Enhanced student support
is a product of the learning community, as discussed previously. Along with the faculty members, students participate as an essential member of the learning community.

- Accessibility means the student will no longer have to choose between work and school. Students work schedules can easily be accommodated due to the flexibility of scheduling.
- The blended learning environment provides a media reach experience for the student while not straying from the sense of connectedness and humanness that are essential aspects of the face-to-face modality.
- Blended learning at the program level assures all program faculty members are available to the students for support. The students are part of the learning community and, as such, have the advantage of benefiting from the experiences of all faculty members in the learning community.

**Limitations**

This action research study used a purposeful-convenience sampling method, which is typical and supported by action research, as the purpose of action research is to identify and solve a local problem. While the specific sample was appropriate and helpful in achieving the findings of this study, the ability to apply the outcomes to a general population is limited. The researcher also is the supervisor of all the faculty members who participated in the study. The researcher personally conducted the training, in-person interviews with the participants, and conducted the classroom observations. Since the researcher has a relationship with the participants and a position of power, it is possible that it may have influenced the participants’ behavior and answers. Additionally, the researcher is the dean of the AMT division and has
knowledge about the dynamics of the institution, its culture, and its issues. Although this limitation was minimized by the use of different data collection and member checking, it could be considered as a limitation; personal knowledge can affect the analysis of the data.

**Recommendations for Further Research**

Blended learning is a growing modality in higher education. SKYCTC embraces the advantage blended learning will bring to the students, faculty, and institution. The program was implemented to provide increased access and accountability for the AMT programs. The current study was designed solely to assess the perceptions of faculty members, and this is undoubtedly an important group to consider. However, students who enroll in AMT blended learning courses also have perceptions that are valuable to consider. Since SKYCTC is supporting the implementation of the blended learning in the AMT programs, a comprehensive program evaluation should be conducted to determine whether and at what level the program is meeting its goals of increasing accountability and accessibility for the AMT programs.

**Summary**

Public institutions of higher education in Kentucky have been experiencing cuts in state budgets. Along with decreasing amounts of funding, Kentucky lawmakers have moved state colleges to a performance-based form of budgeting. In this new budget paradigm, an institution’s funding is based on a metric that significantly considers student retention rates, graduation rates, and the number of credentials awarded. In the new funding model, the money is allocated to the public institutions on a progressive scale based on institutional achievement.
The demand for properly trained and experienced skilled technicians in advanced manufacturing technologies is increasing to a critical level. Technical college programs are not currently meeting the quantity, and in some cases quality, outputs required to sustain the economic growth in the community. Faculties and administrations often have determined the current use of resources will not accommodate the growth needed to meet the future needs of industry. Therefore, to increase the capacity, quality, and accessibility of technical programs, the blended learning approach at the program level was implemented during the Fall 2017 semester.

The design of a practical blended learning course and learning to teach in new ways involves significant pedagogical changes that require instructors to gain new skills and assume multiple roles. Thus, faculty development efforts are necessary components needed for a successful blended learning program, especially in the realm of technical education. While research has supported the benefits of implementing blended learning courses in higher education, many faculty members have hesitated to apply the blended learning approach due to a reluctance to face the challenges of integrating technologies into their course curricula.

This action research study identified factors that influence the faculty members’ attitudes and behavioral intentions to use CMCD technologies to implement a programmatic change in the provision of technical education offered by SKYCTC. Action research strategies were used to collect qualitative data for analysis for this study. Action research employ the methodology approach of inquiry-based research activities to collect qualitative data for analysis. The strategies employed in this study were designed to identify issues that influence faculty attitudes and behavioral intentions to implement
CMCD technologies into their instruction. The implications of the findings from this study may be used to develop practical recommendations for facilitating successful adoption and implementation of a blended learning approach for curriculum delivery at the program or institutional levels.
REFERENCES


APPENDIX A: INITIAL ACTION PLANNING QUESTIONNAIRE

Initial Action Planning Questionnaire

1. Enter your last name (optional)

* 2. How many courses are you currently teaching?

* 3. Of these courses, how many have components available to students online?

* 4. Of these courses, how many do you teach online? (no more than two face-to-face meetings)

* 5. Are you required to have at least one face-to-face course converted to the Blended Learning format and on the Fall 2017 Schedule?

☐ Yes
☐ No
6. Select (all that apply) from the list below technologies you regularly use in your current face-to-face classes

☐ Powerpoint
☐ Powerpoint with audio narration
☐ Multimedia demonstration
☐ Internet Sites
☐ Video camera
☐ VCR
☐ DVD
☐ Overhead
☐ Projector

Other:

7. Select (all that apply) the Blackboard online resources that you regularly use in your teaching?

☐ Course
☐ Announcements
☐ Syllabus
☐ Resources for assignments
☐ email
☐ Course schedule
☐ Course content
☐ Grades
☐ Discussion boards
☐ Online quiz
☐ Virtual trainers / Lab
Streaming video

(Youtube…etc.) Other:

8. For the courses you are currently teaching, how are materials posted online? (check all that apply)

- Blackboard
- Personal
- webpage for the
- course Textbook
- publishers
- website email
- I don't post course materials online

* 9. Please rate your responses to the following statements concerning the ease of use of Computer Mediated Content Delivery (CMCD) to facilitate the Blended Learning model.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Agree nor Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel that using CMCD would be easy for me</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel that my interaction with CMCD would be clear and understandable</td>
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<tr>
<td>I feel that it would be easy to become skillful at using CMCD</td>
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<td>I would find CMCD to be flexible to interact with</td>
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<tr>
<td>Learning to operate CMCD would be easy for me</td>
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<tr>
<td>It would be easy for me to get CMCD to do what I want to do</td>
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<tr>
<td>I feel that my ability to determine CMCD ease of use is limited by my lack of experience</td>
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</tbody>
</table>
* 10. Please rate your responses to the following statements concerning the usefulness of CMCD

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Agree nor disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using CMCD in my course delivery would enable me to accomplish tasks more quickly</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Using CMCD would improve student learning outcomes</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Using CMCD would increase my productivity</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Using CMCD would make it easier to facilitate my classes</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I would find CMCD useful</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
</tbody>
</table>

* 11. Please rate your responses to the following statements concerning CMCD

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Agree nor Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I believe it is a good idea to use CMCD to help facilitate technical program courses</td>
<td>○</td>
<td>○</td>
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<td>○</td>
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<tr>
<td>I like the idea of using CMCD in my courses</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Using CMCD is a positive idea</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I plan to use CMCD in the future even if it's not mandatory that I do so</td>
<td>○</td>
<td>○</td>
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<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Assuming I have access to CMCD, I intend to use it</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>In my teaching position, the usage of CMCD is important</td>
<td>○</td>
<td>○</td>
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<tr>
<td>In my teaching position, the usage of CMCD is relevant</td>
<td>○</td>
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<td>○</td>
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</table>
* 12. How have you changed your teaching in order to integrate technology into your courses?


* 13. What are the advantages of having course materials online?


* 14. What are the disadvantages of having course materials online?
APPENDIX B: END OF WORKSHOP GUIDING QUESTIONS

End of Workshop One Guiding Questions

1. What were the things from today’s activities most helpful to you?

2. What were you looking for in today’s workshop but didn’t get?

3. What are the external factors that you think are important to enhance the integration of CMCD technology into your instruction?

   Note: External variables: Encompass all the factors that could affect a person’s perceptions of a technology integration such as CMCD; demographic or personality characteristics of the individual, and training and development processes.

End of Workshop Two Guiding Questions

1. What were the things from today’s activities most helpful to you?

2. What were you looking for in today’s workshop but didn’t get?

3. How were the workshop activities relevant to your job?

4. What are your colleagues, friends and college leaders saying to you about the changes being made concerning our efforts to convert technical programs to CMCD in the AMT division?

5. Will the implementation of CMCD technologies into our AMT program help us meet our goals to increased quality, accountability, and access to our programs? if yes, how, if no how not.

6. Will the conversion of AMT programs to CMCD be applicable to other programs?
   a. Do you think other programs would be interested in following our lead? If yes, why, if no why not?

7. What would you say is particularly helpful or useful about using CMCD as an instructional tool?
8. Would you do this if it was not mandatory? If yes, why, if no, why not?

**End of Workshop Three Guiding Questions**

1. What were the things from today’s activities most helpful to you?

2. What were you looking for in today’s workshop but didn’t get?

3. Were the workshop activities easy or difficult to learn and apply?

4. What most frightens or concerns you about integrating technology in your instructional practice?

5. At this point in the workshop training for CMCD integration, are the technologies practiced so far easier or harder to master than you expected? If yes, why, if no why not?

6. Do you feel confident that you are learning to apply the CMCD technologies effectively? If yes, why, if no why not?

**End of Workshop Four Guiding Questions**

1. How would you describe your attitude toward the integration of CMCD technologies as an instructional tool?
   a. What would you say are its strengths as an instructional tool?
   b. What would you say are its weaknesses as an instructional tool?

2. Now, describe your attitude toward educational technology in general as instructional tools.

3. Think about this for a moment. Do you believe that you or your students will be better off/worst off when the CMCD technologies are implemented next fall? Explain your thoughts about this.
**APPENDIX C: OBSERVATION GUIDES**

**Cycle One Observation Guide**

**Sub-construct:** External Variables

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## Cycle Two Observation Guide

**Core construct:** Perceived Usefulness  
**Sub-constructs:** Subjective Norms, Image, Job Relevance, Output Quality, Results  
**Demonstrability**

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**Cycle 3 Planning Consensus**
Cycle Three Observation Guide

**Core Construct:** Perceived Ease of Use

**Sub-constructs:** Perception of External Control, Objective Usability, and Computer Self-efficacy

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Cycle 4 Planning Consensus
## Cycle Four Observation Guide

**Core Constructs:** Attitude Toward Use, Behavioral Intent

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**Notes:**
APPENDIX D: INTERVIEW PROTOCOL AND QUESTIONS

Interview Protocol and Questions

Purpose Statement: This qualitative study within an action research context will be used to collect and analyze data related to technical program faculty member’s experiences with the adoption of computer-mediated course delivery technologies associated with a blended learning modality of instruction within a community and technical college context.

Thank you for participating in this study. I expect the interview to last approximately 30 minutes. You can choose to stop this interview at any time. With your permission, I would like to audio-record this interview. Please, rest assured that all data will be treated in confidence. Do you have any questions or concerns before we start? May I turn on the recording device?

[RECORDING DEVICE IS ON]

Again, thank you for participating in this interview. Have you signed the informed consent form? Do you have any questions or concerns regarding the study or this interview?

Let’s begin the interview!

In order to explain technology usage behaviors, Davis (1986) suggested a number of factors that may influence faculty members’ use of technology in their instruction. The following interview questions encompass Davis’s framework.

1. What factors do you think are the most effective in terms of facilitating technology integration into instruction?

2. What are the external factors that enhance the integration of technology into your instruction?

   Note: External factors represent the factors that are either within or beyond faculty members’ control, inside or outside their organizational context.

3. What are your perceptions regarding the educational benefits of technology integration into instruction?

4. As a faculty member, what are the professional benefits that technology integration into instruction entails?

5. To what extent do you believe that educational technology systems are user-friendly?

6. What are your perceptions regarding the expertise or skills needed to facilitate the integration of technology into instruction?
7. In your experience, what are the most effective strategies that alter negative perceptions on technology integration into instruction?

8. In your experience, what are the attitudes that promote technology integration into instruction?

9. In your experience, what are the factors that motivate faculty members to integrate technology into their instruction?

10. How do you perceive professional rewards in terms of motivating faculty members to integrate technology into their instruction?

11. What additional insights, if any, would you like to share regarding integrating technology into your instruction?

Now that the interview is done, I would like to thank you for supporting me in achieving this major academic milestone.
APPENDIX E: IRB LETTER OF APPROVAL

DATE: May 24, 2017

TO: Eugene Basil, MS, MA
FROM: Western Kentucky University (WKU) IRB

PROJECT TITLE: [1064024-1] Developing a Blended Learning Model in Advanced Manufacturing Technologies Programs

REFERENCE #: IRB 17-429
SUBMISSION TYPE: New Project

ACTION: APPROVED
APPROVAL DATE: May 24, 2017
EXPIRATION DATE: August 31, 2017
REVIEW TYPE: Expedited Review

Thank you for your submission of New Project materials for this project. The Western Kentucky University (WKU) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio, and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

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

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the consent document.

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

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.
All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of August 31, 2017.

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

If you have any questions, please contact Paul Mooney at (270) 745-2129 or irb@wku.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Western Kentucky University (WKU) IRB's records.
APPENDIX F: APPROVED INFORMED CONSENT FORM

INFORMED CONSENT

Project Title: Developing a Blended Learning Model in Advanced Manufacturing Technologies Programs
Investigator: Eugene Basil, SKYCTC, gene.basil@kctcs.edu

You are being asked to participate in a project conducted through Western Kentucky University and in cooperation with Southcentral Kentucky Community and Technical College. The University requires that you give your signed agreement to participate in this project.

You must be 18 years old or older to participate in this research study.

The investigator will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask any questions you have to help you understand the project. A basic explanation of the project is written below. Please read this explanation and discuss with the researcher any questions you may have.

If you then decide to participate in the project, please sign this form in the presence of the person who explained the project to you. You should be given a copy of this form to keep.

1. Nature and Purpose of the Project:
This qualitative study within an action research context will be used to collect and analyze data related to technical program faculty member’s experiences with the adoption of computer-mediated course delivery technologies associated with a blended learning modality of instruction within a community and technical college context.

2. Explanation of Procedures:
   a) This study will use a researcher authored questionnaire during the planning phase of the action research process to identify your disposition as a faculty member to accept and implement computer-mediated course delivery technologies into your curricula. The planning phase questionnaire will be provided and conducted in person during the first scheduled faculty development workshop. Location: SKYCTC Transpark campus (approximate time to complete 15 Min).
   b) During the acting and observing phase of the action research, the researcher will maintain a journal based on observations of all participants during the faculty development activities, along with collecting documents created by all participants during the training activities. Location: SKYCTC Transpark campus
   c) Upon the conclusion of the acting phase of the action research plan, the researcher will invite you to participate in a semi-structured interview. The interview will be scheduled over a two-week period at your convenience and will last approximately 30 minutes. The interview will be conducted at the SKYCTC Transpark campus in a private office setting (approximate time to complete 30 Min). A copy of the interview transcripts will be provided to you for final revision in order to validate the content.

WKU IRB# 17-429
Approval - 5/24/2017
End Date - 8/31/2017
Expedited
Original - 5/24/2017

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3. **Discomfort and Risks:** There are no perceived discomfort or risks to you. I do not anticipate any risks to you participating in this study other than those encountered in day-to-day life.

4. **Benefits:** There are no perceived benefits to you. Although you may not directly benefit from taking part in this study, your participation in this research study may help inform future decisions concerning faculty development efforts.

5. **Confidentiality:**
The records of this study will be kept private. In any report the researcher makes public will not include any information that will make it possible to identify you. All research records (digital and paper) will be kept in a locked file for a minimum of three years; only the researchers and Institutional Review Board Members that oversee research may review records to ensure the researcher followed regulatory requirements.

6. **Refusal/Withdrawal:** Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

You understand also that it is not possible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.

Signature of Participant  
Date

Witness  
Date

- I agree to the audio/video recording of the research. *(Initial here)*

THE DATED APPROVAL ON THIS CONSENT FORM INDICATES THAT  
THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY  
THE WESTERN KENTUCKY UNIVERSITY INSTITUTIONAL REVIEW BOARD  
Paul Mooney, Human Protections Administrator  
TELEPHONE: (270) 745-2129
APPENDIX G: LETTER OF COOPERATION

Dear Eugene,

The Southcentral Kentucky Community and Technical College (SKYCTC) is pleased to collaborate with you on your project "Developing a Blended Learning Model in Advanced Manufacturing Technologies Programs."

We understand that participating in this research will include allowing access to faculty participants. I had an opportunity to discuss the research with you and ask for clarifications. Furthermore, the PI and key personnel for this project will maintain the confidentiality of all research participants in all phases of this project.

We look forward to working with you, and please consider this communication as our Letter of Cooperation.

Sincerely,

Dr. Phillip W. Neal
President/CEO
Southcentral Kentucky Community and Technical College