A Dissertation

entitled

A Study of the Factors that Influence Community College Instructors’ Adoption of Course Management Systems

by

Jeffrey Peters

Submitted to the Graduate Faculty as partial fulfillment of the requirements for the Doctor of Philosophy Degree in Curriculum and Instruction: Educational Media

__________________________________________
Berhane Teclehaimanot, Ph.D., Committee Chair

__________________________________________
Robert F. Sullivan, Ph.D., Committee Member

__________________________________________
Gregory E. Stone, Ph.D., Committee Member

__________________________________________
David Meabon, Ph.D., Committee Member

__________________________________________
Patricia R. Komuniecki, Ph.D., Dean
College of Graduate Studies

The University of Toledo
August 2014
An Abstract of

A Study of the Factors that Influence Community College Instructors’ Adoption of Course Management Systems

by

Jeffrey Peters

Submitted to the Graduate Faculty as partial fulfillment of the requirements for the Doctor of Philosophy Degree in Curriculum and Instruction: Educational Media

The University of Toledo

August 2014

Educational technology is prevalent in higher education. An example of educational technology that has become ubiquitous at colleges and universities is a course management system (CMS). Although numerous benefits are associated with course management system use, both for students and faculty members, not all faculty members utilize a CMS.

The purpose of this study was to determine the factors that influence CMS adoption for faculty members from community colleges in different Carnegie classification location settings. By determining the factors that most influence CMS adoption, college administrators and state leaders could initiate policy changes to attempt to influence all faculty members to adopt a CMS into their instructional practices.

The study found that a reward structure was the factor that most faculty members acknowledged would be most effective in influencing faculty CMS adoption.
Further, the study found that different adoption factors affected faculty members differently based on their community college Carnegie location setting.

Specific differences regarding the different adoption factors with faculty members from different community college locations were discussed. Finally, several topics for future studies were recommended.
# Table of Contents

Abstract.......................................................................................................................... iii

Table of Contents ........................................................................................................... v

List of Tables .................................................................................................................. x

List of Figures ................................................................................................................ x

I. Introduction .................................................................................................................. 1  
   A. Statement of Problem............................................................................................... 3  
   B. Purpose of Study..................................................................................................... 4  
   C. Research Questions............................................................................................... 5  
   D. Significance of Study.............................................................................................. 6  
   E. Operational Definitions......................................................................................... 7  
   F. Summary................................................................................................................ 10  

II. Review of Literature................................................................................................... 11  
   A. Historical Perspective of Instructional Technology and Media......................... 11  
      a. Scriptoria............................................................................................................ 11  
      b. School museum movement............................................................................... 11  
      c. Audio-visual movement..................................................................................... 12  
      d. Instructional television..................................................................................... 12  
      e. Internet............................................................................................................. 12  
   B. Course Management Systems................................................................................. 13  
      a. CMS defined...................................................................................................... 13  
      b. CMS history..................................................................................................... 13  
      c. Prevalence in higher education....................................................................... 13  

v
d. Online, blended and supplemental web courses..........................14

C. Course Management Systems Benefits........................................14
   a. Institutional costs savings......................................................15
   b. FERPA compliance.............................................................15
   c. Grade transparency............................................................16
   d. Course management benefits..............................................16
   e. Increase communication.....................................................16
   f. Pedagogical benefits..........................................................17
   g. Improved course design and organization.............................18
   h. Efficiency..............................................................................18
   i. Student benefits....................................................................19

D. Faculty Technology Adoption Factors........................................20
   a. CMS user friendliness...........................................................20
   b. Faculty control issues...........................................................21
   c. CMS alignment with teaching philosophy................................21
   d. Motivational factors that influence faculty CMS adoption.......22

E. Community Colleges and Instructional Technology.....................23
   a. Budgetary concerns...............................................................24
   b. Faculty development in community colleges..........................24
   c. Technical efficacy of community college faculty.....................26

F. Technology Adoption Models and Theories................................29
   a. Technology acceptance model (TAM) ....................................29
   b. Concerns-based model (CBAM) .............................................32
c. Rogers Diffusion of Innovation theory ........................................ 35

III. Methodology .................................................................................. 41

A. Introduction ..................................................................................... 42

B. Research questions .......................................................................... 42

C. Research Method ............................................................................ 43

D. Research Design ............................................................................. 43

E. Pilot Study .......................................................................................... 44

   a. Data Collection .............................................................................. 46

   b. Data Analysis .................................................................................. 47

   c. Overview of Rasch model .............................................................. 48

      1. Difficulty .................................................................................. 49

      2. Fit .............................................................................................. 50

      3. Separation ................................................................................ 51

      4. Reliability .................................................................................. 51

      5. Validity ...................................................................................... 51

      6. Multi-Dimensionality ................................................................. 52

F. Primary Study .................................................................................. 52

   a. Participants and research sites ....................................................... 52

   b. Faculty Adoption of a Course Management System .................... 53

   c. Data Collection ............................................................................. 54

   d. Data Analysis .............................................................................. 54

   e. Facets overview ........................................................................... 55

G. Summary ........................................................................................... 56
IV. Results ..................................................................................................................... 57

A. Pilot Study.............................................................................................................. 57
   a. Participant characteristics.............................................................................. 57
   b. Reliability and Separation............................................................................. 59

B. Primary Study...................................................................................................... 61
   a. Participant characteristics........................................................................... 62
   b. Reliability, separation and variance............................................................. 69
   c. Group 1: Institutional dimension--Reliability, separation and variance..... 71
   d. Group 2: Personal characteristics dimension--Reliability, Separation and variance................................................................. 72
   e. Research questions......................................................................................... 72
      1. Research question 1.................................................................................. 72
      2. Research question 2.................................................................................. 80
      3. Research question 3.................................................................................. 84
      4. Research question 4.................................................................................. 88

V. Conclusions, discussions and recommendations................................................. 93

A. Overview ............................................................................................................. 93

B. Conclusions........................................................................................................ 97
   a. Research question 1..................................................................................... 97
   b. Research question 2..................................................................................... 98
   c. Research question 3..................................................................................... 98
   d. Research question 4..................................................................................... 99
C. Discussions ........................................................................................................... 101
   a. Rewarding faculty members for using a CMS........................................... 102
   b. Relative advantage .................................................................................. 103
   c. Technology self-efficacy .......................................................................... 104
   d. Faculty control over instructional materials ...................................... 104
   e. Professional development ...................................................................... 105
   f. Technology usefulness ............................................................................ 106
   g. Differences between part-time and full-time faculty members ........ 106
   h. Community college location setting differences ................................. 108

D. Recommendations ......................................................................................... 111
   a. Human performance technology perspective ...................................... 112
   b. Community college administrators .................................................. 115
   c. State leaders .......................................................................................... 115

E. Recommendations for future research ....................................................... 117

F. Summary ........................................................................................................ 118

References .......................................................................................................... 121

Appendixes .......................................................................................................... 129
   a. Pilot Study Questionnaire ........................................................................ 129
   b. Letter for Primary Study ........................................................................ 139
   c. Pilot Questionnaire and Letter of Consent ........................................... 140
List of Tables

Table 1. Gender Frequency Statistics.................................................................57
Table 2. Work Status Frequency Statistics..........................................................57
Table 3. Academic Department Frequency Statistics..........................................58
Table 4. Years of Teaching Experience Frequency Statistics................................59
Table 5. Participant Characteristics..................................................................63
Table 6. Work Status.........................................................................................63
Table 7. Rural--Academic Department...............................................................64
Table 8. Suburban--Academic Department..........................................................65
Table 9. Urban--Academic Department..............................................................66
Table 10. Years of Teaching Experience.............................................................67
Table 11. Technology Skill Level........................................................................68
Table 12. CMS Skill Level..................................................................................69
List of Figures

Figure 1. Types of Course Formats................................................................. 2

Figure 2. Original technology acceptance model (TAM)................................. 30

Figure 3. Concerns-based model................................................................... 33

Figure 4. Levels of Use.................................................................................. 34

Figure 5. Diffusion of Innovation................................................................... 36

Figure 6. Rasch item-fit analysis..................................................................... 61

Figure 7. Rasch item contrast loading analysis................................................ 71

Figure 8. Rasch analysis of the presented institutional dimension construct map .... 73

Figure 9. Rasch analysis of the presented personal characteristic dimension construct map............................................................................................................. 80

Figure 10. Rasch analysis of the presented institutional dimension.................... 84

Figure 11. Rasch analysis of the presented personal characteristics dimension......... 85

Figure 12. Rasch analysis of question item statistics: correlation order............... 86

Figure 13. Rasch analysis of the presented institutional dimension..................... 89

Figure 14. Rasch analysis of the presented personal characteristics dimension........ 90
Chapter 1

Introduction

It is evident that information technology, in general, is important in the United States and worldwide. According to a 2012 technology industry forecast, “Spending on IT software, equipment, and services is projected to reach $3.75 trillion worldwide this year, driven by solid growth in computer hardware and enterprise software” (Nagel, 2012, p. 1). In higher education, an example of enterprise software that has become ubiquitous at colleges and universities worldwide is a course management system, such as Blackboard, Moodle, or Sakai (Jarrahi, 2010). The course management system (CMS) market in the U.S. has reached nearly $1 billion, and virtually every campus has such a system (DeFranco & Malm, 2011). CMSs have played an important role in higher education because they provide a web-based platform that allows colleges and universities to host and offer online, blended, and supplemental courses. CMSs typically offer a variety of tools that allow instructors to post documents, distribute grades, and collect/return assignments, as well as communicate with students via web-based email, discussion board, and synchronous chat (Gautreau, 2011). Further data that underscore the importance of technology in higher education, specifically CMSs, can be found in a 2012 report from Babson Survey Group and the College Board that noted “Over 6.7 million students were taking at least one online course during the fall 2011 term, an increase of 570,000 students over the previous year” (Sloan Consortium, 2012). Although the significant number of college students taking online courses reinforces the importance of technology in higher education, specifically, web-based course management systems, CMSs also support other types of courses in higher education.
Research has indicated that there are a variety of different types of course formats that use a course management system. The focus of a great deal of research in this area focuses on purely online courses, which are defined as courses in which 80% or more of the content is delivered in a completely online format (Allen & Seaman, 2010). Two additional course formats that students have encountered using a CMS include blended and web-facilitated, or supplemental. Blended courses have been defined at those that deliver 30 to 79% of course content online, and web-facilitated or supplemental courses have been defined as traditional courses that meet face to face in the classroom but also utilize a CMS (Allen & Seaman, 2010). Figure 1 outlines the various course formats that students have encountered in higher education, including those that incorporate a CMS:

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

*Figure 1. Types of Course Formats (Allen & Seaman, 2010).*

Just as there are a variety of types of learning experiences with CMSs, there are a variety of benefits associated with course management system use. Morgan (2003) noted numerous benefits that CMS technology affords instructors, such as improved
communication with students, greater transparency because grades can be posted in a CMS, improved course organization, reduced photocopying costs as a result of posting documents online in a CMS, and a reduction in mundane tasks associated with course preparation and management. Additionally, Al-Shboul (2011) noted that the use of a course management system allows instructors to provide course activities and also to extend their traditional classrooms and communicate with students outside of class. In addition to the benefits that course management systems provide instructors, CMSs also provide numerous benefits to students. According to The National Lone Star Report on Aligning Technology with Student Success, 78% of students surveyed reported that they perceived benefits to their grades and their overall learning experience because of effective technology use (as cited in Namahoe, 2011). Although the Lone Star Report does not specifically cite course management systems, it does underscore students’ perceptions about the educational benefits of technology. Other researchers have specifically cited student benefits associated with CMS technology, such as elimination of space and time barriers, greater access for students with disabilities and part-time non-traditional students, and increased flexibility for students with varied learning modality preferences (Keller, 2005). Although researchers have cited numerous benefits regarding the use of course management systems, both to students and faculty, all higher education faculty have not embraced the use of CMSs (Gautreau, 2011).

**Statement of the Problem**

According to a 2007 study that examined the use of student information technology in higher education, 58.9% of community college students reported using a CMS on a weekly basis, while 77% of four-year college students reported using a CMS
on a weekly basis (Caruso, 2007). Other research has noted the under-utilization of course management systems and faculty resistance to using these systems (Defranco & Malm, 2010; Schaffhauser, 2010). Further research has revealed a variety of reasons for the underutilization of CMSs in community colleges. Caruso indicated that less frequent use of CMSs among faculty members at the community college level can be attributed to workload issues and decreased faculty support at community colleges compared to four-year college and universities. Another issue that has influenced community college faculty members and their decision to use a CMS is that college faculty tend to be instructionally conservative (Kerste, 2011); as a result, they have relied on more traditional methods of teaching, such as lecturing.

Approximately one third, or 7.7 million, of all college students are community college students (Carnegie Foundation for the Advancement of Teaching, 2010 & Caruso, 2007). If only 58.9% of community college students report utilizing a CMS, which was cited in a 2007 study, that equates to millions of students that are not benefitting from the use of course management systems (Carnegie Foundation for the Advancement of Teaching, 2010 & Caruso, 2007). Based on these figures, it would seem crucial to gain a better understanding of the reasons why a substantial portion of the 400,000 faculty teaching at community colleges (Kerste, 2011) have chosen not to utilize a course management system, especially since limited research has been conducted that focuses specifically on community college faculty adoption of course management systems (West, Waddoups, Kennedy, & Graham, 2007).
Purpose of the Study

Instructional technologies, and specifically course managements systems, have become a staple at virtually all colleges and universities in the U.S. It is clear that community colleges in the U.S. educate a substantial portion of the overall number of college students; however, community college faculty members seem to utilize CMSs less frequently than their four-year university colleagues (Caruso, 2007). This seems to place community college students at a disadvantage because numerous benefits have been reported with CMS use, both for students and faculty.

This study seeks to identify and understand the most important factors that influence faculty to adopt CMSs into their instructional practice. Although there are a number of different types of instructional experiences students and faculty can have with a CMS, the focus of this research study is not limited to faculty using a course management system for online instruction, but also for other types of instructional experiences, such as blended or supplemental. Further, because there are approximately 400,000 full-time and part-time faculty members who teach at community colleges in the United States, it seems prudent to initiate research on this segment of higher education faculty (Kerste, 2011). By identifying the most important CMS faculty adoption factors, community college and state leaders can gain a better understanding of their faculty regarding CMS adoption and initiate policy and programmatic changes that bolster CMS usage. Additionally, a substantial number of community colleges students have failed to realize the benefits of course management systems because their instructors have chosen not to use these systems. Of the approximately 7.7 million community college students, approximately 40% do not use a CMS (Caruso, 2007). The
findings of this study could influence more community college faculty to utilize a CMS and benefit their students.

**Research Questions**

For the purposes of this study, the following research questions will be addressed:

1. What factors most influence faculty members at two-year community colleges to adopt a course management system?
2. What factors most inhibit faculty members at two-year community colleges from adopting a course management system?
3. Are the course management system adoption factors different for part-time and full-time faculty members at two-year community colleges?
4. Are the course management system adoption factors different for rural and suburban community college faculty?

**Significance of the Study**

Based on the review of issues pertaining to community college faculty adoption of course management systems, it is important to understand faculty perceptions as they relate to CMS use. Through a better understanding of the perceptions of community college faculty regarding their CMS use, community college leaders can initiate policy changes that may encourage faculty to use a course management system. For example, if the findings suggest that faculty perceive that they do not have enough time in their schedule to utilize a CMS, policy changes could be initiated to reduce faculty workload.
Another benefit of understanding faculty perceptions regarding CMS use is that community college leaders, specifically those who work in faculty development departments, could develop interventions, such as training programs, to address issues that faculty members perceive as problematic. For example, if the findings suggest that faculty members perceive course management systems to be too complicated and are reticent to attend a group training session, faculty development professionals could develop online training modules or one-on-one training initiatives.

Finally, examining faculty perceptions regarding CMS use will help provide a better understanding of the potential differences between the needs of full-time faculty and part-time faculty, as well as faculty from different location settings. Similar to the previous section, these findings will benefit faculty development professionals by allowing them to focus on specific training initiatives for the unique needs of full-time or part-time faculty, or for faculty in different college settings, such as rural, suburban or urban locations.

**Operational Definitions**

*Adoption.* The decision to utilize an innovation. (West, Waddoups, Kennedy, & Graham, 2007).

*Community college.* A post-secondary educational institution serving all segments of society through an open-access admissions policy that offers equal and fair treatment to all students, comprehensive educational programs, and lifelong learning opportunities (American Association of Community Colleges, 2009).
Course management system. A web-based system that provides features for course content presentation, communication, student assessment, grading, and materials and activities management (Morgan, 2003).

Faculty. According to the university terminology defined by University of Illinois, “the faculty are composed of persons who teach classes for colleges. Some colleges differentiate between faculty and instructors. Instructors are hired to teach a specific class or classes, while faculty members have contracts with the college that require additional duties beyond teaching.” (You, 2010).

Hybrid (blended) course. Blended courses are defined as courses that deliver between 30% and 80% of the course content online (Allen & Seaman, 2003). In this study, hybrid or blended courses refer to courses in which students complete their learning in a combination of traditional and distance class sessions. Students attend regularly scheduled classes on campus and also meet online in a virtual classroom (You, 2010).

Large-enrollment community college. Fall enrollment data show FTE (full-time equivalent) enrollment of 5,000–9,999 students at these associate’s degree granting institutions (Carnegie Foundation for the Advancement of Teaching, 2012).

Medium-enrollment community college. Fall enrollment data show FTE (full-time equivalent) enrollment of 2,000–4,999 students at these associate’s-degree-granting institutions (Carnegie Foundation for the Advancement of Teaching, 2012).

Online course. These types of courses are defined as courses where 80% or more of the course content is delivered online (Allen & Seaman, 2010).
Rural community college. Urban-serving and suburban-serving institutions are physically located within primary metropolitan statistical areas (PMSAs) or metropolitan statistical areas (MSAs), respectively, with populations exceeding 500,000 people according to the 2000 Census. Institutions in PMSAs or MSAs with a lower total population, or not in a PMSA or MSA, are classified as rural-serving institutions (Carnegie Foundation for the Advancement of Teaching, 2012).

Small-enrollment community college. Fall enrollment data show FTE (full-time equivalent) enrollment of 500–1,999 students at these associate’s degree granting institutions (Carnegie Foundation for the Advancement of Teaching, 2012).

Suburban community college. Urban-serving and suburban-serving institutions are physically located within primary metropolitan statistical areas (PMSAs) or metropolitan statistical areas (MSAs), respectively, with populations exceeding 500,000 people according to the 2000 Census. Institutions in PMSAs or MSAs with a lower total population, or not in a PMSA or MSA, are classified as rural-serving institutions (Carnegie Foundation for the Advancement of Teaching, 2012).

Supplemental (Web-assisted) course. Supplemental courses are taught in traditional (face-to-face) classroom settings and utilize the Internet to enhance delivery of the course content and/or interaction. In Web-assisted environments, no class sessions are held online. The Web is used to supplement content delivery and/or interactions (You, 2010).
Urban community college. Rural-, suburban-, or urban-serving Urban-serving and suburban-serving institutions are physically located within primary metropolitan statistical areas (PMSAs) or metropolitan statistical areas (MSAs), respectively, with populations exceeding 500,000 people according to the 2000 Census. Institutions in PMSAs or MSAs with a lower total population, or not in a PMSA or MSA, are classified as rural-serving institutions (Carnegie Foundation for the Advancement of Teaching, 2012).

Very Large-enrollment community college. Fall enrollment data show FTE (full-time equivalent) enrollment of at least 10,000 students at these associate’s degree granting institution (Carnegie Foundation for the Advancement of Teaching, 2012).

Summary

As course management systems continue to gain popularity at U.S. colleges and universities, and since there are a variety of benefits associated with CMS use, both for students and faculty, it seems of paramount importance to understand the reasons why faculty choose to adopt course management systems so that colleges and state leaders can initiate policies to encourage faculty CMS use so that all faculty and students can benefit from the advantages of using a CMS. Additionally, this research is necessary because a paucity of research exists on CMS adoption, specifically as it pertains to community college faculty.
Chapter 2

Literature Review

This literature review examines several of the recurrent themes cited on the topic of technology, specifically course management systems (CMS), in education. The literature review first examines the history of technology and media in education to provide background information and context for the topic. The literature review also defines course management systems, explains how these systems are used in education, and describes the benefits and limitations of these systems. Next, this chapter reviews research on the use of CSMs within educational settings, specifically community college settings, and highlights course management system usage differences among the various educational settings. This literature review also focuses on technology adoption factors that are associated with CMS faculty adoption. Finally, this review concludes with an examination of several technology adoption models and research theories.

Historical Perspective of Instructional Technology and Media

The use of supplemental educational technology in education has existed for centuries. In the 15th century, traveling teachers in search of student unions carted around scriptoria, or religious texts, that had been copied from medieval scribes (Morgan, 2003). Since that time, there have been several supplemental technology or media movements in education. In the early 1900s, the school museum movement featured “...visual instruction by distribution of portable museum exhibits, stereographs, films, study prints, charts, and other instructional media” (Reiser, 2001, p. 55). The early 20th century saw the visual media movement, which featured films, slides, and
photographs. This movement was championed by Thomas Edison, who proclaimed that film would lead to the demise of books in schools (Reiser, 2001). The audio-visual movement of the 1920s and 1930s used radio broadcasting, audio recordings and sound motion pictures for instruction; particularly distance education (Fink, 2007). The mid-twentieth century marked the rise of instructional television. According to Reiser (2001),

The 1952 decision by the Federal Communication Commission to set aside 242 television channels for education purposes led to the rapid development of a large number of public (then called “educational”) television stations. By 1955, there were 17 such stations in the United States, and by 1960 there were more than 50” (p. 58). You (2010) added that the availability of satellite technology in the 1960s made instructional television more available. Satellite cable television broadcasts, along with videotape, were used as instructional tools in the 1980s (Halawi & McCarthy, 2007). Although computers had been used in education since the 1950s, they did not begin to have a significant impact until the 1980s (Reiser, 2001).

Similar to Thomas Edison’s prediction that film would make books obsolete eight decades before, Seymour Papert, noted MIT computer scientist and educator, predicted that the computer would be the catalyst to a significant change in education (as cited in Reiser, 2001). The Department of Defense in the 1970s designed a communication system for U.S. defense purposes, which was called the Advanced Research Project Agency (ARPA) and connected 30 defense locations in a network. Eventually, this network became available to everyone in the 1990s and was called the Internet (Fink, 2007). As Internet browsers became available (e.g., Netscape in 1994 and Internet Explorer in 1995), the Internet became more accessible to the average user
(Chang, 2008). “Since 1995, rapid advances in computer and other digital technology, as well as the Internet, have led to a rapidly increasing interest in, and use of, these media for instructional purposes” (Reiser, 2001, p. 60). These many instructional technology advancements, especially the advent of the personal computer and Internet, have led to the ubiquity of course management system used in education.

**Course Management Systems**

Course management systems, also referred to in the research literature as “virtual learning environments” or “learning management systems” (Chang, 2008, p. 20), are Internet-based software programs that became available in the mid-1990s and have provided colleges, universities, and instructors with the ability to manage student enrollment, track student performance, and distribute course content electronically (Al-Shboul, 2011). You (2010) defined CMSs as “seamless and secure instructional delivery systems” (p. 20) and suggested that they serve as gateways to course tools, including email, chat rooms, discussion boards, and whiteboards. According to You, CMSs allow instructors to track the CMS Web pages that students’ access, offer online assessments, and statistically analyze student performances. According to West, Waddoups, Kennedy, and Graham (2007), as many as 95% of colleges and universities utilize some form of course management system. Many CMSs were developed for use in higher education, such as WebCT, a CMS that was developed at the University of British Columbia, and Blackboard, which was developed at Cornell University (Morgan, 2003). In addition to Blackboard and WebCT, other popular CMSs include Moodle, Sakai, Desire2Learn, and Angel, among others (Jarrahi, 2010).
Course management systems have been used in a variety of different ways to create a variety of different learning experiences in higher education. The three primary types of CMS-facilitated learning experiences students’ encounter in higher education include (1) fully online courses, (2) blended or hybrid courses, and (3) supplemental or Web-facilitated courses. Online courses deliver content entirely online through a CMS and typically do not require face-to-face meetings; blended or hybrid courses integrate face-to-face instruction with Web-based instruction via a CMS; and Web-facilitated or courses meet regularly in the classroom but also utilize a CMS to augment the traditional face-to-face course (Allen & Seaman, 2010).

Much of the CMS literature has focused on fully online courses. In part, this intense interest in CMSs has been because of a proliferation of online students. According to a 2012 survey by the Babson Survey Group and the College Board “Over 6.7 million students were taking at least one online course during the fall 2011 term, an increase of 570,000 students over the previous year” (Sloan Consortium, 2012). Although course management systems are critical to hosting and managing online courses, online courses are not the only instructional experience faculty and students can have with a CMS. According to Malikowski and Thompson (2007), faculty utilize course management systems three times more often in a Web-facilitated environment to supplement their traditional face-to-face courses than they do in their fully online courses.

**Course Management System Benefits**

Researchers have reported a wide range of benefits in the literature regarding CMS use in higher education, and these benefits are advantageous for higher education
institutions in general as well as for specific populations of CMS users, such as faculty and students. One of the most frequently cited benefits for institutions is cost savings (Chang, 2008; Grimes, 2001; Morgan, 2003; Young, 2002). One research study focused on the University of Wisconsin system specifically identified lower photocopying costs as an example of institutional costs savings; however, it was also believed that these costs may be transferred from the institution to its students (Morgan, 2003). Chang (2008) cited the institutional benefit of cost effectiveness that is possible through the use of a CMS to deliver web-based instruction as well as other benefits. According to Chang (2008),

Many higher (educational) institutions believe the adoption of online learning technology is able to improve the quality of learning, better equip learners with information technology skills that are useful for their professional development, provide wider access in education to meet the demand for higher education as well as improve cost effectiveness in the delivery of education. (p. 18)

Other institutional benefits include attracting a global audience to the college or university, increasing disabled student and non-traditional student access, and increasing the opportunities for institutions to collaborate with other domestic and international colleges and universities (Keller, 2005). Institutions benefit from using a course management system through the ability of the system to provide secure student grades and other private information required by FERPA (Federal Educational Rights and Privacy Act) as well as copyright protection (Morgan, 2003). Many higher education institutions are under pressure from state agencies, as well as accrediting agencies, among others, to demonstrate learning results and fiscal efficiency.
According to Kultur (2009) administrators of higher education institutions must “balance the fiscal pressures of running a large organization influenced by external forces such as rankings and increased competition for students and faculty and internal stresses produced by boards and accrediting agencies who are demanding more transparency, accountability, and tangible evidence of success, are best served by seeking continued innovation in curricular programs, delivery mechanisms, support services, and operations” (p. 18). In response, institutions have found that using some type of CMS has been helpful in enabling them to balance the pressures Kultur (2009) identified and, to some degree, alleviate costs associated with delivering educational products.

In addition to the numerous benefits that CMSs offer higher education institutions, research has indicated that course management systems also provide a variety of benefits to faculty (Anderson, 2003; Chang, 2008; Falvo, 2007; Harrington, Staffo, & Wright, 2006; Keller, 2005; Kultur, 2009; Malikowski, Thompson, & Theis, 2007; Morgan, 2003; Rabinowitz & Ullman, 2004; Vovides, Sanchez-Alonso, Mitropoulou, & Nickmans, 2007). Several researchers noted the course administration and course management benefits that are associated with using a CMS (Kultur, 2009; Morgan, 2003). According to Morgan (2003), faculty members can use CMSs to accomplish repetitive administrative tasks that are inherent in teaching and that CMSs are especially helpful in conducting large classes. More specifically, Kultur (2009) noted that course management systems are helpful to faculty because they enable them to monitor and track student activities more efficiently.
Researchers have noted that course management systems benefit faculty members by increasing course communication with students and among students (Anderson, 2003; Harrington, Staffo, & Wright, 2006; Kultur, 2009; Morgan, 2003; Mullinix & McCurry, 2003). According to Lonn and Teasley’s (2009) research, when faculty were asked what was the most critical benefit of using a CMS they indicated the ability to communicate efficiently. Several researchers specifically cited the CMS discussion board and email features as the primary tools used to facilitate communication with and among students in their courses (Harrington, Staffo, & Wright, 2006; Morgan, 2003). Anderson (2003) noted that the discussion board and chat features offered in many course management systems are beneficial in facilitating collaboration and a sense of community in courses as well as expanding course communication beyond the scheduled class time. Other researchers have noted the ability of course management systems to extend the regular face-to-face course using communication tools available through CMSs (Harrington, Staffo, & Wright, 2006). These researchers further noted that extending the class beyond the scheduled face-to-face classroom meeting times increased the likelihood of communication, engagement, and additional learning (Harrington, Staffo, & Wright, 2006). Although numerous researchers have noted the benefit of increased communication with and among students who use CMSs (Anderson, 2003; Harrington, Staffo, & Wright, 2006; Kultur, 2009; Mullinix & McCurry, 2003), Kultur (2009) specifically noted that increased communication enabled by using course management systems also increases the workload for faculty and should be considered.
Numerous pedagogical benefits have also been linked to faculty CMS use (Morgan, 2003; Keller, 2005; Harrington, Staffo & Wright, 2006; Vovides, Sanchez-Alonso, Mitropoulou, & Nickmans, 2007; Malikowski, Thompson, & Theis, 2007; Kultur, 2009). An author noted that faculty CMS use has influenced faculty to rethink their pedagogical approach (Kultur, 2009). Kultur (2009) also noted how some faculty perceived CMS use as a way for them to develop their technical skills and “force them to think about applying new methods” (p. 124). Another study reinforced Kultur’s assertion and noted how the faculty in the study found themselves reflecting on their content and instructional practices daily while using a CMS (Harrington, Staffo & Wright, 2006).

Additionally, researchers have noted that course management systems provide improved course design and organization (Kultur, 2009) as well as a place where instructors can post course materials online (Morgan, 2003; Keller, 2005; Vovides, Sanchez-Alonso, Mitropoulou & Nickmans, 2007; Malikowski, Thompson & Theis, 2007; Harrington, Staffo & Wright, 2006; Kultur, 2009). By providing course materials online, faculty can provide course information in a central online location (Keller, 2005), provide supplemental information to increase student learning (Morgan, 2003), and extend the traditional classroom beyond the scheduled meeting times to foster greater engagement with course materials (Harrington, Staffo, & Wright, 2006).

Although several researchers cited the benefit of the CMS to provide a space for faculty to post course materials, Vovides, Sanchez-Alonso, Mitropoulou, and Nickmans (2007) suggested that some faculty may experience an over reliance on posting only course materials on CMSs and underutilize other content CMS features: “Despite this potential
of the CMS to scaffold learners, it seems that many instructors currently use course management systems simply as a delivery mechanism for the subject matter. The integrated features and functionalities, such as the capabilities to present the learning material content in multimedia ways, are often underutilized” (p. 66).

Still other researchers have noted efficiency benefits associated with faculty CMS use (Anderson, 2003; Kultur, 2009; Morgan, 2003). Kultur (2009) specifically noted that CMSs can help faculty better manage course materials instead of photocopies, and that was a benefit. According to Anderson (2003),

Using Blackboard and technology helped to increase productivity. The course management tools, when used appropriately, can help faculty to spend time more meaningfully and foster a very independent learner. Students are able to receive more immediate feedback after submitting and assignment without having to wait until the next classroom time or wait for the instructor to mail a hard copy (p. 15).

Researchers have reported additional miscellaneous benefits associated with CMS faculty use, such as copyright compliance, FERPA compliance, and course transparency (Kultur, 2009; Morgan, 2003). One study suggested that CMSs are helpful for students with learning disabilities and those who are shy (Kultur, 2009). CMSs help ensure copyright compliance because they enable faculty to keep course materials in a password-protected online space, and FERPA compliance benefits have been associated with the ability of CMSs to keep student grades in a password-protected online environment (Morgan, 2003).
Researchers have reported that CMSs are beneficial for students, especially students with disabilities and shy students, because course management systems feature asynchronous discussion capabilities. Asynchronous discussion allows students to “slow the course down” and affords them more time to reflect and compose their responses, as opposed to the real-time challenges some students experience when they participate in synchronous classrooms (Morgan, 2003). Morgan (2003) described the benefits of transparency afforded by a CMS as (1) making course goals and processes more visible, (2) making student work more visible, and (3) making grades more visible. This transparency makes students more accountable. Finally, Lonn and Teasley (2009) noted that the students in their study indicated that they felt the CMS improved teaching and learning.

**Faculty Technology Adoption Factors**

Researchers have suggested that a variety of factors affect faculty CMS adoption (Anderson, 2003; Morgan, 2003; Keller, 2005; Halawi & McCarthy, 2007; Chang, 2008; Ioannou & Hannafin, 2008; Kultur, 2009; Jarrahi, 2010; Al-Shboul, 2011; Gautreau, 2011). Several researchers have noted that faculty cited time as a factor which affects their decision about whether to adopt a course management system into their teaching (Morgan, 2003; Ioannou & Hannafin, 2008; Al-Shboul, 2011; Gautreau, 2011). In Morgan’s (2003) study, faculty reported that CMSs were too time consuming to use. Ioannou and Hannafin (2008) reached similar conclusions, but they reported that some instructors perceived the CMS login procedure to be the most time consuming. Additional research on course management system adoption by faculty has indicated that faculty workload concerns could affect whether or not faculty choose to
adopt a CMS. Both Al-Shboul (2011) and Gautreau (2011) noted that providing faculty release time to work on a course management system could have a positive influence on faculty adoption.

In studies conducted by a number of researchers, the degree to which CMSs were perceived by faculty to be user friendly or intuitive was also a factor that affected faculty CMS adoption (Anderson, 2003; Morgan, 2003; Halawi & McCarthy, 2007; Ioannou & Hannafin (2008); Kultur, 2009). While Anderson (2003) and Morgan (2003) noted how CMS ease of use affected faculty adoption, Ioannou and Hannafin (2008) noted more generally how users of course management systems prefer ease of use and the speed of the system. Halawi and McCarthy (2007) focused their research on a specific CMS, Blackboard, and the degree to which Blackboard features were perceived to be easy to use by instructors. Finally, Kultur’s (2009) research noted how faculty technical skills, or self-efficacy, affected faculty perceptions of course management system ease of use. Kultur (2009) noted that “perceived ease of use directly affects perceived usefulness and as a result indirectly affects the usage of CMS through perceived usefulness” (p. 146).

Several researchers have reported that some faculty perceived a loss of control when utilizing a CMS and that this perception influenced future CMS use (Morgan, 2003; Keller, 2005; Kultur, 2009; Al-Shboul, 2011). In Morgan’s (2003) study, faculty cited a loss of control of their teaching environment as well as negative perceptions related to increased bureaucracy due to CMS usage. Al-Shboul (2011) also reported that course management systems “…reduce their [instructors’] control of instruction and the instructional environment” (p. 226). Both Keller (2005) and Kultur (2009) identified
faculty issues with course management system and loss of control, and both researchers specifically cited how faculty perceptions of academic freedom affected CMS adoption. Specifically, Keller (2005) noted how faculty reported their concern over academic freedom issues when their respective institutions required them to utilize educational technology in general.

Researchers also cited the ability of CMSs to align with the teaching philosophies of faculty members as a factor that affects CMS adoption (Morgan, 2003; Chang, 2008; Jarrahi, 2010). Morgan (2003) noted how some faculty found the features and tools in CMSs to be ill-suited to their discipline, specifically faculty in the area of science and mathematics. Chang (2008) stated that “if the new technology cannot be aligned with a faculty member’s teaching philosophy or pedagogical perspective, then the utilization of the new technology would be limited” (p. 30).

An additional factor that is noted in the literature is related to how individual faculty technical skills affect course management system adoption (Kultur, 2009; Gautreau, 2011). According to Gautreau (2011),

The level of technology experience influences a faculty member’s decision to adopt an LMS in their instructional practices. Faculty who had experience and were proficient with technology in general, were likely to use technology in instruction. The level of technology proficiency coincides with a faculty member’s use of technology in their personal life. If an instructor is adept at using technology as part of their daily life, then those skills transfer to their teaching and technology use is common practice. (p. 11)
Kultur (2009) noted that faculty members’ self-efficacy with technology affected their perceptions of CMS utilization and that it is critical to incorporate training and support to assist faculty. Several other researchers also have noted the importance of faculty training and support as a factor that affects course management system adoption (Al-Shboul, 2011; Gautreau, 2011).

In addition to perceived loss of control, alignment with teaching philosophies, and technological self-efficacy, researchers have cited numerous motivational factors that influence faculty CMS adoption (Halawi & McCarthy, 2007; Al-Shboul, 2011; Gautreau, 2011). Both Al-Shboul (2011) and Gautreau (2011) cited extrinsic motivational factors that affect faculty course management system usage. Al-Shboul (2011) noted that “…receiving a stipend for using CMS, receiving a recognition/reward from the administration, merit pay, release time, teaching workload and training in the use of CMS” (p. 230), were all factors that influenced faculty CMS adoption. Gautreau (2011) noted institutional support system factors and specifically cited technology support resources, modeling by university administrators and collaboration with colleagues as factors that influence faculty course management system adoption. Several other researchers cited intrinsic motivational factors that influenced CMS faculty usage (Anderson, 2003; Halawi & McCarthy, 2007; Kultur, 2009). Halawi and McCarthy (2007) cited perceived CMS usefulness as an intrinsic motivational factor that affects faculty CMS adoption. Kultur (2009) also cited the intrinsic motivation of personal benefit as a factor that influenced course management system adoption and stated that
...it can be speculated that the task-related features that were perceived to be useful should also be perceived as personally beneficial to be effective on behavioral intention to use CMS. In other words, without seeing benefits for themselves, instructors may reject the use of a CMS, although they can accept that it can be a necessary instrument for their courses. (p. 148)

Finally, Morgan (2003) noted several student issues that affected faculty course management use. According to Morgan, several faculty noted that their students discouraged them from using a CMS. Additionally, faculty reported concerns regarding poor student technology skills and their inability to access the CMS reliably (Morgan, 2003). Interestingly, Morgan stated that “we had difficulty determining the degree to which this assessment resulted from faculty’s projecting their own fears and inadequacies with instructional technology onto their students” (p. 11).

Community Colleges and Instructional Technology

Several recurring themes have appeared throughout the literature concerning community colleges and their use of technology. First, numerous research articles have reported that community colleges continue to face budgetary issues that influence their ability to provide the technology infrastructure and support necessary to deliver a high-quality educational experience (Tschechtelin, 2011; Eddy, 2007; Pennington, Williams & Karvonen, 2006; Sink, Jackson, Boham & Shockley, 2004; Foster, 2004). Tschechtelin (2011) noted that increasing enrollment, the national recession, and decreasing local and state tax funding of community colleges have negatively impacted college budgets. Foster (2004) noted how preparing larger and more diverse community college students for technologically-based job market stresses community college
infrastructures and budgets. Both Eddy (2007) and Pennington, Williams and Karvonen (2006) have cited the budgetary challenges faced by rural community colleges as specific problematic concerns. According to Eddy (2007) and Pennington, Williams and Karvonen (2006), rural community colleges confront the same issues that urban and suburban community college’s face, although Pennington noted that additional geographic barriers exist at rural community colleges that compound the problematic nature of issues related to funding and providing adequate technology and support. An example that illustrates how technology affects rural community colleges, particularly as it relates to their geographic locations, is Internet access. Sink, Jackson, Boham and Shockley (2004) noted that “funding for affordable, high-speed Internet access is often allocated for urban colleges; however, many rural community colleges are often located in economically distressed areas, and do not have adequate broadband access” (p. 322).

In addition to budgetary concerns, a number of scholarly articles in the research literature have focused on community colleges and instructional technology. These articles have identified concerns related to faculty professional development and support (Mitchell, 2011; Jackowski & Akroyd, 2010; Eddy, 2007; Wilson, 2001). Eddy (2007) noted the importance of professional development for faculty and also noted how rural community colleges often lack the adequate infrastructure to provide professional development. Additionally, rural faculty support professionals reported less interest in advancing new initiatives in teaching than did respondents from urban community colleges (Eddy, 2007). Wilson’s (2001) research, which was not exclusively focused on community colleges but included community colleges along with other
Kentucky state-supported institutions, also noted lack of support and training as a barrier for faculty using instructional technology.

A confounding issue related to faculty development in community colleges is that two-thirds of community college faculty are part-time instructors (Jackowski & Akroyd, 2010; Sallee, 2008). Jackowski and Akroyd (2010) cited a number of concerns related to the high proportion of part-time instructors at community colleges, including compensation issues, as well as how part-time faculty are poorly integrated and do not have the same access to technology as full-time faculty: “More specifically, a greater percentage of full-time faculty members (87%) had access to the Internet at work and at home than did part-time faculty (58%). A greater percentage of part-time faculty (43%) had no Internet access or Internet access only at home compared to full-time faculty (13%). This has led to the conclusion that part-time faculty have less access to the Internet than their full-time counterparts” (Jackowski & Akroyd, 2010, p. 635). Interestingly, another author noted that the problems related to part-time faculty utilization of technology at community colleges is more of an issue at suburban and urban community colleges because rural community colleges tend to rely more on full-time faculty and utilize fewer part-time faculty (Eddy, 2007). Del Favero and Hinson (2007) further noted the important role of department chairs and their potential influence on community college faculty in attempting to integrate instructional technology. In addition, numerous researchers have noted the importance of community college faculty training and professional development initiatives to help faculty increase their effectiveness with instructional technology (Jackowski, 2010; Mitchell, 2011; Del Favero & Hinson (2007); Eddy, 2007; Wilson, 2004).
Additional research on community colleges and instructional technology has cited concern over the technical efficacy of community college faculty (Jackwoski & Akroyd, 2010; Del Favero & Hinson, 2007; Pennington, Williams & Karvonen, 2006). Jackwoski and Akroyd (2010) noted how faculty members who feel less competent are also less likely to incorporate instructional technology, and Del Favero and Hinson (2007) reported that community college faculty members are often less technologically savvy than their students. Additional research on this topic has suggested that some community college leaders feel a sense of excitement about the increased use of instructional technology, but those same leaders also have reported concerns about hiring faculty members who have the necessary technical skills to effectively incorporate the technology into their classrooms (Pennington, Williams & Karvonen, 2006).

Additional factors have been cited throughout the literature that influence technology use among faculty at community colleges include personal characteristics of faculty members (Meyer, 2009; Mars & Ginter, 2007), faculty resistance (Mars & Ginter, 2007), motivation (Jackwoski & Akroyd, 2010), and time (Mitchell, 2011; Jackwoski & Akroyd, 2010). According to Meyer (2009), age matters for technology use, with older faculty perhaps finding it more difficult to keep up with new technologies (which does not mean they are not willing or not able to learn). Highest degree also matters, as does teaching load. The more likely that faculty possess the doctorate and have a high teaching load, the more likely they will use websites in their teaching. But perhaps in contrast to early expectations that females used technologies less than males, gender did
not have significant influence on faculty use of websites in teaching in either type of institution. (p. 66)

Another researcher noted how community college faculty members are more likely to incorporate instructional technology as an extension of their own personal interests rather than being influenced to do so by college policy (Mars & Ginter, 2007). Faculty resistance to technology was cited in further research, and this resistance was attributed to their fear of being replaced and their perspective that technology was ineffective (Mars & Ginter, 2007). Jackowski and Akroyd (2010) noted how faculty in their study cited autonomy as a factor that motivated them to use technology, along with compensation. Other research on this topic indicated how student demands motivated faculty to incorporate instructional technology (Mars & Ginter, 2007). Time constraints were also noted by several researchers as a factor influencing community college faculty and their use of instructional technology (Mitchell, 2011; Jackowski & Akroyd, 2010). According to Mitchell (2011),

One of the greatest barriers to participation in training activities is time. If people cannot see the benefit of learning how to use technology, they will not attend trainings. Faculty members, particularly those who are not comfortable with using technology, can be incredibly resistant to training for technology they think they will not use or do not need to use. Thus, it is important to approach training for technology use from an adult learning perspective… Time is a factor that should be considered from multiple angles. The person or department responsible for training will have to consider the time it will take: to set up the
hardware or software; to learn how to use the technology properly; to train staff, faculty, and students; and for maintenance and support. (p. 49)

Other research cited the notion that time demands affect community college faculty members’ use of instructional technology. This research also noted just how time consuming it can be to learn and implement new technology and that faculty members may need to be paid additionally or given reduced workloads to provide adequate time for faculty members to learn new instructional technologies (Jackwoski & Akroyd, 2010).

Technology Adoption Models and Theories

Technology Acceptance Model (TAM)

Numerous models and theories with which to analyze technology adoption have been reported in the scholarly literature (Al-Shboul, 2011; Del Favero & Hinson, 2007; Halawi & McCarthy, 2007; Holden & Rada, 2011; Jarrahi, 2010; Keller, 2005; Kultur, 2009; Gautreau, 2011; Rogers, 2003; Song, Wang, & Liu, 2011; West, Waddoups, Kennedy, & Graham, 2007; Zayim, Yildirim & Saka, 2006). Specifically, authors have introduced and endorsed the technology acceptance model (Halawi & McCarthy, 2007; Holden & Rada, 2011; Kultur, 2009), the concerns-based model (Del Favero & Hinson, 2007; Song, Wang, & Liu, 2011; West, Waddoups, Kennedy, & Graham, 2007;), and the Rogers theory of technology diffusion and adoption (Al-Shboul, 2011; Gautreau, 2011; Keller, 2005; Rogers, 2003; Song, Wang, & Liu, 2011; Zayim, Yildirim, & Saka, 2006).

The technology acceptance model (TAM) is modeled after the social psychology theory of reasoned action and posits that a technology user’s perceptions of
usefulness and ease of use affect their adoption of technology (see Figure 2) (Halawi & McCarthy, 2007; Kultur, 2009). Further, Holden and Rada (2011) noted that

...the TAM is a theoretical model that predicts how a user comes to accept and use a given information technology. The model suggests that when users are presented with a particular information technology, a number of factors, notably perceived usefulness and perceived ease of use, influence their decision of how and when they will use the technology. (p. 343)

*Figure 2. Original technology acceptance model (TAM) (Kultur, 2009, p. 35).*

One of the primary components of the TAM, perceived ease of use, has been defined as the amount of effort related to using a particular technology (Holden & Rada, 2011). In Kultur’s (2009) research on private university instructors, Kultur reported that the instructors’ perceptions of ease of use affected their course management system usage. Specifically, Kultur stated,

The results of this study showed that instructors’ perception of easiness of a system affects the usage and is affected by their self-efficacy in using CMS and computers. Moreover, perceived ease of use directly affects perceived usefulness and as a result indirectly affects the usage of CMS through perceived usefulness. The interview results support these findings. For example, user-
friendly interface, reliable services and flexibility of the software were issues that were emphasized and given importance by the instructors. (p. 146)

In another study that examined college faculty CMS adoption using the TAM, Halawi and McCarthy (2007) also noted that perceived ease of use influenced instructors’ use of the Blackboard CMS.

The other essential component in the TAM, perceived usefulness, has been defined as the degree to which an individual believes that a technology will enhance or improve his or her performance (Kultur, 2009). Kultur’s (2009) research on private university faculty members and their use of course management systems revealed that there is a strong relationship between perceived usefulness, perceived personal benefit, and the intent to use a CMS.

External variables are also important components of the TAM and have been defined as those variables that affect the degree to which users accept technology (Holden & Rada, 2011). Holden and Rada’s (2011) research study on the use of technology by K-12 teachers found that the external variables of population and situation should be accounted for. They reported that,

…the outcomes of these variables are population-dependent and possibly situation based and will vary based on the targeted user population evaluated…. Thus, the influences of external variables might not be generalizable and may vary depending on the population. This idea may be the reason why external variables have not been well investigated in many existing TAM studies. Nonetheless, they remain an important component in explaining the technology acceptance and usage behavior of the population in question”. (p. 362)
Other researchers found that technology training and support was an external variable within the TAM that should be considered. According to Kultur’s (2009) research, the perception of training and support availability was significantly related to perceived ease of use. However, training and support were found to have a weak relationship with intent to use and instructor computer self-efficacy. Further, Kultur (2009) noted that although the external variables of training and support may not influence instructors’ intent to use a course management system, these variables might influence their continued use of CMSs.

Another variable related to the TAM noted in the literature is self-efficacy. Self-efficacy has been defined as “one’s belief in his or her ability to execute a particular task (Holden & Rada, 2011, p. 345). In one TAM study, self-efficacy was correlated with both perceived usefulness and ease of use (Kultur, 2009). Holden and Rada (2011) noted that there are several different types of efficacy, such as computer, technology, e-learning, and Internet. Holden and Rada’s (2011) research on the use of technology by K-12 teachers found that “technology self-efficacy was more beneficial to the TAM than computer self-efficacy; however, this impact might vary for the evaluations of different populations and technologies” (p. 343). Further, Holden and Rada (2011) noted that the variable of perceived usability is important because based on their TAM research, this variable “explained more variance and was more influential to TAM elements than its absence, thereby supporting the importance… of evaluating usability when investigating educational technology acceptance and usage behavior” (p. 343).
Concerns-based Model (CBAM)

In addition to the TAM, researchers also have promoted another model within the literature: the concerns-based model (CBAM). The CBAM describes the types of concerns faculty experience when they are deciding to adopt a particular technology: awareness, informational, personal, management, consequences, collaboration, refocusing (West, Waddoups, Kennedy, & Graham, 2007) (see Figure 3).

<table>
<thead>
<tr>
<th>Stage of Concern</th>
<th>Expression of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>0. Awareness</td>
<td>I am not concerned about it.</td>
</tr>
<tr>
<td>1. Informational</td>
<td>I would like to know more about it.</td>
</tr>
<tr>
<td>2. Personal</td>
<td>How will using it affect me?</td>
</tr>
<tr>
<td>3. Management</td>
<td>I seem to be spending all my time getting materials ready.</td>
</tr>
<tr>
<td>4. Consequence</td>
<td>How is my use affecting learners? How can I refine it to have more impact?</td>
</tr>
<tr>
<td>5. Collaboration</td>
<td>How can I relate what I am doing to what others are doing?</td>
</tr>
<tr>
<td>6. Refocusing</td>
<td>I have some ideas about something that would work even better.</td>
</tr>
</tbody>
</table>

*Figure 3. Concerns-based model (Del Favero & Hinson, 2007, p. 394).*

According to West, Waddoups, Kennedy, and Graham, (2007)

In order, these concerns are awareness, informational, personal, management, consequences, collaboration, and refocusing. The earlier concerns focus mostly on becoming aware of an innovation, and simply learning to survive successfully with that innovation. Later, instructors acquire concerns about consequences, leading them to eventually refocus their use of the innovation to improve consequences, such as learning outcomes. (p. 17)
Other researchers have noted that in the early stages of the CBAM, individuals are focused on themselves and trying to understand how the innovation or technology is going to affect them (Del Favero & Hinson, 2007). Song, Wang, and Liu (2011) divided the CBAM concerns into three phases and titled the initial concerns as “self-concerns” or a characterization which supported what other researchers have noted in this area:

According to these stages, adopters advance from lower-level, self-oriented concerns (awareness, informational, and personal) to intermediate-level, task-related concerns (management), and finally to impact concerns (consequence, collaboration, and refocusing). In the awareness stage (Stage 0), a person has either little knowledge of or little involvement with the innovation. Self-concern refers to the questions we ask when we hear about an innovation (Stage 1, informational) and think about how the innovation may affect us (Stage 2, personal). Task concerns emerge as we learn new skills such as time management and material usage (Stage 3, management). Impact concerns describe our thoughts on how we can make an innovation work better for our students (Stage 4, consequence), how to make it work better by actively improving it with colleagues (Stage 5, collaboration), and, ultimately, how to be successful with the innovation and seek out positive changes to implement (Stage 6, refocusing). (Song, Wang and Liu, 2011, p. 142)

Researchers also noted that levels of use are another component of the concerns-based model (Del Favero & Hinson, 2007) (see Figure 4). According to Del Favero and Hinson (2007), “Designated behaviors are evidence of faculty progress through the various stages of the adoption process. Similar to the stages of concern, these behaviors
can also be used as observable guideposts for department chair assessment of where individual faculty members are in the adoption process” (p. 395).

<table>
<thead>
<tr>
<th>Levels of Use</th>
<th>Behavioral Indicators of Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0. Non-Use</td>
<td>The user has no interest, is taking no action.</td>
</tr>
<tr>
<td>1. Orientation</td>
<td>The user is taking the initiative to learn more about the innovation.</td>
</tr>
<tr>
<td>2. Preparation</td>
<td>The user has definite plans to begin using the innovation.</td>
</tr>
<tr>
<td>3. Mechanical</td>
<td>The user is making changes to better organize use of the innovation.</td>
</tr>
<tr>
<td>4a. Routine</td>
<td>The user is making few or no changes and has an established pattern of use.</td>
</tr>
<tr>
<td>4b. Refinement</td>
<td>The user is making changes to increase outcomes.</td>
</tr>
<tr>
<td>5. Integration</td>
<td>The user is making deliberate efforts to coordinate with others in using the innovation.</td>
</tr>
<tr>
<td>6. Renewal</td>
<td>The user is seeking more effective alternatives to the established use of the innovation.</td>
</tr>
</tbody>
</table>

Figure 4. Levels of Use of the Innovation: Typical Behaviors (Del Favero & Hinson, 2007, p. 395).

A research study utilizing the CBAM as a theory to examine the implementation of Blackboard at a university found that the majority of students surveyed preferred their instructors to use Blackboard. Additionally, the majority of faculty surveyed indicated that they were confident using Blackboard and found the CMS to be easy to use (West, Waddoups, Kennedy, & Graham, 2007). Conversely, findings within this same study revealed that students and faculty both were concerned about the stability of the system and reported numerous system outages since it had been implemented (West, Waddoups, Kennedy, & Graham, 2007). When examining their findings through the CBAM lens, West, Waddoups, Kennedy, and Graham (2007) further noted that,
earlier concerns [of instructors] focus mostly on becoming aware of an innovation, and simply learning to survive successfully with that innovation. Later, instructors acquire concerns about consequences, leading them to eventually refocus their use of the innovation to improve consequences, such as learning outcomes. It could be that because the adoption of CMS technologies was still a relatively new occurrence for many instructors on our campus, instructors and students still had basic concerns of simply managing the technology, and were consequently using the tool for those tasks that were easiest, such as to communicate with students about grades or announcements or to “hand-out” articles to read. This could explain why the tool was mostly used for teacher-centered instructional activities. (p. 17)

**Rogers Diffusion of Innovation Theory**

Yet another theory related to technology adoption is the Rogers Diffusion of Innovation theory. According to Rogers (2003), an innovation is an “idea, practice or object that is perceived to be ‘new’ by the individual or unit of adoption” (p. 12), and diffusion is the “process by which 1) an innovation 2) is communicated through certain channels 3) over time 4) among the members of a social system” (p. 11). A principle feature of Rogers’ theory is that there are five adopter categories that identify individuals’ predisposition to adopting an innovation: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, (5) laggards (Gautreau, 2011; Rogers, 2003; Zayim, Yildirim, & Saka, 2006) (see Figure 5).
Zayim, Yildirim, and Saka (2006) noted that individuals in a social system do not adopt an innovation at the same rate and that individuals differ in terms of their psychological and social traits. Specifically, the researchers noted that individuals that were considered to be early adopters possessed traits such as visionary, risk taker, favored change, experimenter, self-sufficient and horizontally connected, while individuals that were considered more mainstream possessed traits such as conservative, problem oriented, risk averse, in need of support and vertically connected (Zayim, Yildirim and Saka, 2006). Additionally, the researchers stated, “The differences between people who fall into Rogers’ Early Adopter and Early Majority categories create gaps in motivation, expectations and needs”. (Zayim, Yildirim and Saka, 2006, p. 215) The results of Zayim, Yildirim, and Saka’s, (2006) research on medical faculty and their use of technology revealed that early adopters used more technologies, had higher levels of computer competency, and value instructional technology more than mainstream faculty.

Rogers also promoted the notion that there are five perceived attributes of innovation and noted that these attributes accounted for approximately half of the variance in the rate of innovation adoption: relative advantage, compatibility,
complexity, triability and observability (Rogers, 2003). For Rogers, relative advantage addressed the innovation adopters’ perceptions that a new innovation supersedes the current or old innovation (Rogers, 2003). The compatibility attribute focused on the adopters’ perception that an innovation is aligned with their values and the complexity attribute addressed adopters perceptions of an innovation being too complicated (Rogers, 2003). Finally, Rogers’ triability attribute addressed adopters’ perceptions of an innovation being available on a trial basis for personal experimentation and observability focused on adopters’ perceptions that an innovation’s results are visible to others (Rogers, 2003). In the research conducted by Keesee and Shepard (2011), they examined Rogers’ adopter levels and how they correspond with the five innovation attributes related to faculty adoption of CMSs. The results of their research revealed that the complexity attribute was the only significant predictor of adopter status for all 5 adopter levels (Keesee & Shepard, 2011). Their research also confirmed that Roger’s adopter status can be predicted based on faculty perceptions of the perceived attributes of the CMS (Keesee & Shepard, 2011). Furthermore, the researchers noted that by “identifying faculty attitudes toward online education and the CMS, administrators and faculty development staff may be able to account for factors that influence or impede adoption and diffusion” (Keesee & Shepard, 2011, p. 11). Finally, the findings of this study noted that faculty in different adopter categories have different support needs (Keesee & Shepard, 2011).

An additional component of Rogers’ theory is four major diffusion factors: (1) the innovation itself, (2) innovation information distribution, (3) time, and (4) the social system adopting the innovation (Rogers, 2003; Gautreau, 2011). According to Rogers
Getting a new idea adopted, even when it has obvious advantages, is difficult…” (p. 1). Rogers also observed that “when new ideas are invented, diffused, and are adopted or rejected, leading to certain consequences, social change occurs” (p. 6).

Other researchers also have examined the innovation process in organizations as it relates to Rogers’ theory (Keller, 2005; Song, Wang, & Liu, 2011). Keller (2005) noted how Rogers posits that there are two broad activities that organizations experience during the innovation process: initiation and implementation. The initiation process is marked by two stages, agenda setting and matching, where agenda setting focuses on defining the organization problem and the matching stage focuses on customizing the innovation to solve the identified organizational problem (Keller, 2005). The implementation phase has three components, redefining/restructuring, clarifying, and routinizing (Keller, 2005).

The first stage of the implementation is redefining/restructuring, when the innovation is re-invented to accommodate the organisational needs more closely. Clarifying occurs as the innovation is put to a more widespread use and the meaning of the innovation becomes clear to the organisation’s members. Routinizing marks the end of the innovation process, as the innovation becomes an incorporated part of the organisation and ceases to be an innovation. (Keller, 2005, p. 3)

Song, Wang, and Liu (2011) cited Rogers’ notion that the innovation process follows these steps: knowledge, persuasion, decision, implementation, and confirmation. They also noted that “in general, when people are confronted with a new
technology, they will gather information, test the technology, and then consider whether the new technology is a sufficient improvement to warrant the investment of their time and energy to learn the skills required to use it” (p. 142).

Although the TAM, CBAM, and diffusion of innovation theories were the most frequently cited theories of technology adaptation in the literature, others were also mentioned. For example, Gautreau (2011) cited the motivation hygiene theory, which explored motivation and job satisfaction. Gautreau also noted the importance of change theory and strategies for influencing the rate of change as it relates to technology. Jarrahi (2010) utilized structuration theory to examine how social implications influence learning technologies. Jarrahi’s (2010) research found that “at the heart of structurational analysis rests a due consideration of the context within which the CMS innovation unfolds. The investigation put forth in this article demonstrates how particular social structures specific to an academic context would have an important bearing on the use of a CMS” (p. 269).

An examination of the theories and models related to technology adoption helps provide a foundation for further adoption research. The concerns based model, technology acceptance model and diffusion theory provide a wealth of information regarding factors that influence technology adoption, which can be applied to research on course management system technology adoption.
Chapter 3

Methods

Introduction

Approximately one third of all college students (approximately 7.7 million) attend a community college (Carnegie Foundation for the Advancement of Teaching, 2010; Caruso, 2007). According to a 2007 report by the EDUCAUSE Center for Applied Research (ECAR), community college students indicated that only 49% of their courses used a CMS, while four-year university students reported that 66.7% of their courses used a CMS. Based on this report, it would seem crucial to gain a better understanding of the reasons why a substantial portion of the 400,000 faculty members teaching at community colleges (Kerste, 2011) have chosen not to utilize a course management system, especially since numerous benefits are associated with course management system use for faculty and students in online, blended and supplemental courses. Furthermore, limited research has been conducted that focuses specifically on community college faculty adoption of course management systems (West, Waddoups, Kennedy, & Graham, 2007).

The intent of this study was to identify and understand the most important factors that influence faculty members to adopt CMSs. By identifying the most influential CMS faculty adoption factors, state and community college leaders, as well as faculty development professionals who wish to increase course management system adoption among faculty at their colleges could gain a better understanding of faculty perceptions regarding CMS adoption and initiate policy and programmatic changes that bolster CMS usage.
Research Questions

For the purposes of this study, the following research questions will be addressed:

RQ1: What factors most influence faculty members at two-year community colleges to adopt a course management system?

RQ2: What factors most inhibit faculty members at two-year community colleges from adopting a course management system?

RQ3: Are the course management system adoption factors different for part-time faculty members and full-time faculty members at two-year community colleges?

RQ4: Are the course management system adoption factors different for rural, suburban and urban community college faculty members?

Research Method

The intent of the researcher in this study is to employ quantitative techniques to analyze the perceptions of community college faculty members and the factors that influence their adoption of course management systems for instructional purposes. In a broad sense, quantitative research techniques will assist the researcher in this study to make predictions that can be generalized to the broader population of people and places as well as contribute to theory on this subject (Leedy & Ormrod, 2005). A quantitative research approach seems appropriate since it “typically employs strategies of inquiry such as experiments and surveys, and collects data on predetermined instruments that yield statistical data” (Richy & Klein, 2007, p. 159). Much of the research cited
previously in the review of literature utilized quantitative methods, specifically surveys, to collect data regarding faculty instructional technology use (Davis, 1989; Gautreau, 2001; Halawi & McCarthy, 2007; Holden & Rada, 2011; Keese & Shepard, 2011; Moore & Benbasat, 1991; Morgan, 2003; Zayim, Yildirim, & Saka, 2006).

Additionally, it has been suggested that quantitative research is effective at measuring both attitudes and behavior, which also seems well suited for the goals of this research study (Kerste, 2010).

**Research Design**

The research design for this study is a non-experimental, descriptive survey design. According to Leedy (2005), “Survey research involves acquiring information about one or more groups of people—about their characteristics, opinions, attitudes, or previous experiences—by asking them questions and tabulating their answers. The ultimate goal is to learn about a large population by surveying a sample of that population; thus, we might call this approach a descriptive survey or normative survey” (p. 183). Kerste (2010) noted that non-experimental approaches are superior for studying perceptions and beliefs. Further, survey research is designed to obtain data on specific variables from a sample of individuals that are representative of a group (Richey & Klein, 2007). The survey research design approach is well suited for the purpose of this study, which is to examine, using a web-based survey instrument, the factors that influence community college faculty members to adopt a course management system.
After a review of the literature regarding faculty adoption of instructional technology, specifically course management systems, the researcher determined that there was a need to validate the researcher-developed survey instrument.

**Pilot Study**

Much research has been conducted on faculty adoption of instructional technology, yet less research has been conducted on faculty adoption of course management systems, and even less research has been conducted on community college faculty members and their adoption of course management systems. In previous research studies published on faculty instructional technology and course management system adoption, the researchers of those studies cited a variety of factors that influence faculty adoption: ease of use (Halawi & McCarthy, 2007; Holden & Rada, 2011; Kultur, 2009); usefulness (Halawi & McCarthy, 2007; Holden & Rada, 2011; Kultur, 2009); self-efficacy (Halawi & McCarthy, 2007; Holden & Rada, 2011; Kultur, 2009); training and support (Kultur, 2009); control issues (Al-Shboul, 2011); time and workload issues (Al-Shboul, 2011; Gautreau, 2011); organizational culture, reward structure (Zayim, Yildiriim, Saka, 2006); prestige (Moore & Benbast, 1991); discipline considerations (Jarrahi, 2010); pedagogical approach (Chang, 2008); relative advantage (Rogers, 2003); triability (Rogers, 2003); observability (Rogers, 2003); visibility (Moore & Benbast, 1991); voluntariness (Moore & Benbast, 1991); CMS flexibility, reliability, and consistency (Anderson, 2003; Morgan, 2003). Since these factors were reported in various research studies and not all in one study, the researcher developed a new questionnaire containing all of these factors. Further, by constructing a
questionnaire with all of these factors, the researcher in this study will be able to fully answer the research questions.

The purpose of the pilot study was to validate the instrument developed by the researcher to be used in the primary study. The survey instrument was a self-report questionnaire with three parts (see Appendix A). The first part contained question items designed to gather basic demographic information, such as gender, part-time or full-time instructor status, tenured or non-tenured status, academic discipline, years of service at a community college, and years of experience with course management systems.

The second part of the questionnaire contained items designed to collect information about the respondents’ perceived technological skill level. Items in this section focused on determining the respondent’s knowledge and experience in using CMSs.

The third part of the questionnaire contains items designed to collect information about the various CMS adoption factors cited in the research literature on this topic. The items in this section are based on a research studies focused on faculty members’ adoption of instructional technology, specifically course management systems. These factors include the following:

4 Training and support (Al-Shboul, 2011; Gautreau, 2011; Kultur, 2009)
5 Instructor control issues (Al-Shboul, 2011)
6 Time and workload issues (Al-Shboul, 2011; Gautreau, 2011)
7 Organizational culture (Jarrahi, 2010)
8 Reward structure (Al-Shboul, 2011; Gautreau, 2011; Zayim, Yildiriim, & Saka, 2006)
9 Prestige (Moore & Benbast, 1991)
10 Instructor discipline considerations (Jarrahi, 2010)
11 Instructor pedagogical approach (Chang, 2008)
12 Triability (Rogers, 2003)
13 Observability (Rogers, 2003)
14 Visibility (Moore & Benbast, 1991)
15 Relative advantage (Rogers, 2003)
16 Voluntariness (Moore & Benbast, 1991)
17 CMS flexibility, reliability, and consistency (Anderson, 2003; Morgan, 2003)

Data Collection

According to Wright (1985), in order to construct an effective survey questionnaire, the researcher must have a “clear idea of the aim of the questionnaire” (p. 75) as well as an intimate knowledge of the “language the intended subjects understand and use” (p. 75). To ensure the research-based questionnaire had a clear aim and was worded appropriately, the questionnaire was sent to a group of experts, including instructional
designers and research and measurement professors. These experts were asked to review the questionnaire and comment on its organization, composition, clarity, and language usage. Feedback from the experts was considered by the researcher and, where appropriate, revisions were made to the questionnaire prior to the start of the pilot study.

The revised questionnaire was placed on SurveyMonkey.com, a web-based survey website. According to Richy and Klein (2007) “Web-based surveys are rapidly becoming the norm in many areas of research. There is a wide variety of low-cost software that formats survey instruments for delivery over the Internet. Thus, it is possible to manage a participant sample from a wide geographic area and within a broad range of work settings if these participants can connect easily to the internet (p. 118). Richy and Klein (2007) noted several suggestions for improving web-based questionnaires, such as including a progress bar in multi-page surveys; using dictionary-recognizable words and phrases; simplifying the questionnaire color scheme so that there is a high degree of contrast between the background and the font; and limiting colors, font types, italics, and animations. One hundred fifty-two faculty members at a Midwestern four-year research university during the spring 2013 semester were selected to participate in the pilot study. An email was sent to the faculty members requesting their participation in the pilot. The faculty members were asked to complete a web-based questionnaire within ten business days and were also sent two reminder messages before the survey period expired.

Data Analysis

The Rasch model was used to analyze data from the pilot study. The Rasch model is a measurement model in the item response theory (IRT) family of
measurement models, which is based on the notion of a single underlying latent trait that is being measured (Keeves & Alagumalai, 1999). The Rasch model is a mathematical formula used to examine the nature of the relationship between persons completing a survey and the survey items contained within the survey that operationalize one trait or construct (Green & Frantom, 2002). Further, Wright (1985) noted that an important function of the Rasch model is to provide a method for constructing linear systems from observed counts, such as likert scales, where both items and subjects are measured.

**Rasch model Overview**

The nature of quantitative research is to identify events and qualities of the environment that are worthy of observation and count them (Wright & Stone, 1999). These counts of observed events or qualities, or raw scores, are not necessarily measures because they do not have numerical properties (Wright & Stone, 1999). One of the most important functions of the Rasch model is to transform raw scores into measures with more defined meanings (Wright & Linacre, 1989; You, 2010). “Rasch analysis is a method for constructing from observed counts and categorical responses (like likert scales) linear systems within which items and subjects can be measured unambiguously” (Wright, 1985, p. 75).

Additionally, the Rasch approach is grounded in the notion that the more difficult an item on a survey or test is, the more likely it is for the subject to be unsuccessful (Wright & Stone, 1999). It is because of this assumption that the Rasch model is able to convert raw scores or counts into measures (Wright & Stone, 1999). “The measure of a subject on each variable summarizes the subject’s statements about
the variable to the extent that the subject shares a definition of the variable with others. Rasch analysis is able to detect idiosyncrasies – specific departures of subjects and items from the shared understanding that is emerging from the ongoing research” (Wright, 1985, p. 75).

Further, Rasch measurement also assumes that subjects’ item responses are influenced by the difficulty of the item and the latent trait (Green & Frantom, 2002). The Rasch model provides theory and techniques to support quantitative research by examining observations to see how well they fit together and cooperate to define the intended underlying meaning (Wright & Stone, 1999). This underlying meaning is considered a latent trait, which is part of the research traditions of item response theory and latent trait theory (Fink, 2007; Keeves & Alagumalai, 2005). A key concept in item response theory is unidimensionality, which is concerned with whether the data being measured form a single construct (Smith, Fallowfield, Stark, Velikova, & Jenkins, 2010). “The Rasch model is a mathematical formula that specifies the form of the relationship between persons and the items that operationalize one trait” (Green & Frantom, 2002) or construct. The researcher of this study has chosen to apply the Rasch model to determine whether the survey instrument that has been developed comprises the single construct of course management system adoption factors affecting community college faculty. There are a several critical characteristics that comprise the Rasch model, such as difficulty, fit, separation, reliability, validity and multi-dimensionality.

**Difficulty.** The Rasch model measures both item difficulty and person ability, and the measures are expressed as log odd units, also referred to as logit measures.
Item difficulty refers to the likelihood a subject will respond to an item favorably. “Items that are more difficult to agree with will elicit fewer favorable responses than items that are easier to respond in a favorable manner. Items that are more difficult and persons with greater propensity to be satisfied are generally reported as positive logits. Easier items or persons with a lesser propensity to be satisfied are generally reported as negative logits” (Fink, 2007, p.66).

Fit. The Rasch model provides information related to how well there is a match or fit between the observed responses and the model expectations (You, 2010). Specifically, Rasch fit refers to when researchers compare observed person and item responses to the expected values that are determined by the measurement model expectations (Wright & Stone, 1999). “Fit statistics are calculated by differing each pair of observed and model-expected responses, squaring the difference, summing all the pairs, averaging and standardizing to approximate a unit normal (z) distribution” (Green & Frantom, 2002, p. 7). Fit information is provided by the Rasch computer program WINSTEPS™ through mean square fit (msqn) statistics related to whether items and subjects conform to the model expectations (Fink, 2007). Fit statistics have an expected value of 1.0, and deviations higher than 1.0 correspond with a lack of fit between item and model (Smith, Fallowfiled, Stark, Velikova, & Jenkins, 2010). Rasch fit analysis examines both the fit of the items and the fit of the persons. Item fit examines the item patterns for all subjects, and person fit examines the patterns of specific subject responses to all the survey instrument items (You, 2010). Person fit can determine the consistency of subject responses as well as determine idiosyncratic responses or out fit (Green & Frantom, 2002). Out fit is associated with erratic
responses from participants that could be considered outliers (Smith, Fallowfiled, Stark, Velikova, & Jenkins, 2010). Over fit is considered a Rasch fit MSQ statistic below 1.0 and could indicate the presence of redundant survey items, while under fit is a MSQ statistic above 1.0 that suggests unusual response patterns (Smith, Fallowfiled, Stark, Velikova, & Jenkins, 2010). Overall, survey responses attempt to use the same language as respondents to achieve a shared understanding of survey items; fit stats allow researchers to check whether they have a basis for communication (Green & Frantom, 2002).

Separation. The function of separation in the Rasch model “measures the spread of both items and persons in standard error units” (Green & Frantom, 2002, p. 8). When determining separation, the larger the separation detected in the model, the more the instrument is able to discern between persons and items (You, 2010). The formula for determining the separation is the ratio of the person’s or item’s adjusted standard deviation to the root square standard error (Fink, 2007). The reliability of person separation is similar to classic test theory’s Cronbach alpha (Green & Frantom, 2002; You, 2010).

Reliability. In the Rasch model, reliability is defined as the proportion of true variance of a set of measures (You, 2010) and is also associated with instrument stability when research is replicated (Fink, 2007). True variance, according to Fink (2007), “is the variance that remains after deducting measurement error. In Rasch, error variance is the mean-square error from a model misfit. Reliability is expressed as a separation of statistically different strata found in the sample” (p. 69).
Validity. The Rasch model examines validity through a fit analysis of each item (Wright, 1999). Additionally, content and construct validity are provided in the Rasch model by analyzing both high- and low-scoring respondents (Fink, 2007). One of the fit statistics reported in the Rasch model is infit mean square (MNSQ), and if item statistics are near 1.0, items are considered valid (Fink, 2007). Measure validity is also determined in the Rasch model by the consistency of each person’s performance on the instruments and the degree to which their performance fits the model pattern (Wright & Masters, 1982).

Multi-dimensionality. One of the principle components of the Rasch model is unidimensionality, yet the requirement of unidimensionality is difficult to adhere to completely because of the numerous factors that can influence performance. According to Smith (2002), “… unidimensionality should not be viewed as a dichotomous yes or no decision, but rather as a continuum. A relevant research question then becomes, “At what point on the continuum does multidimensionality threaten the interpretation of the item and person estimates?” (p. 576). Because the Rasch model constructs a one-dimensional measurement the model assumes that all the data results can be explained by one latent variable, then the residual data would represent random noise that would be considered normal when standardized in the model (Smith, 2002). Multidimensionality only becomes a problem when data present multiple dimensions that are so distinct that the Rasch model is unable to define specific unique dimensions (Smith, 2002).

Primary Study

Research Sites and Participants
The research sites were chosen based on their Carnegie classifications. One institution had a Carnegie student enrollment classification of “medium,” which is defined as a community college with a student enrollment of 2,000–4,999, and the setting is considered “suburban” according to their Carnegie classification (Carnegie Foundation for the Advancement of Teaching, 2012). The second community college also is classified as “medium,” the setting classification is “rural” (Carnegie Foundation for the Advancement of Teaching, 2012). The third community college is considered “very large” based on its enrollment of over 10,000 students and is located in what is considered an “urban” setting based on their Carnegie classification (Carnegie Foundation for the Advancement of Teaching, 2012). Nationally, 43 community colleges share the Carnegie Classification of “medium” and “suburban,” 113 share the Carnegie Classification of “medium” and “rural” and 42 are considered “very large” and “urban” (Carnegie Foundation for the Advancement of Teaching, 2012). The instructor population at the medium rural community college consists of 47 full-time faculty members and 151 part-time faculty members. The instructor population at the medium suburban community college consists of 60 full-time faculty members and 185 part-time faculty members. Finally, the instructor population at the very large, urban community college consists of 95 full-time faculty and 921 part-time instructors. All three Midwestern community colleges use Blackboard as their course management system.

**Faculty Adoption of a Course Management System**

A number of factors are associated with faculty members’ decision to adopt a course management system. In order to collect data regarding the most important
factors associated with adopting a CMS, the research developed a 41-item survey. The questions focus on the primary factors reported in the literature: Ease of use, perceived usefulness, self-efficacy, training and support, instructor control, time and work-load issues, organizational culture, reward structure, prestige, instructor discipline, pedagogical approach, triability, observability, visibility, relative advantage, voluntariness, and CMS flexibility, reliability, and consistency. A four-point Likert scale was used to collect faculty members’ responses (1 = “strongly disagree,” 4 = “strongly agree”).

Data Collection

Similar to the pilot study, an Internet survey utilizing SurveyMonkey.com was developed to collect research data. An invitation was sent to all faculty members teaching during the fall 2013 semester at both of the community colleges. The email invitation contained a brief overview of the nature of the research and a request for participation. A response deadline of 10 business days was also included in the invitation email. Invitations were sent to approximately 198 faculty members teaching at the small rural community college, approximately 245 faculty members teaching at the medium rural community college and 1000 teaching at the very large urban community college. A follow-up invitation was sent out after 6 days to those who had not responded to the initial invitation.

Data Analysis

Similar to the pilot study, a Rasch analysis using the computer program WINSTEPS™ was conducted to examine uni-dimensionality, item and person fit, difficulty, separation, and reliability and validity, and multi-dimensionality.
Additionally, an analysis using Facets™ was conducted to attempt to detect any difference between faculty in different community college settings and between part-time and full-time faculty members regarding CMS adoption factors.

**Facets Overview**

The Facets™ computer program provides a research analysis tool that enables researchers to analyze results from various settings and individuals representing various groups and transform those results into measures with greater meaning (Linacre and Wright, 2002). Facets™ provides a research tool whereby researchers can make comparisons of participants by using a common scale, similar to other Rasch models (Linacre and Wright, 2002). The Facets™ model was derived directly from the requirement of objectivity in the same manner as other Rasch models and acknowledges that “complete objectivity may not be obtainable for steps of the rating scale, however, when the definition of the scale depends on the observed structure of a particular testing situation” (Linacre and Wright, 2002, p. 300). Furthermore, Facets™ provides estimation equations similar to the partial credit model, whereby the equations provide parameter estimates and standard errors for research participant ability, item difficulty, severity of judge, and level of performance, as well as mean square fit statistics (Linacre and Wright, 2002). Through the use of Facets™ analysis and the techniques outlined previously, the researcher hopes to identify any differences between part-time and full-time faculty and between faculty participants from different community college settings related to CMS adoption factors.

**Summary**
A number of factors are associated with faculty members’ decision to adopt a course management system—specifically, ease of use; perceived usefulness; self-efficacy; training and support; instructor control; time and workload issues; organizational culture; reward structure; relative advantage; prestige; instructor discipline; pedagogical approach; triability; observability; visibility; voluntariness; and CMS flexibility, reliability, and consistency. The researcher developed a 41-item questionnaire focused on various CMS adoption factors in an attempt to determine the most meaningful factors. A pilot study was conducted to test the survey questionnaire and ensure that it was uni-dimensional through the use of of Rasch analysis. The Rasch analysis helped determine the uni-dimensionality of the survey instrument as well as identify overall effectiveness of the instrument rating scale, person-response consistency, idiosyncratic responses, and redundant or missing survey questionnaire items. Finally, multi-dimensional analysis using Facets™ assisted the researcher with identifying meaningful differences among community college faculty from different college location settings and differences among part-time and full-time community college faculty related to the factors that influence faculty adoption of course management systems.
Chapter 4

Results

Pilot Study

A pilot study was conducted by sending an online questionnaire to 152 faculty members who taught during the 2013 spring/summer semester at a Midwestern four-year institution. Twenty-nine faculty members completed the online questionnaire for a response rate of 19%. The online questionnaire was open for a period of three weeks, from July 8, 2013, until July, 26, 2013.

Participant Characteristics

The largest number of pilot study participants indicated they were full-time (82.8%) female (64.3%) faculty members (see Table 1 and Table 2).

Table 1

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>10</td>
<td>35.7</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>64.3</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>100</td>
</tr>
</tbody>
</table>

Note. One participant failed to report his or her gender.

Table 2

<table>
<thead>
<tr>
<th>Work Status</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
</table>
The largest number of pilot study participants (34.5%) indicated that they taught within the health sciences area, while the second largest number of pilot study participants (20.6%) indicated that they taught within the social sciences area (see Table 3).

Table 3

*Academic Department Frequency Statistics*

<table>
<thead>
<tr>
<th>Academic Department</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts</td>
<td>3</td>
<td>10.3</td>
</tr>
<tr>
<td>Business</td>
<td>2</td>
<td>6.9</td>
</tr>
<tr>
<td>Education</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Engineering</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Health Sciences</td>
<td>10</td>
<td>34.5</td>
</tr>
<tr>
<td>Humanities</td>
<td>3</td>
<td>10.3</td>
</tr>
<tr>
<td>Mathematics</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Science</td>
<td>1</td>
<td>3.4</td>
</tr>
<tr>
<td>Academic Department</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>----------------------------</td>
<td>----</td>
<td>------</td>
</tr>
<tr>
<td>Social Science</td>
<td>6</td>
<td>20.7</td>
</tr>
<tr>
<td>Vocational Trades</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>13.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>29</td>
<td>99.9</td>
</tr>
</tbody>
</table>

Note. Three participants failed to indicate their academic department.

Additionally, the majority (86.2%) of participants in the pilot study indicated that they had 10 or more years of experience teaching at the college level (See Table 4).

### Table 4

*Years of Teaching Experience Frequency Statistics*

<table>
<thead>
<tr>
<th>Years of Teaching Experience</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 years</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2-4 years</td>
<td>1</td>
<td>3.4</td>
</tr>
<tr>
<td>5-9 years</td>
<td>3</td>
<td>10.3</td>
</tr>
<tr>
<td>10+</td>
<td>25</td>
<td>86.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>29</td>
<td>99.9</td>
</tr>
</tbody>
</table>
**Reliability and Separation**

A Rasch analysis revealed a 0.84 participant reliability with a 2.33 separation. The participant reliability results indicate that the questionnaire produced consistent results, and the separation statistic indicated that there were two statistically significant groupings of participants. The participant separation statistic is related to the clarity or precision of the measures. The item results revealed a 0.84 item reliability with a 2.27 separation. This also indicated good item reliability, and the separation statistic indicated that there are two groupings of items on the questionnaire.

An examination of the Rasch item-fit analysis revealed that several items needed possible revision (see Figure 6). The typical range for reliable items in the Rasch Infit MNSQ report is .06-1.4. Any items outside of this range should be examined more closely and perhaps modified or removed. Based on the Rasch Infit MNSQ analysis, several items on the pilot study questionnaire required revision.

Item 11, “The advantages of using a CMS outweigh the disadvantages,” had an Infit MNSQ statistic of 2.40. The item was revised to be more concise and was changed to “There are advantages with using a CMS.”

Item 26, “My college rewards faculty teaching innovation,” had an Infit MNSQ statistic of 1.89. Upon review, the item was reworded to focus more directly on CMS use. The item wording was revised to “My college rewards faculty who use a CMS.”

Item 19, “Using a CMS takes too much time,” had an Infit MNSQ statistic of 1.67. This item was revised to be more concise and was changed to “Using a CMS is time consuming.”
Item 17, “CMS use allows me to have greater control over my teaching,” had an Infit MNSQ statistic of .48. The item was revised to be more specific and was revised to “CMS use allows me to have greater control over my instructional materials.”

Item 24, “My colleagues encourage CMS use,” had an Infit MNSQ statistic of .44. The item was revised to be more personal and was changed to “My colleagues encourage me to use a CMS.”

Item 13, “I don’t feel that I have the technology skills to effectively use a CMS,” had an Infit MNSQ statistic of .30. The item was revised to have a more positive tone and was changed to “I have the technology skills necessary to effectively use a CMS.”

Table 10.3: CMS Adoption Pilot Study

<table>
<thead>
<tr>
<th>Entry</th>
<th>Total</th>
<th>Score</th>
<th>Count</th>
<th>Measure</th>
<th>Sum</th>
<th>MNSQ</th>
<th>ZT/CONF</th>
<th>LogR</th>
<th>EXP</th>
<th>Infit</th>
<th>MNSQ</th>
<th>ZT</th>
<th>CONF</th>
<th>LogR</th>
<th>EXP</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>90</td>
<td>20</td>
<td>1.12</td>
<td>-.90</td>
<td>5.17</td>
<td>1.60</td>
<td>2.91</td>
<td>3.31</td>
<td>21</td>
<td>38</td>
<td>1.34</td>
<td>4.04</td>
<td>1.15</td>
<td>21</td>
<td>7.59</td>
<td>6.48</td>
</tr>
<tr>
<td>11</td>
<td>79</td>
<td>29</td>
<td>1.09</td>
<td>.40</td>
<td>5.06</td>
<td>1.35</td>
<td>2.73</td>
<td>3.41</td>
<td>36</td>
<td>34</td>
<td>1.35</td>
<td>4.04</td>
<td>1.17</td>
<td>21</td>
<td>7.59</td>
<td>6.48</td>
</tr>
<tr>
<td>17</td>
<td>57</td>
<td>29</td>
<td>1.00</td>
<td>.90</td>
<td>5.17</td>
<td>1.57</td>
<td>2.73</td>
<td>3.41</td>
<td>36</td>
<td>34</td>
<td>1.35</td>
<td>4.04</td>
<td>1.17</td>
<td>21</td>
<td>7.59</td>
<td>6.48</td>
</tr>
<tr>
<td>22</td>
<td>52</td>
<td>29</td>
<td>1.00</td>
<td>.40</td>
<td>5.00</td>
<td>1.57</td>
<td>2.73</td>
<td>3.41</td>
<td>36</td>
<td>34</td>
<td>1.35</td>
<td>4.04</td>
<td>1.17</td>
<td>21</td>
<td>7.59</td>
<td>6.48</td>
</tr>
<tr>
<td>25</td>
<td>61</td>
<td>29</td>
<td>1.00</td>
<td>.40</td>
<td>5.00</td>
<td>1.57</td>
<td>2.73</td>
<td>3.41</td>
<td>36</td>
<td>34</td>
<td>1.35</td>
<td>4.04</td>
<td>1.17</td>
<td>21</td>
<td>7.59</td>
<td>6.48</td>
</tr>
<tr>
<td>30</td>
<td>67</td>
<td>29</td>
<td>1.00</td>
<td>.40</td>
<td>5.17</td>
<td>1.57</td>
<td>2.73</td>
<td>3.41</td>
<td>36</td>
<td>34</td>
<td>1.35</td>
<td>4.04</td>
<td>1.17</td>
<td>21</td>
<td>7.59</td>
<td>6.48</td>
</tr>
</tbody>
</table>

Figure 6. Rasch item-fit analysis.

Primary Study

Three community colleges in the Midwest were chosen based on their Carnegie location setting classification. One community college was based in a rural setting, another was located in a suburban setting, and the third was based in an urban setting. The researcher contacted administrators in the instructional area at each of the...
community colleges to seek approval to conduct research and seek assistance with emailing the part-time and full-time faculty members who were teaching at each respective college during the fall 2013 semester. After the researcher received approval from the three community colleges, an email was sent to the administrative contacts at each college that contained instructions for sending out the email invitation (see Appendix B). This email included information about the nature of the research, the duration of time that the questionnaire would be available, and a link to the questionnaire (see Appendix C). Five days after the initial questionnaire invitation email had been sent, a reminder email was sent to faculty members at the three community colleges encouraging their participation. Due to low initial response rates, a third reminder email was sent to faculty at all three community colleges two days prior to the scheduled end date for the questionnaire. After the questionnaire response collection period ended, the researcher calculated the response rates from the three community colleges. One hundred and seventy emails were sent to faculty members at the rural community college, and 61 responded for a response rate of 35.8%. Two hundred and thirty-seven emails were sent to faculty members at the suburban community college, and 91 responded for a response rate of 38.3%. Finally, 741 emails were sent to faculty members at the urban community college, and 190 responded for a response rate of 25.6%. Overall, the researcher solicited 1,148 community college faculty members at three different community colleges, and a total of 338 responded to the questionnaire for a response rate of 29.4%.

**Participant Characteristics**
More female than male students participated in the primary study at all three community colleges (see Table 5), and the largest number of participants indicated they were part-time faculty members (see Table 6).

Table 5

*Participant Characteristics*

<table>
<thead>
<tr>
<th>Location</th>
<th>Gender</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>Male</td>
<td>24</td>
<td>39.3</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>37</td>
<td>60.7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>61</td>
<td>100</td>
</tr>
<tr>
<td>Suburban</td>
<td>Male</td>
<td>43</td>
<td>47.3</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>48</td>
<td>52.7</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>91</td>
<td>100</td>
</tr>
<tr>
<td>Urban</td>
<td>Male</td>
<td>71</td>
<td>37.6</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>118</td>
<td>62.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>189</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6

*Work Status*

<table>
<thead>
<tr>
<th>Location</th>
<th>Work Status</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
</table>
The largest number of rural and suburban community college participants were from the health sciences area (21.3%, and 22%, respectively), while the largest number of participants from the urban community college indicated they were from the humanities area (23%) (See Table 7, Table 8, and Table 9).

Table 7

*Rural--Academic Department*

<table>
<thead>
<tr>
<th>Rural--Academic Department</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts</td>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Academic Department</strong></td>
<td><strong>N</strong></td>
<td><strong>%</strong></td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Business</td>
<td>10</td>
<td>16.4</td>
</tr>
<tr>
<td>Education</td>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td>Engineering</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Health Sciences</td>
<td>13</td>
<td><strong>21.3</strong></td>
</tr>
<tr>
<td>Humanities</td>
<td>6</td>
<td>9.8</td>
</tr>
<tr>
<td>Mathematics</td>
<td>4</td>
<td>6.6</td>
</tr>
<tr>
<td>Science</td>
<td>7</td>
<td>11.5</td>
</tr>
<tr>
<td>Social Science</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>Vocational Trades</td>
<td>6</td>
<td>9.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>61</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 8**

*Suburban--Academic Department*

<table>
<thead>
<tr>
<th><strong>Suburban--Academic Department</strong></th>
<th><strong>N</strong></th>
<th><strong>%</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts</td>
<td>3</td>
<td>3.3</td>
</tr>
<tr>
<td>Business</td>
<td>18</td>
<td>19.8</td>
</tr>
<tr>
<td>Education</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Academic Department</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Engineering</td>
<td>8</td>
<td>8.8</td>
</tr>
<tr>
<td>Health Sciences</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>Humanities</td>
<td>18</td>
<td>19.8</td>
</tr>
<tr>
<td>Mathematics</td>
<td>8</td>
<td>8.8</td>
</tr>
<tr>
<td>Science</td>
<td>6</td>
<td>6.6</td>
</tr>
<tr>
<td>Social Science</td>
<td>9</td>
<td>9.9</td>
</tr>
<tr>
<td>Vocational Trades</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>91</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 9

_Urban--Academic Department_

<table>
<thead>
<tr>
<th>Urban--Academic Department</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts</td>
<td>9</td>
<td>5.2</td>
</tr>
<tr>
<td>Business</td>
<td>23</td>
<td>13.2</td>
</tr>
<tr>
<td>Education</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>Engineering</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Health Sciences</td>
<td>22</td>
<td>12.6</td>
</tr>
</tbody>
</table>
### Humanities
- 40 participants, 23% of total

### Mathematics
- 18 participants, 10.3% of total

### Science
- 24 participants, 13.8% of total

### Social Science
- 23 participants, 13.2% of total

### Vocational Trades
- 12 participants, 6.9% of total

### Total
- 174 participants, 99.9% of total

Additionally, the largest number of participants from all three community colleges indicated that they had 10 or more years of experience teaching at the college level (see Table 10).

#### Table 10

**Years of Teaching Experience**

<table>
<thead>
<tr>
<th>Location</th>
<th>Years of Teaching</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>0-1 years</td>
<td>3</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>2-4 years</td>
<td>5</td>
<td>8.2</td>
</tr>
<tr>
<td></td>
<td>5-9 years</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>10+</td>
<td>39</td>
<td><strong>63.9</strong></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>29</td>
<td><strong>99.9</strong></td>
</tr>
</tbody>
</table>
Finally, the largest number of participants from all three community colleges indicated that their technology skill level was proficient (48.2%) and that their CMS skill level was intermediate (52.7%) (see Table 11 and Table 12).

<table>
<thead>
<tr>
<th></th>
<th>Suburban</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-1 years</td>
<td>0-1 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suburban</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0-1 years</td>
<td>4</td>
</tr>
<tr>
<td>Suburban</td>
<td>2-4 years</td>
<td>16</td>
</tr>
<tr>
<td>Suburban</td>
<td>5-9 years</td>
<td>24</td>
</tr>
<tr>
<td>Suburban</td>
<td>10+</td>
<td>46</td>
</tr>
<tr>
<td>Suburban</td>
<td>Total</td>
<td>90</td>
</tr>
</tbody>
</table>
Table 11

**Technology Skill Level**

<table>
<thead>
<tr>
<th>Technology Skill Level</th>
<th>Non-User</th>
<th>Basic</th>
<th>Intermediate</th>
<th>Proficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which of the following</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>best describes your</td>
<td>0.0%</td>
<td>14.2% (12)</td>
<td>46.9% (151)</td>
<td>48.3% (176)</td>
</tr>
<tr>
<td>computer technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>skill level?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 12

**CMS Skill Level**

<table>
<thead>
<tr>
<th>CMS Skill Level</th>
<th>Non-User</th>
<th>Basic</th>
<th>Intermediate</th>
<th>Proficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which of the following</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>best describes your Course Management System (e.g., Blackboard, Moodle, etc.) skill level?</td>
<td>10.3% (30)</td>
<td>9.3% (31)</td>
<td>52.7% (180)</td>
<td>27.6% (99)</td>
</tr>
</tbody>
</table>

**Reliability, Separation, and Variance**

Rasch statistics on reliability, separation, contrast loadings, and variance were run and analyzed using Winsteps™. The results from the Rasch analysis revealed a 0.79 participant reliability with a 1.96 separation. The participant reliability results indicate that the questionnaire produced consistent results, and the separation statistic
indicated that there were potentially two statistically significant groupings of participants. The participant separation statistic is related to the clarity or precision of the measures. The item results revealed a 0.99 item reliability with a 8.61 separation. This indicated excellent item reliability, and the separation statistic indicated that there are eight groupings of items on the questionnaire. The Rasch variance statistic indicated that only 37.3% of the variance could be explained by the measures (see Figure 7). Typically, the explained variance statistic should be 60% or higher to confirm that only a single construct is being measured. Explained variance statistics below 60% may mean that the questionnaire items were not written clearly enough or there is more than one construct being measured.

An examination of the Rasch item contrast loading analysis revealed the presence of two potential underlying dimensions (see Figure 7). Items whose contrast loading fall above or below .4 to -.4 are determined to share commonality on the underlying dimensions. The items above 0.4 seemed to share the theme of the institution or exterior element influencing participants CMS adoption. For example, items 33, 34, and 35 were above 0.4, and they all contained reference to “my college” and its influence on participants CMS adoption, which supported the institutional-themed grouping of items. Additionally, item 24 contained a reference to “subject area” and its impact on CMS adoption, which also reinforces an institutional theme for this grouping of items. Upon further analysis, the researcher found 13 items in the positive range of the contrast loadings that also contained an institutional or external theme. Those items were 13, 14, 16, 17, 18, 20, 23, 24, 31, 32, 33, 34, and 35. Further, after a review of the items below -0.4, it appears that these items all contain the theme of
personal involvement with CMS adoption. For example, item 7 refers to personal technology efficacy and how it affects course management system adoption.

Additionally, item 19 refers to the instructor's students personally encouraging the instructor to use a CMS, and item 28 refers to individual or personal awareness of CMS professional development opportunities. Upon further analysis, the researcher found 10 items in the positive range of the contrast loadings that also contained references to personal factors influencing course management system adoption. Those items were 1, 2, 3, 6, 7, 8, 9, 10, 15, 19, and 28. Based on these meaningful clusters of items, the researcher split the instrument in two and measured each dimension (construct) independently.

Table 23.3.C: \( \text{\LaTeX} \) document converted to \( \text{\LaTeX} \) text.
reliability results indicate that the questionnaire produced moderately consistent results, and the separation statistic indicated that there were potentially two statistically significant groupings of participants. The participant separation statistic is related to the clarity or precision of the measures. The item results revealed a 0.99 item reliability with a 8.68 separation. This also indicated good item reliability, and the separation statistic indicated that there are eight groupings of items on the questionnaire. The Rasch variance statistic was improved, confirming that separating the items into two groups strengthened the analysis and reinforced that only a single construct (institutional factors) is being analyzed.

**Group 2: Personal characteristics dimension—Reliability, separation and variance**

Rasch statistics on reliability, separation, and variance were analyzed with the Group 2 data set that contained personal-themed questions. The results from the Rasch analysis revealed a 0.84 participant reliability with a 2.63 separation. The participant reliability results indicate that the questionnaire produced consistent results, and the separation statistic indicated that there were potentially two statistically significant groupings of participants. The participant separation statistic is related to the clarity or precision of the measures. The item results revealed a 0.98 item reliability with a 7.28 separation. This indicated excellent item reliability, and the separation statistic indicated that there are seven groupings of items on the questionnaire. The Rasch variance statistic was improved, confirming that separating the items into two groups strengthened the analysis and reinforced that only a single construct (personal characteristics) is being analyzed.
Research Questions

Research Question 1: What factors most influence faculty members at two-year community colleges to adopt a course management system? The Rasch analysis of the presented institutional dimension construct map (see Figure 8) revealed that faculty members found it easiest to respond positively to those items related to the advantages of using a CMS, awareness of the benefits of using a CMS, how a CMS increases teaching effectiveness, and how CMS use allows for greater control over instructional materials. These results suggest that factors that most influence faculty adoption of a CMS are related to perceptions of advantages associated with CMS use, such as the ability of a CMS to enhance teaching effectiveness and increase control over instructional content.

Figure 8. Rasch analysis of the presented institutional dimension construct map.
The easiest item in the questionnaire for faculty members in the institutional-themed group to respond to favorably was item 5, “There are advantages to using a CMS,” as illustrated on the Rasch item map in Figure 8. The mean score for all faculty participants to item 5 was 3.29 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 334 faculty members who responded to item 5, 31.7% strongly agreed, and 65% agreed with the statement that they perceived advantages by using a CMS. Only 7.3% disagreed, and 0.9% strongly disagreed with item 5. The favorable response from faculty members to item 5 supported Rogers’ (2003) theory that the perception of relative advantage will positively influence adoption.

The second easiest item in the questionnaire for faculty members in the institutional-themed group to respond to favorably was item 30: “The benefits of using a CMS are apparent to me”. The mean score for all faculty participants to item 30 was 3.05 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 332 faculty members who responded to item 30, 21.8% strongly agreed, and 62.2% agreed with the statement that they were aware of the benefits of using a CMS. Only 13.8% disagreed and, 2% strongly disagreed with item 30. The favorable response from faculty members to item 30 supported Rogers’ (2003) theory that the perception of relative advantage positively influenced adoption.

The third easiest item in the questionnaire for faculty members in the institutional-themed group to respond to favorably was item 3, “Using a CMS enhances teaching effectiveness,” as illustrated on the Rasch item map in Figure 8. The mean score for all faculty participants to item 3 was 3.08 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 333 faculty who responded to item 3, 27.9% strongly
agreed, and 56.2% agreed with the statement that a CMS enhances teaching effectiveness. Only 13.2% disagreed, and 2.5% strongly disagreed with item 3. The favorable response from faculty members to item 3 supports previous research that concluded that perceptions of technology usefulness positively influence technology adoption (Anderson, 2003; Halawi & McCarthy, 2007; Holden & Rada, 2011; Kultur, 2009; Rogers, 2003). Additionally, usefulness is also a primary component of the technology acceptance model (TAM), along with ease of use.

The fourth easiest item in the questionnaire for faculty members in the institutional-themed group to respond to favorably was item 11: “Using a CMS allows me to have greater control over my instructional materials”. The mean score for all faculty participants to item 11 was 2.98 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 331 faculty members who responded to item 3, 21.6% strongly agreed, and 59.1% agreed with the statement that a CMS allows faculty members to have greater control over their instructional materials. Only 17% disagreed, and 2.2% strongly disagreed with item 11. The favorable response from faculty members to item 11 contradicts earlier research suggesting that faculty members perceive CMSs negatively because of loss of control (Al-Shboul, 2011; Keller, 2005; Kultur, 2009; Morgan, 2003).

The fifth easiest item for faculty members in the institutional-themed group to respond to favorably was item 16: “My college encourages faculty to use a CMS”. The mean score for all faculty participants to this item 16 was 3.03 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 329 faculty members who responded to item 16, 15.3% strongly agreed, and 72% agreed with the statement that their college
encourages faculty to use a CMS. Only 10.8% disagreed, and 1.8% strongly disagreed with item 16. This item supported previous research suggesting that organizational or campus culture influenced CMS use (Jarrahi, 2010). Additionally, although these items were not in the top 5 most frequent and favorable responses from faculty members in the institutional-themed group, item 17, “My supervisor (i.e., dean, department chair, etc.) encourages faculty to use a CMS,” and item 18, “My colleagues encourage me to use a CMS,” also received favorable responses well above the mean, which supported the notion that an institutional culture of encouragement and support positively influenced CMS adoption.

Finally, items 25 and 26 both referenced the compatibility of a CMS with an instructor’s teaching philosophy and style, and both items received favorable responses from faculty members in the institutional-themed group. These items support previous research by Chang (2008) suggesting that faculty members’ ability to align their teaching approaches and philosophies with new technology, such as a CMS, influenced adoption and use.

Rasch analysis of the presented personal characteristic dimension construct map (see Figure 9) revealed that the items that faculty members in this group found the easiest to respond to positively related to technology self-efficacy, the advantages of using a CMS, awareness of the benefits of using a CMS, and the awareness of professional development opportunities. These results suggest that the factors that most influenced faculty members related to self-efficacy, awareness of advantages and benefits of using a CMS, and professional development.
The easiest item in the questionnaire for faculty members in the personal-themed group to respond to favorably was item 7, “I have the technology skills necessary to effectively use a CMS,” as illustrated on the Rasch item map in Figure 9. The mean score for all faculty participants to item 7 was 3.28 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 337 faculty members who responded to this item, 34.8% strongly agreed, and 55.8% agreed with the statement that they had the necessary technology skills to effectively use a CMS. Only 8.5% disagreed, and 0.7% strongly disagreed with item 7. The favorable response from faculty members to item 7 supported Kultur’s (2009) theory that faculty perceptions of technology self-efficacy influenced their perceptions of technology ease of use and adoption. The item that received the second most favorable and frequent response from faculty in the personal-themed group was item 5: “There are advantages to using a CMS.” This further supported Kultur’s (2009) notion of how perceptions of technology self-efficacy influenced perceptions and adoption of technology, such as a CMS.

The second most frequent favorable response was to item 5: “There are advantages to using a CMS”. The mean score for all faculty participants to item 5 was 3.29 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 334 faculty members who responded to item 5, 31.7% strongly agreed, and 65% agreed with the statement that they perceived advantages by using a CMS. Only 7.3% disagreed, and 0.9% strongly disagreed with item 5. The favorable response from faculty members to item 5 supported Rogers’ (2003) theory that the perception of relative advantage positively influenced adoption. This item was highly favored by faculty members both in the institutional-themed group and in the personal-themed group.
The third most frequent favorable response from faculty in the personal-themed group was to item 8, “My college provides ample opportunities to learn more about our CMS,” as illustrated on the Rasch item map in Figure 9. The mean score for all faculty participants to item 8 was 3.29 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 337 faculty members who responded to item 8, 38.3% strongly agreed, and 49.9% agreed with the statement that their college provided ample opportunities to learn about a CMS. Only 10.5% disagreed, and 1.2% strongly disagreed with item 8. The favorable response from faculty members to item 8 supported the importance of training and support for CMS adoption (Al-Shboul, 2011; Gautreau, 2011; Kultur, 2009).

The fourth easiest item for faculty in the personal-themed group to respond to favorably was item 30: “The benefits of using a CMS are apparent to me”. The mean score for all faculty participants to item 30 was 3.05 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 332 faculty members who responded to item 30, 21.8% strongly agreed, and 62.2% agreed with the statement that they were aware of the benefits of using a CMS. Only 13.8% disagreed, and 2% strongly disagreed with item 30. The favorable response from faculty members to item 30 also supported Rogers’ (2003) theory that the perception of relative advantage positively influenced adoption. Additionally, this item was also highly favorable to faculty in the institutional-themed group and was the second easiest for that group to respond to favorably.

The fifth easiest item for faculty in the personal-themed group to respond to favorably was item 10: “My college’s CMS professional development activities are
effective”. The mean score for all faculty participants to item 10 was 3.01 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 330 faculty members who responded to item 10, 19.2% strongly agreed, and 64.3% agreed with the statement that their college’s CMS professional development activities were effective. Only 15.1% disagreed, and 1.2% strongly disagreed with item 10. Similar to item 8, the item to receive the third most favorable response by faculty in the personal-themed group, item 10, also supported the importance of training and support CMS adoption (Al-Shboul, 2011; Gautreau, 2011; Kultur, 2009).

Additionally, although these items were not among the top five most frequent and favorable responses from faculty members in the personal-themed group, item 3, “Using a CMS enhances teaching effectiveness,” and item 11, “Using a CMS allows me to have greater control over my instructional materials,” also received favorable responses well above the mean. Item 3 supports previous research that concluded that perceptions of technology usefulness positively influence technology adoption (Anderson, 2003; Halawi & McCarthy, 2007; Holden & Rada, 2011; Kultur, 2009; Rogers, 2003). Item 11 contradicts earlier research suggesting that faculty members perceive CMSs negatively because of loss of control (Morgan, 2003; Keller, 2005; Kultur, 2009; Al-Shboul, 2011).

Finally, the themes of other items from the personal-themed group that received favorable responses above the mean related to how perceived technology comfort level influenced CMS use (item 6), CMS ease of use (item 1) flexibility (item 12), awareness of opportunities to try out a CMS (item 28), and CMS compatibility with faculty members’ philosophies (item 26) and teaching styles (item 25). These items support
earlier research indicating that technology self-efficacy (Al-Shboul, 2011; Gautreau, 2011; Halawi & McCarthy, 2007; Holden & Rada, 2011; Jarrahi, 2010; Kultur, 2009), ease of use (Anderson, 2003; Halawi & McCarthy, 2007; Holden & Rada, 2011; Ioannou, 2008; Kultur, 2009; Morgan, 2003; Rogers, 2003), flexibility (Anderson, 2003; Morgan, 2003), awareness of opportunities to learn about and try a CMS (Roger, 2003), and faculty perceptions of the degree to which their teaching philosophies and styles are aligned with using a CMS (Chang, 2008) all influence technology adoption and CMS adoption.

![Figure 9. Rasch analysis of the presented personal characteristic dimension construct map.](image)

**Research Question 2:** What factors most inhibit faculty members at two-year community colleges from adopting a course management system? Rasch
analysis of the presented institutional dimension construct map revealed that the items that faculty members found the most difficult to respond to positively related to the college rewarding faculty members for using a CMS (see Figure 8).

The most difficult item in the questionnaire for faculty members in the institutional-themed group to respond to favorably was Item 20, “My college rewards faculty who use a CMS,” as illustrated on the Rasch item map in Figure 8. The mean score for all faculty participants to item 20 was 1.82 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 321 faculty members who responded to item 20, only 1.7% strongly agreed, and 6.9% agreed with the statement that the college rewards faculty members who use a CMS. Conversely, 66.2% disagreed, and 26.3% strongly disagreed with item 20. The unfavorable response from faculty to item 20 supported previous research suggesting that rewards influence technology adoption (Al-Shboul, 2011; Gautreau, 2011; Zayim, Yildiriim, & Saka, 2006).

The second and third most difficult items in the questionnaire for faculty members from the institutional-themed group to respond to favorably was item 33, “The CMS at my college is constantly unavailable and I can’t access it when I need it,” and item 34, “The CMS at my college is very inflexible and I can’t modify it to suit my instructional approach.” Items 33 and 34 have more of a positive connotation than does item 20 because they suggest that the availability and the flexibility of the CMS at their college was not a factor in their decision to adopt a CMS.

The fourth most difficult item in the questionnaire for faculty members from the institutional-themed group to respond to favorably was item 21: “I feel adequately rewarded/compensated for integrating a CMS into my teaching practices.” The mean
score for all faculty participants to item 21 was 2.18 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 329 faculty members who responded to item 21, only 1.4% strongly agreed, and 30.4% agreed with the statement that they feel adequately rewarded/compensated for integrating a CMS into their teaching practices. Conversely, 49.9% disagreed, and 18.1% strongly disagreed with item 21. The unfavorable response from faculty members to item 21 supported item 20 and also supported previous research suggesting that rewards influence technology adoption (Al-Shboul, 2011; Gautreau, 2011; Zayim, Yildiriim, & Saka, 2006).

Rasch analysis of the presented personal characteristics dimension construct map revealed that the items that faculty members found the most difficult to respond to positively also related to the college rewarding faculty members for using a CMS (see Figure 9). The most difficult item in the questionnaire for faculty from the personal-themed group to respond to favorably was item 21: “I feel adequately rewarded/compensated for integrating a CMS into my teaching practices”. The mean score for all faculty participants to item 21 was 2.18 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 329 faculty members who responded to item 21, only 1.4% strongly agreed, and 30.4% agreed with the statement that they feel adequately rewarded/compensated for integrating a CMS into their teaching practices. Conversely, 49.9% disagreed, and 18.1% strongly disagreed with item 21. The unfavorable response from faculty members to item 21 is consistent with the results from the personal-themed group, and also supported previous research suggesting that rewards influence technology adoption (Al-Shboul, 2011; Gautreau, 2011; Zayim, Yildiriim, & Saka, 2006).
The second most difficult item in the questionnaire for faculty in the personal-themed group to respond to favorably was item 9, “I would increase my CMS use if I had greater support from the college,” as illustrated on the Rasch item map in Figure 9. The mean score for all faculty participants to item 9 was 2.28 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 336 faculty members who responded to item 9, only 4.9% strongly agreed, and 26.9% agreed with the statement that they would increase their CMS use if they had greater support from their college. Conversely, 59.8% disagreed, and 8.3% strongly disagreed with item 9. The response to item 9 actually had a positive connotation because it implied that faculty members are satisfied with the support they receive from their home college and that the support is not a factor in their decision to increase their CMS usage.

The third most difficult item in the questionnaire for faculty members in the personal-themed group to respond to favorably was item 29: “I am aware of how others are using a CMS in their teaching.” The mean score for all faculty participants to item 29 was 2.54 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 331 faculty members who responded to item 29, only 5% strongly agreed, and 51% agreed with the statement that they were aware of how others were using a CMS in their teaching practices. Conversely, 38.9% disagreed, and 5.1% strongly disagreed with item 29. The results support Rogers’ (2003) notion that perceptions of how and whether others are using technology, such as a CMS, and observing how technology yields positive outcomes to others may influence adoption.

The fourth most difficult item in the questionnaire for faculty in the personal-themed group to respond to favorably was item 27: “The availability of a CMS course
for a trial period would help to encourage faculty who currently do not use a CMS.”

The mean score for all faculty participants to item 27 was 2.6 on a scale from 1 (strongly disagree) to 4 (strongly agree). Of the 329 faculty members who responded to item 27, 3.5% strongly agreed, and 58.5% agreed with the statement that the availability of a trial CMS would help encourage non-users to adopt a CMS. Conversely, 32.6% disagreed, and 5.3% strongly disagreed with item 27. The results here do not support Rogers’ (2003) belief that the triability of a technology positively influenced its adoption.

**Research Question 3: Are the course management system adoption factors different for part-time faculty members and full-time faculty members at two-year community colleges?** Data were analyzed using a multi-faceted Rasch approach to account for additional factors, including work status. Both dimensions were analyzed through the multifaceted model to assess possible differences. Rasch analysis of the presented institutional dimension revealed a 0.04 measure statistic for full-time faculty and a -0.04 for part-time faculty (see Figure 10). The standard error statistic for full-time faculty members was 0.11 and 0.09 for part-time faculty members. This indicated that there were no statistically significant differences at the 95% confidence level regarding CMS adoption factor differences among part-time faculty members and full-time faculty members in the institutional-themed group.
Rasch analysis of the presented institutional dimension revealed a 0.18 measure static for full-time faculty members and a -0.18 for part-time faculty members (see Figure 11). The standard error statistic for full-time faculty members was 0.10 and 0.07 for part-time faculty members. This indicated that there was a statistically significant difference at the 95% confidence level regarding CMS adoption factor differences among part-time faculty members and full-time faculty members in the personal-themed group. By examining the question items between .18 and -.18 on the item correlation order figure 12, it was possible to determine which questions had a statistically significant difference. Question item 1, “Using a CMS is easy”, item 2, “Learning to utilize a CMS is easy”, item 25, “A CMS fits well with my teaching style” and item 26, “A CMS is compatible with my teaching philosophy” all were between .18 and -.18 on the Rasch correlation order analysis, indicating that there was significant difference between part-time and full-time faculty on these items.
A closer examination of the cross-tabulated survey results of the question items listed above revealed for question item 1, “Using a CMS is easy”, 60% of rural full-time faculty agreed with the statement, compared to nearly 80%, specifically 78.8%, of part-time rural faculty. For suburban faculty participants, 65.6% of full-time faculty agreed with the statement, compared to 68.3% of part-time suburban faculty. Conversely, 28% of rural full-time faculty disagreed with the statement regarding the ease of using a CMS, compared to 18.2% of part-time rural faculty. For suburban faculty participants,
28.1% of full-time faculty disagreed with the statement regarding the ease of using a CMS, compared to 17.5% of part-time suburban faculty. Urban faculty cross-tabulated responses showed little difference between part-time and full-time faculty.

The cross-tabulated results for question item 2, “Learning to utilize a CMS is easy”, revealed that 44% of rural full-time faculty agreed with the statement, compared to 72.7% of part-time rural faculty. For suburban faculty participants, 62.5% of full-time faculty agreed with the statement, compared to 65.6% of part-time suburban faculty. Conversely, 44% of rural full-time faculty disagreed with the statement regarding the ease of learning to use a CMS, compared to 21.1% of part-time rural faculty. For suburban faculty participants, 34.4% of full-time faculty disagreed with the statement regarding the ease of learning to use a CMS, compared to 23% of part-time suburban faculty. Urban faculty cross-tabulated responses showed little difference between part-time and full-time faculty.

The cross-tabulated results for question item 25, “A CMS fits well with my teaching style”, revealed that 54.2% of rural full-time faculty agreed with the statement, compared to 55.9% of part-time rural faculty. For suburban faculty participants, 53.1% of full-time faculty agreed with the statement, compared to 49.2% of part-time suburban faculty. Conversely, 25% of rural full-time faculty disagreed with the statement regarding a CMS fitting their teaching style, compared to 26.5% of part-time rural faculty. For suburban faculty participants, 34.4% of full-time faculty disagreed with the statement regarding a CMS fitting their teaching style, compared to 20.6% of part-time suburban faculty. Again, urban faculty cross-tabulated responses showed little difference between part-time and full-time faculty.
Finally, the cross-tabulated results for question item 26, “A CMS is compatible with my teaching philosophy”, revealed that 64% of rural full-time faculty agreed with the statement, compared to 69.7% of part-time rural faculty. For suburban faculty participants, 62.5% of full-time faculty agreed with the statement, compared to 58.3% of part-time suburban faculty. Conversely, 20% of rural full-time faculty disagreed with the statement regarding a CMS being compatible with their teaching philosophy, compared to 12.1% of part-time rural faculty. For suburban faculty participants, 18.8% of full-time faculty disagreed with the statement regarding a CMS being compatible with their teaching philosophy, compared to 13.3% of part-time suburban faculty. Again, urban faculty cross-tabulated responses showed little difference between part-time and full-time faculty.

Based on the data provided in figures 11 and 12, coupled with the cross-tabulated data, it appears that rural part-time faculty feel that a course management system is easier to use compared to their full-time colleagues. Also, it appears that more rural part-time faculty feel that a CMS is easier to learn to use compared to their full-time colleagues. To a lesser degree, it also appears that more part-time rural faculty feel that a CMS fits with their teaching style and is compatible with their teaching philosophy.

In the suburban community college setting, similar to the rural community college setting, it is appears that suburban part-time faculty feel that a course management system is easier to use compared to their full-time colleagues. Also, it appears that more suburban part-time faculty feel that a CMS is easier to learn to use compared to their full-time colleagues. Further, it appears that more part-time suburban
faculty feel that a CMS fits with their teaching style. To a lesser degree, more part-time suburban faculty members perceive that a course management system is compatible with their teaching philosophy. Again, urban faculty cross-tabulated responses showed little difference between part-time and full-time faculty.

**Research Question 4: Are the course management system adoption factors different for rural, suburban and urban community college faculty members?** Data were similarly analyzed using a multi-faceted Rasch approach to account for additional factors, including the geographic location of the colleges. Both dimensions were analyzed through the multifaceted model to assess possible differences. Rasch analysis of the presented institutional dimension revealed a 0.59 measure statistic for rural, a -0.24 measure statistic for suburban, and a -0.35 measure statistic for urban (see Figure 13). The standard error statistic was 0.16 for rural faculty members, 0.13 for suburban faculty members, and 0.09 for urban faculty members. This indicated that there were statistically significant differences at the 95% confidence level regarding CMS adoption factor differences between rural, suburban, and urban community college faculty members.

![Table 7.2.3 College Measurement Report](image)

*Figure 13. Rasch analysis of the presented institutional dimension.*

Based on these results, it is possible to identify which factors are related to the specific community college setting: rural, suburban, or urban. Figure 8 indicated that
the top three easiest items for faculty members to respond to favorably related to recognition of the advantages of using a CMS, recognition of the benefits of using a CMS, and how a CMS enhances teaching effectiveness. Since the rural measure statistic was 0.59 and the suburban measure statistic was -0.24, it is likely that rural and suburban faculty members favored these question items.

The three most difficult items for faculty members to respond to favorably in the institutional-themed group were related to the college rewarding faculty members who use a CMS and the unavailability and inflexibility of the college’s CMS system (see Figure 8). Since the urban measure statistic was -0.35, it is likely that urban faculty members identified with the question items presented above.

Rasch analysis of the presented personal characteristics dimension revealed a 0.26 measure statistic for rural, a -0.04 measure statistic for urban, and a -0.21 measure statistic for suburban (see Figure 13). The standard error statistic was 0.13 for rural faculty members, 0.08 for urban faculty members, and 0.11 for suburban faculty members. This indicated that there were statistically significant differences at the 95% confidence level regarding CMS adoption factor differences between rural, suburban, and urban community college faculty members.

Figure 14. Rasch analysis of the presented personal characteristics dimension.
Based on these results, it is possible to identify which factors were related to the specific community college setting for the personal-themed group. Figure 9 indicated that the top three easiest items for faculty to respond to favorably related to technology self-efficacy, recognition of the advantages of using a CMS, and the availability of professional development opportunities to learn more about CMSs. Since the rural measure statistic is 0.26, it is likely that rural faculty members favored these question items.

The three most difficult items for faculty to respond to favorably in the personal-themed group were related to the college rewarding/compensating faculty members who use a CMS, increasing CMS use if the college offered more support, and the awareness of how others are using a CMS (see Figure 9). Since the suburban measure statistic was -0.21, it is likely that suburban faculty members identified with these question items.

It is clear from these findings that specific CMS adoption factors resonated more so with community college faculty than did other adoption factors. The notion of rewarding faculty for adopting a course management system into their instructional practices resonated the most with community college faculty in this study. Additionally, the research findings also supported how faculty perceptions of relative advantage, CMS benefits, professional development and support, as well as control of instructional materials are positive factors associated with CMS adoption. The findings here also revealed that there are difference between full-time and part-time community college faculty members and their perceptions of course management system adoption. Specifically, the research findings here showed that part-time faculty at rural and suburban community colleges reported that it is easier to use a CMS, as well as to learn
to use a CMS. Finally, the research findings also revealed differences among community college faculty members based on location setting. Specifically, along with the differences comparing part-time and full-time faculty, the findings revealed that rural and suburban community college faculty members responded more favorably to the question items related to recognition of the advantages of using a CMS, recognition of the benefits of using a CMS, and how a CMS enhances teaching effectiveness. Conversely, more urban and suburban faculty member found it more difficult to respond favorably to question items related to rewards for using a CMS.
Chapter 5

Conclusions, Discussions and Recommendations

Overview

A comprehensive review of the research literature revealed that information technology is a major industry and is prevalent in higher education (Nagel, 2012). One example of information technology’s prevalence in higher education is that the course management system (CMS) market in the U.S. has reached nearly $1 billion and has made CMSs ubiquitous on college campuses (DeFranco & Malm, 2011). CMSs have played an important role in higher education because they provide an Internet-based platform that allows colleges and universities to host and offer online, blended, and supplemental courses. Course management systems typically offer a variety of tools that allow instructors to post documents, distribute grades, and collect/return assignments as well as communicate with students via Internet-based email, discussion boards, and synchronous chat features (Gautreau, 2011). Further data illustrating the importance of information technology in higher education, specifically CMSs, indicate that in the fall of 2011, more than 6.7 million students were enrolled in at least one online course, which is an increase of 570,000 students over the previous year (Sloan Consortium, 2012).

One reason for the growth and popularity of course management systems in higher education is the numerous benefits they provide for faculty and students. Morgan (2003) noted the numerous benefits CMS technology affords instructors, such as improved communication with students, greater transparency because grades can be posted in CMSs, improved course organization, reduced photocopying costs as a result
of posting documents online, and a reduction in the number of mundane tasks. Morgan (2003) also noted that the benefit of course management systems to students include increased transparency, such as making course goals and processes more visible, making student work more visible, and making grades more visible. Finally, Lonn and Teasley (2009) noted that the students in their study indicated that they felt the CMS improved teaching and learning. Although researchers have cited numerous benefits regarding the use of CMSs, both to students and faculty, all higher education faculty have not embraced the use of course management systems (Gautreau, 2011).

According to a 2007 study that examined the use of student information technology in higher education, 58.9% of community college students reported using a CMS on a weekly basis, while 77% of four-year college students reported using a CMS on a weekly basis (Caruso, 2007). Research has indicated that a variety of reasons have accounted for the underutilization of CMSs at community colleges. Some have noted that the less frequent use of course management systems among faculty members at the community college level can be attributed to workload issues and decreased faculty support at community colleges compared to four-year college and universities (Caruso, 2007). Another issue that may influence community college faculty members and their decision to use CMSs is that community college faculty members tend to be instructionally conservative (Kerste, 2011).

The review of literature revealed several possible factors that may influence the decision of faculty members to adopt new technologies, such as CMSs:

4. Training and support (Al-Shboul, 2011; Gautreau, 2011; Kultur, 2009)
5. Instructor control issues (Al-Shboul, 2011)
6. Time and workload issues (Al-Shboul, 2011; Gautreau, 2011)
7. Organizational culture (Jarrahi, 2010)
10. Instructor discipline considerations (Jarrahi, 2010)
11. Instructor pedagogical approach (Chang, 2008)
12. Triability (Rogers, 2003)
13. Observability (Rogers, 2003)
15. Relative advantage (Rogers, 2003)
17. CMS flexibility, reliability, and consistency (Anderson, 2003; Morgan, 2003)

Based on the prevalence of CMSs in higher education, the benefits cited in the research literature, the potential under-utilization of course management systems by community college faculty members, and numerous technology adoption factors, the researcher set
out to answer the following research questions:

1. What factors most influence faculty members at two-year community colleges to adopt a course management system?
2. What factors most inhibit faculty members at two-year community colleges from adopting a course management system?
3. Are the course management system adoption factors different for part-time and full-time faculty members at two-year community colleges?
4. Are the course management system adoption factors different for rural and suburban community college faculty?

An Internet-based questionnaire was developed to collect data. The questionnaire was entitled “A Study of the Factors that Influence Community College Instructors’ Adoption of a Course Management System” and contained three separate sections of questions. The first section contained items designed to collect basic demographic information, such as gender, part-time or full-time instructor status, tenured or non-tenured status, academic discipline, years of service at a community college, and years of experience with CMSs. The second section contained items designed to collect information about participants’ perceived technological skill level. The third section contained items designed to collect information about the various CMS adoption factors cited in the research literature. (e.g., rewards, relative advantage, training and support, self-efficacy, etc.).

Email invitations were sent to all faculty members teaching during the fall 2013 semester at the three Midwestern community colleges. Invitations were sent to
approximately 198 faculty members teaching at a small rural community college, approximately 245 faculty members teaching at a medium rural community college, and 1,000 faculty members teaching at a very large urban community college. Overall, the researcher solicited 1,148 community college faculty members at three different community colleges, and 338 responded to the questionnaire for a response rate of 29.4%.

Conclusions

The following conclusions were drawn from the data analysis:

**Research Question 1: What factors most influence faculty members at two-year community colleges to adopt a course management system?**

Faculty members in the institutional dimension group indicated that they found it easiest to respond favorably to those items related to (a) the advantages of using a CMS, (b) awareness of the benefits of using a CMS, and (c) how a CMS increases teaching effectiveness and allows for greater control over instructional materials. These results suggest that the factors that most influence faculty adoption of a CMS are related to perceptions of advantages associated with CMS use, as well as how a CMS enhances teaching effectiveness and control over instructional content.

Faculty members in the personal characteristic dimension group indicated that they found it easiest to respond favorably to those items related to (a) technology self-efficacy, (b) the advantages of using a CMS, (c) awareness of the benefits of using a CMS, and (d) the awareness of professional development opportunities. These results suggest that the factors that most influenced faculty adoption of a CMS are related to
self-efficacy, awareness of advantages and benefits of using a CMS, and professional development.

Faculty in both groups agreed on the advantages of using a CMS and awareness of the benefits of using a CMS, which supported Rogers’ (2003) theory that the perception of relative advantage favorably influenced adoption.

**Research Question 2: What factors most inhibit faculty members at two-year community colleges from adopting a course management system?**

Faculty members from the institutional dimension group indicated that the most difficult item to respond to favorably related to the college rewarding faculty for using a CMS. These results suggest that a reward structure or lack of reward structure inhibits faculty from adopting a CMS. Additionally, these results support previous research that noted how rewards influence technology adoption (Al-Shboul, 2011; Gautreau, 2011; Zayim, Yildiriim, & Saka, 2006).

Faculty in the personal characteristics dimension group indicated that the item faculty members found the most difficult to respond to favorably also related to the college rewarding faculty for using a CMS. These results were similar to what faculty in the institutional-themed group reported.

Both groups of faculty members were in agreement regarding the need for a reward structure to influence CMS adoption, which supported previous research that noted how rewards influence technology adoption (Al-Shboul, 2011; Gautreau, 2011; Zayim, Yildiriim, & Saka, 2006).
Research Question 3: Are the course management system adoption factors different for part-time and full-time faculty members at two-year community colleges?

For faculty in the institutional-themed group, there were no statistically significant differences found in this study. For faculty in the personal-themed group, there were statistically significant differences found between part-time and full-time faculty participants. Based on the study findings it appears that rural part-time faculty participants feel that a course management system is easier to use compared to their full-time colleagues. Also, it appears that more rural part-time faculty feel that a CMS is easier to learn to use compared to their full-time colleagues. To a lesser degree, it also appears that more part-time rural faculty feel that a CMS fits with their teaching style and is compatible with their teaching philosophy.

In the suburban community college setting, similar to the rural community college setting, it is appears that suburban part-time faculty feel that a course management system is easier to use compared to their full-time colleagues. Also, it appears that more suburban part-time faculty feel that a CMS is easier to learn to use compared to their full-time colleagues. Further, it appears that more part-time suburban faculty feel that a CMS fits with their teaching style. To a lesser degree, more part-time suburban faculty members perceive that a course management system is compatible with their teaching philosophy. Again, urban faculty cross-tabulated responses showed little difference between part-time and full-time faculty.

Research Question 4: Are the course management system adoption factors different for rural and suburban community college faculty?
Based on the responses of the institutional-themed group, it is likely that rural faculty members favored the items related to (a) recognition of the advantages of using a CMS, (b) recognition of the benefits of using a CMS, and (c) recognition of how a CMS enhances teaching effectiveness. These results support Rogers’ (2003) theory that the perception of relative advantage favorably influenced adoption. Additionally, these findings support previous research that noted how perceptions of technology usefulness positively influence technology adoption (Anderson, 2003; Halawi & McCarthy, 2007; Holden & Rada, 2011; Kultur, 2009; Rogers, 2003). Further, urban faculty members from this group responded unfavorably to the item related to the college rewarding faculty members who use a CMS. This is consistent with prior research noting that rewards influence technology adoption (Al-Shboul, 2011; Gautreau, 2011; Zayim, Yildiriim, & Saka, 2006).

Results from the analysis of the responses of faculty members from the personal-themed group indicated that rural faculty members responded favorably to items related to (a) technology self-efficacy, (b) recognition of the advantages of using a CMS, and (c) the availability of professional development opportunities to learn more about CMSs. These results support prior research noting how self-efficacy (Al-Shboul, 2011; Gautreau, 2011; Halawi & McCarthy, 2007; Holden & Rada, 2011; Jarrahi, 2010; Kultur, 2009), recognition of advantages (Roger, 2003), and the availability of professional development and support (Al-Shboul, 2011; Gautreau, 2011; Kultur, 2009) influence technology adoption.

Additionally, suburban faculty members in personal-themed group responded unfavorably to the items related to (a) the college rewarding/compensating faculty
members who use a CMS, (b) increasing CMS use if the college offered more support, and (c) the awareness of how others are using a CMS. This supported the literature noting that rewards influence technology adoption (Al-Shboul, 2011; Gautreau, 2011; Zayim, Yildiriim, & Saka, 2006) and the fact that awareness of how others are using technology influenced adoption (Rogers, 2003). Conversely, for urban faculty members in the personal-themed group the notion of support was not a factor in increasing CMS usage, which contradicts previous literature on this topic (Al-Shboul, 2011; Gautreau, 2011; Kultur, 2009).

Discussion

According to the overall results of this study for the institutional-themed group, faculty members found it easiest to respond favorably to those items related to (a) the advantages of using a CMS, (b) awareness of the benefits of using a CMS, and (c) how a CMS increases teaching effectiveness and allows for greater control over instructional materials. Faculty members from the institutional-themed group also indicated that the most difficult item to respond to favorably related to the college rewarding faculty for using a CMS.

Further, when examining difference between faculty members in community college settings, rural faculty members in in the institutional-themed group favored the items related to (a) recognition of the advantages of using a CMS, (b) recognition of the benefits of using a CMS, and (c) recognition of how a CMS enhances teaching effectiveness, while urban faculty members in the institutional-themed group responded unfavorably to the item related to the college rewarding faculty who use a CMS.
The overall results of this study for the personal-themed group indicated that the items faculty members in this group found the easiest to respond to favorably related to (a) technology self-efficacy, (b) the advantages of using a CMS, (c) awareness of the benefits of using a CMS, and (d) the awareness of professional development opportunities. Conversely, faculty members in personal-themed group indicated that the item most difficult to respond to favorably related to the college rewarding faculty members for using a CMS.

Additionally, when examining difference between faculty members in community college settings, rural faculty members from the personal-themed group responded favorably to items related to (a) technology self-efficacy, (b) recognition of the advantages of using a CMS, (c) the availability of professional development opportunities to learn more about CMSs. However, suburban faculty members from the personal-themed group responded unfavorably to the items related to (a) the college rewarding/compensating faculty who use a CMS, (b) increasing CMS use if the college offered more support, and (c) the awareness of how others are using a CMS.

Both groups of faculty members, those from the institutional-themed group and those from the personal-themed group, were in agreement regarding the advantages of using a CMS, awareness of the benefits of using a CMS, and the need for a reward structure. Both groups of faculty members also reported that rural faculty members recognized the advantages of using a CMS. Urban faculty members in institutional-themed group and suburban faculty in personal-themed group reported similar results related to a lack of rewards from the college for using a CMS.
Rewarding faculty members for using a CMS. The findings of this study support what numerous researchers have previously reported regarding the positive influence that rewards have on technology adoption (Al-Shboul, 2011; Gautreau, 2011; Zayim, Yildiriim, & Saka, 2006). Al-Shboul (2011) noted that faculty benefits, such as “…receiving a stipend for using CMS, receiving a recognition/reward from the administration, merit pay, release time, teaching workload and training in the use of CMS” (p. 230), were all factors that influenced faculty CMS adoption. The results of this study supported previous research related to rewards influencing CMS adoption. Interestingly, this study found that faculty members from urban and suburban community college settings perceived rewards as a more influential factor in adoption than did faculty members from rural community colleges. One possible explanation for the differences between (a) urban/suburban faculty members and (b) rural faculty members is that rural community colleges tend to hire a greater percentage of full-time faculty members compared to urban or suburban community colleges (Eddy, 2007). It is also possible that the faculty members from rural community colleges in this study were satisfied with their college’s current reward structure as it related to CMS adoption.

Relative advantage. The findings in this study supported Rogers’ (2003) theory that perceptions of relative advantage positively influence technology adoption. Rogers (2003) posited that there are five perceived attributes of innovation: one of those attributes is relative advantage, which postulates that if adopters perceive that a new innovation has advantages over the current or old innovation, then the adopter will adopt the new innovation (Rogers, 2003). Another factor related to relative advantage is perception of benefits. Kultur (2009) reported that the intrinsic motivation of personal
benefit is a factor that influenced CMS adoption. Both groups of faculty members in this study supported Rogers (2003) theory regarding relative advantage. Interestingly, this study found that faculty members in rural community college settings perceived relative advantage as more of a factor in CMS adoption than did faculty members in urban or suburban community college settings.

**Technology self-efficacy.** The results of this study supported previous research related to how perceptions of technology self-efficacy affect technology adoption (Al-Shboul, 2011; Gautreau, 2011; Halawi & McCarthy, 2007; Holden & Rada, 2011; Jarrahi, 2010; Kultur, 2009). Jackwoski and Akroyd (2010) noted how faculty members who feel less competent are also less likely to incorporate instructional technology. Additional research on this topic has suggested that some community college leaders feel a sense of excitement about the increased use of instructional technology, but are concerned about hiring faculty members without the necessary technical skills to effectively incorporate technology into their classrooms (Pennington, Williams & Karvonen, 2006). The results from faculty members in the personal characteristic dimension group indicated the easiest item to respond to favorably related to technology self-efficacy. Additionally, rural faculty members from the personal characteristic dimension group responded favorably to items related to technology self-efficacy. This contradicts previous research that raised specific concerns about rural college faculty support and identified inadequate professional development at rural institutions (Eddy, 2007). Perhaps the difference between prior studies and the results of this present study can be attributed to the fact that rural community colleges tend to hire a greater percentage of full-time faculty members, while urban and suburban community colleges
tend to hire a greater percentage of part-time faculty members (Eddy, 2007). It is also possible that the faculty members from rural community colleges in this study had greater technical acumen and greater awareness of the benefits of CMS use.

**Faculty control over instructional materials.** The findings of this study refute what other researchers have reported regarding how some faculty members perceive a loss of control when using a CMS and that this perception negatively influenced future CMS use (Al-Shboul, 2011; Keller, 2005; Kultur, 2009; Morgan, 2003). One study reported that faculty cited a loss of control of their teaching environment as well as negative perceptions related to increased bureaucracy due to CMS usage (Morgan, 2003). Both Keller (2005) and Kultur (2009) identified faculty issues with CMS use and loss of control, and both researchers specifically cited how faculty perceptions of academic freedom influenced CMS adoption. Faculty members from the institutional-themed group responded favorably to items pertaining to greater control over instructional materials. These results contradict previous research that noted negative perceptions related to faculty control and CMS use (Al-Shboul, 2011; Gautreau, 2011; Halawi & McCarthy, 2007; Holden & Rada, 2011; Jarrahi, 2010; Kultur, 2009). Since the majority of participants in this study identified themselves as either basic, intermediate, or proficient CMS users (9.3%, 52.7%, and 27.6%, respectively) and only a small number of participants identified themselves as CMS non-users (10.3%), it is possible that since the majority of participants were CMS users that they viewed the questions related to control positively, and more synonymously with freedom rather than negatively, as in restrictive, which may be the perception of non-users and is influencing them not to adopt a CMS.
**Professional development.** The findings in this study support previous research that cited how training and support were factors in CMS adoption (Al-Shboul, 2011; Gautreau, 2011; Kultur, 2009). Some researchers also have identified concerns related to faculty professional development and support regarding instructional technology (Eddy, 2007; Jackowski & Akroyd, 2010; Mitchell, 2011; Wilson, 2001). Additionally, some research has raised specific concerns about rural college faculty support and has identified inadequate professional development at rural institutions (Eddy, 2007). Faculty members in the personal dimension group responded favorably to items pertaining to professional development. Interestingly, rural faculty members from the personal-themed group responded favorably to items related to CMS professional development opportunities. This would seem to contradict previous research that rural faculty members lack professional development opportunities (Eddy, 2007). Perhaps the difference between prior studies and the results of this present study can be attributed to the fact that rural community colleges tend to hire a greater percentage of full-time faculty members, while urban and suburban community colleges tend to hire a greater percentage of part-time faculty members (Eddy, 2007). It is also possible that the faculty members from rural community colleges in this study were satisfied with their college’s current CMS training and support services.

**Perceptions of technology usefulness.** The findings in this study support previous research that cited how perceptions of technology usefulness positively influence technology adoption (Anderson, 2003; Halawi & McCarthy, 2007; Holden & Rada, 2011; Kultur, 2009; Rogers, 2003). Specifically, faculty members from the institutional-themed group highly favored the question item related to their perceptions
that a course management system enhanced teaching effectiveness, as it was their third most favored question item. Faculty from the personal-themed group favored this factor to a lesser degree, but still above mean.

**Differences between part-time and full-time faculty members.** The results of this study refute previous researcher that raised concerns related to the high proportion of part-time instructors at community colleges, including compensation issues and how part-time faculty are poorly integrated and do not have the same access to technology as do full-time faculty members (Jackowski & Akroyd, 2010). Additional research noted how the high proportion of part-time instructors is more common at urban and suburban community colleges than at rural community colleges, which tend to hire more full-time faculty (Eddy, 2007). The results of this study revealed statistically significant differences between full-time and part-time faculty members in the personal-themed group.

Based on the results of the multi-faceted Rasch analysis, coupled with an examination of the cross-tabulated survey results, it is appears that rural part-time faculty feel that a course management system is easier to use compared to their full-time colleagues. Also, it appears that more rural part-time faculty feel that a CMS is easier to learn to use compared to their full-time colleagues. To a lesser degree, it also appears that more part-time rural faculty feel that a CMS fits with their teaching style and is compatible with their teaching philosophy.

Further, in the suburban community college setting, similar to the rural community college setting, it is appears that suburban part-time faculty feel that a course management system is easier to use compared to their full-time colleagues. Also,
it appears that more suburban part-time faculty feel that a CMS is easier to learn to use compared to their full-time colleagues. Further, it appears that more part-time suburban faculty feel that a CMS fits with their teaching style. To a lesser degree, more part-time suburban faculty members perceive that a course management system is compatible with their teaching philosophy. Again, urban faculty cross-tabulated responses showed little difference between part-time and full-time faculty.

It is possible that because previous researchers had identified concerns about integrating part-time faculty members and increasing their access to technology, colleges have developed initiatives to better acclimate part-time faculty members to campus life and assist them with technology access. Additionally, it is possible age affected perceptions and use of course management systems by the participants in this study as cross-tabulated results showed that more full-time faculty at the rural and suburban college reported that they had 10 or more years of college-level teaching experience, 72% and 62.5% respectively, compared to their part-time colleagues, 56.8% and 45.2% respectively. This supports previous research by Meyer (2009) that noted how age affects technology use, with older faculty perhaps finding it more difficult learn and use new technology. Finally, it also may be that the ever-increasing prevalence of smartphone and tablet devices is ameliorating the previously reported access issues.

**Community college setting differences.** Research has noted differences between rural, urban, and suburban community colleges (Eddy, 2007; Pennington, Williams & Karvonen, 2006; Sink, Jackson, Boham & Shockley, 2004). Much of their research has focused on the difficulties rural community colleges face regarding
funding, geographical restrictions, and technology support. Pennington, Williams, and Karvonen (2006) cited budgetary challenges faced by rural community colleges as reasons for these difficulties. These researchers further noted that geographic barriers exist at rural community colleges, which compounds the problem of providing funding and providing adequate technology and support. Additionally, rural faculty support professionals reported less interest in advancing new initiatives in teaching than did respondents from urban community colleges (Eddy, 2007). Finally, researchers noted that affordable Internet access is available for urban and suburban colleges but not for many rural colleges (Sink, Jackson, Boham, & Shockley, 2004). This study found statistically significant differences between faculty members in different community college settings.

**Rural Community College Setting.** Results from this study found that rural faculty members from the institutional-themed group responded favorably to the items related to (a) recognition of the advantages of using a CMS, (b) recognition of the benefits of using a CMS, and (c) the ability of a CMS to enhance teaching effectiveness. However, urban faculty members from this group responded unfavorably to the item related to the college rewarding faculty members who use a CMS. Rural faculty members from the personal-themed group responded favorably to items related to (a) technology self-efficacy, (b) recognition of the advantages of using a CMS, and (c) the availability of professional development opportunities to learn more about CMSs.

Additionally, it appears that rural part-time faculty feel that a course management system is easier to use compared to their full-time colleagues. Also, it appears that more rural part-time faculty feel that a CMS is easier to learn to use
compared to their full-time colleagues. To a lesser degree, it also appears that more part-time rural faculty feel that a CMS fits with their teaching style and is compatible with their teaching philosophy.

The findings here seem to indicate that the rural faculty members in this study were more technologically advanced than those in previous research. According to Eddy (2007) rural faculty support professionals reported less interest in advancing new initiatives in teaching than did respondents from urban community. Additionally, it does appear from this study that part-time rural faculty members reported that using a course management system was easier compared to full-time rural faculty members. Again, this may be related to the age of full-time faculty compared to part-time faculty, as more full-time faculty reported having 10 or more years of teaching experience compared to part-time faculty members. Furthermore, the differences could be related to the differences in teaching departments as more full-time rural faculty reported being from either the health sciences, social sciences or vocational/trades departments compared to part-time faculty that reported being from business, health sciences or social sciences departments.

Suburban Community College Setting. Overall, suburban faculty in this study favored question items related to recognition of the advantages of using a CMS, recognition of the benefits of using a CMS, and how a CMS enhances teaching effectiveness. Additionally, suburban community college faculty members appear to feel that a course management system is easier to use compared to their full-time colleagues. Also, it appears that more suburban part-time faculty feel that a CMS is easier to learn to use compared to their full-time colleagues. Further, it appears that
more part-time suburban faculty feel that a CMS fits with their teaching style. To a lesser degree, more part-time suburban faculty members perceive that a course management system is compatible with their teaching philosophy compared to their full-time counterparts.

The findings here indicate that the suburban faculty members in this study had similar perceptions regarding CMS adoption compared to rural faculty. Additionally, similar to rural faculty in this study, part-time suburban faculty members reported that using a course management system was easier compared to their full-time counterparts. Again, this may be related to the age of full-time faculty compared to part-time faculty, as more suburban full-time faculty reported having 10 or more years of teaching experience compared to part-time faculty members.

**Urban Community College Setting.** Urban faculty members from the institutional-themed group indicated that the most difficult question item for them to respond to favorably was related to the college rewarding faculty members who use a course management system. Overall, urban faculty members in this study were female, part-time and were from a humanities, science, business or health science department. Perhaps the majority part-time status of urban faculty in this study was the more influential factor related to the group indicating the need for rewards in CMS adoption. This would confirm previous research that noted how part-time faculty are less integrated into the college and poorly compensated (Jackowski & Akroyd, 2010). Further, the findings here support previous research that noted how urban institutions tend to employ more part-time faculty compared to rural community colleges (Eddy, 2007).
Recommendations

**Human Performance Technology Perspective.** Several technology adoption models and theories were discussed in this research study, such as the technology adoption model, concerns based adoption model and Rogers’ diffusion of innovation theory. A detailed knowledge models and theories related to technology adoption is greatly helpful in understanding and influencing CMS adoption. In addition to technology adoption models and theories, anyone interested in influencing technology adoption, such as course management systems, should:

1. Determine need. A needs analysis is about examining the current situation on your campus or organization to identify the external and internal factors affecting CMS adoption on your campus or organization (International Society for Performance Improvement, 2012). This process identifies performance gaps that need to be addressed through some intervention. Specifically, a needs analysis process looks at:
   a. Jobs or tasks and identifies the required activities or processes and compares them to actual practice.
   b. Work environment and “identifies and evaluates the effectiveness and efficiency of feedback, the reward and incentive system, information and communication systems, work and process designs, and work tools and equipment” (International Society for Performance Improvement, 2012, p. 21).
   c. User or audience to determine current expectations, perceptions, abilities, and knowledge and skills with regard to technology.
d. Data systems, such as a course management system, to evaluate the capability, maintenance and costs.

e. Culture of organization to determine if the current practices and belief systems support technology adoption.

f. Benchmarks. Benchmarking provides a perspective of how other organizations are implementing and evaluating initiatives. For a technology adoption initiative, such as increasing course management system adoption, it is imperative to understand what others are doing to encourage, support and evaluate CMS use. Examples of benchmarks for CMS support and evaluation would be the Quality Matters program (Quality Matters Program, 2013) for online and blended courses or the Chico online instruction rubric from California State University (California State University, Chico, 2012).

2. Take a systemic view. A systemic view implies a consideration of the interconnected of all those involved on a campus or organization. A systemic view takes into account all the various offices, departments, and individuals in an organization throughout the needs identification and intervention development processes. (International Society for Performance Improvement, 2012).

3. Work collaboratively. When attempting to influence technology adoption in an organization or on a campus, it is important to work collaboratively so that decisions about goals, next step, and implementation are all shared.
responsibilities among all stakeholders (International Society for Performance Improvement, 2012).

4. Focus on results. Focusing on results means helping stakeholders determine and agree on what they want to accomplish with regard to technology adoption and the measures and processes that will be used to evaluate the initiative (International Society for Performance Improvement, 2012).

5. Design a solution to increase technology adoption that includes how it will be implemented and evaluated. “Design is about identifying the key attributes of a solution” (International Society for Performance Improvement, 2012, p. 21).

6. Develop the solution and test its feasibility. Development refers to creating some or all of the elements of the solution. The findings of this study suggest that a solution for increasing CMS adoption should include a reward structure, training, performance development, and highlighting the usefulness and advantages of using a course management system.

7. Implement the solution. “Implementation is about deploying the solution and managing the change required to sustain it. The outputs are changes in or adoption of the behaviors that are believed to produce the anticipated results or benefits” (International Society for Performance Improvement, 2012, p. 24).

8. Evaluate the results. Evaluation is about measuring results and providing evidence that the needs were met or not met. “Evaluation results become feedback and loop back to results, gap, opportunities, and needs identified in the analysis steps” (International Society for Performance Improvement, 2012, p. 28).
Community College Administrators. The results of this study supported previous research related to rewards influencing CMS adoption (Al-Shboul, 2011; Gautreau, 2011; Zayim, Yildiriim, & Saka, 2006). Interestingly, this study found that faculty participants from urban and suburban community college settings perceived rewards to be a greater factor in CMS adoption than did rural community college faculty participants. In whatever community college setting, it seems clear that faculty members perceive rewards as a factor that influenced CMS adoption. Community college administrators who wish to increase faculty use of CMSs should consider a reward structure as a way to increase CMS usage, as well as other factors. This study encourages community college administrators to:

1. Consider introducing rewards such as merit pay, release time, recognition programs, or adjustable teaching workloads to encourage CMS adoption.

2. Develop professional development programs that showcase how current CMS faculty adopters are using CMSs in their instructional practices.

3. Promote CMS use to faculty by highlighting the advantages of efficiency, grade transparency, improved communication, greater control and flexibility with distributing course materials and reduced printing costs, all benefits associated with course management system use.

4. Ensure adequate support services are available for new CMS users, as well as advanced CMS users.

5. Choose course management systems based on their ease of use and usefulness.

State leaders in higher education. According to Louis Soares (2013), vice president for Policy Research and Strategy at the American Council on Education,
“...the current state policy environment does not encourage the adoption of these technologies (learning technologies) in a generative way in which proven practice informs policy information” (p. 72). The findings of this study are supportive of learning technology, specifically course management systems, and encourage the increased use of these types of systems. In order for community college leaders to be able to initiate policies to increase CMS adoption at their campuses they need support from their respective states. Specifically, state leaders should:

1. Provide funding incentives to community colleges that are currently not utilizing course management systems to begin doing so. Additionally, provide funding incentives to community colleges to help encourage full participation and use by faculty members.

2. Develop new capital investment formulas that recognize that learning technology adoption requires training funds, course development funds and time (Soares, 2013).

3. Encourage community colleges to adopt multi-discipline team approaches to course and program development with learning technology, such as CMSs (Soares, 2013).

4. Encourage community colleges that are not fully utilizing course management systems to develop supplemental, blended or online courses to help with college readiness, STEM related initiatives, vocational or certificate programs, and competency based education (Hurley, Harnisch, Parker, 2014).
5. Explore return-on-investment strategies for learning technology systems and transparency and learning outcome measurements that are available through systems, such as CMSs (Soares, 2013).

6. Conduct a policy audit to determine which community college policies are helping or hindering learning technology adoption and diffusion (Soares, 2013).

7. Ensure that community colleges that currently use CMSs for online, blended or supplemental instruction meet quality standards that benefit student learning (Soares, 2013).

8. Provide grants funds to community colleges to encourage creative uses of learning technologies, such as CMSs, MOOCs, customized credential pathways and flexible course offerings (Soares, 2013).

**Future Research.** One of the more significant findings reported in this study related to rewarding faculty members as a way of encouraging CMS adoption. Unfortunately, the results of this study did not provide any information about what specific rewards would be most effective in influencing faculty to adopt a CMS. Future research should focus on the various kinds of rewards, such as compensation, informal recognition, formal recognition, or trophies, would be helpful to identify which rewards work best to encourage faculty members to adopt a CMS (Halliburton, 2005). Other rewards noted in the literature that could influence faculty to adopt a CMS are stipends for using CMS, recognition by the college administration, merit pay, release time, and teaching workload adjustments (Al-Shboul, 2011). Again, additional research to determine which rewards work best for CMS faculty adoption would be beneficial.
A majority of the faculty participants in this study identified themselves as CMS users (89.7%), and only a small number identified themselves as non-users (10.3%). A limitation of this study is that a greater number of non-users were not included in this study. The limitation of including only a limited number of non-users in this research is more than likely inherent in utilizing a web-based survey instrument. Future research should combine an Internet-based survey instrument with a paper-based version for individuals with lower technical acumen. Including the perspectives of a greater number of non-users would be helpful in developing a truer picture of the factors that influence CMS faculty adoption.

This study identified two different groups of questionnaire items based on the Rasch analysis: Group 1 contained institutional-themed items, and Group 2 contained personal-themed items. For accuracy, the research results reported in this study were identified by group. For a more efficient study, future researchers should examine questionnaire items and ensure that all items contain either institutional-themed or personal-themed items, not both. This would provide a more singular perspective of the CMS faculty adoption factors, as opposed to the multiple perspectives that were provided in this study: a) institutional-themed b) personal-themed.

Finally, the focus of this study was on the factors that influence community college faculty CMS adoption and not on any type of quality measurement after adoption. Obviously, using a CMS effectively is important and should be considered in future research on this topic. Future research could investigate potential differences between rural, urban, and suburban community college faculty members and CMS best practices.
Summary

The faculty members in this study reported that being rewarded is a factor that may influence them to increase their CMS adoption. This is especially true of the faculty members from urban and suburban community colleges. The results of this study supported Rogers’ (2003) theory regarding relative advantage and its positive influence on technology adoption among faculty members. This was especially true of faculty members from rural community colleges. Faculty members’ perceptions of (a) technology self-efficacy, (b) control, and (c) training and development also were factors in CMS adoption, as were other factors to a lesser degree, based on the community college setting. The results of this study indicated that not only are there specific factors that influence CMS faculty adoption but also that the community college setting also influenced the prominence of some factors over others.

Community college administrators who wish to increase their CMS adoption should examine their current reward structure for encouraging CMS adoption. Community college administrators should consider some type of recognition, pay, stipend or adjusted workload for faculty who adopt a CMS into their teaching practices. When community college administrators are promoting CMS adoption, they also should emphasize the factors of relative advantage and control and ensure that their college has adequate faculty CMS training and support.

This study explored a variety of technology adoption factors and their importance in CMS adoption among faculty members at three different community colleges situated in three different Carnegie Classification settings. The results of this study provided insight into the influence of different adoption factors on faculty
members from different community colleges in different settings. Future research should account for the absences of non-users and for the division of questionnaire items that were either personal-themed or institutional-themed to provide a more focused analysis on this topic.

If the trend of technology in education continues, this study and other similar studies will provide important contributions that will benefit college and university faculty members, students, and administrators. Until colleges and universities achieve complete participation from faculty members regarding CMS use, research on this topic should continue so that the perceptions and needs of faculty members can be captured and then addressed through college and university policies and initiatives.
References


Foster, L. (2004). Meeting the Next Phase of Challenges. In B. Bower & K. Hardy (Eds.), *From Distance Education to E-Learning: Lessons Along the Way*. *New Directions for Community Colleges*, 128, 73-78. doi: 10.1002/cc.177


Appendixes

Appendix A

Pilot Study Questionnaire

1. Part I. Demographic Information

Which of the following best describes your gender?

a. Male
b. Female

2. Which of the following best describes your faculty work status?

a. Full-time faculty
b. Part-time instructor

3. Which of the following best describes the department in which you teach?

a. Arts
b. Business
c. Education
d. Engineering
e. Health sciences
f. Humanities
g. Mathematics
h. Science
i. Social science
j. Vocational/Trades
k. Other (please specify)
4. Which of the following best describes your years of college-level teaching experience?
   a. 0-1 years
   b. 2-4 years
   c. 5-9 years
   d. 10+ years

Part II. Technology Skill Level

1. Which of the following best describes your computer technology skill level?
   a. Non-User (i.e. use computer technology as little as possible.)
   b. Basic (i.e. low degree of comfort using a few software programs and minimal internet browsing. Require assistance with technology on a regular basis.)
   c. Intermediate (i.e. moderate degree of comfort using a variety of software programs and internet browsing. Require occasional assistance with technology.)
   d. Proficient (i.e. high degree of comfort using a variety of software programs and internet browsing. Rarely need assistance with technology.)

2. Which of the following best describes your Course Management System (i.e. Blackboard, Moodle, etc.) skill level?
   a. Non-User (i.e. I don’t use a course management system)
   b. Basic (i.e. low degree of comfort performing basic CMS functions. Require assistance with CMS on a regular basis)
   c. Intermediate (i.e. moderate degree of comfort performing a variety of CMS functions. Require occasional assistance with CMS.)
   d. Proficient (i.e. high degree of comfort using a wide variety of CMS functions.)
Part III. Course Management System (CMS) Adoption Factors

1. Using a CMS is easy.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

2. Learning to utilize a CMS is easy.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

3. Using a CMS enhances teaching effectiveness.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

4. Using a CMS makes it easier to teach.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

5. The advantages of using a CMS outweigh the disadvantages.
   a. Strongly disagree
b. Disagree  
c. Agree  
d. Strongly agree

6. My comfort level with technology directly affects my CMS use.  
   a. Strongly disagree  
   b. Disagree  
   c. Agree  
   d. Strongly agree

7. I don’t feel that I have the technology skills to effectively use a CMS.  
   a. Strongly disagree  
   b. Disagree  
   c. Agree  
   d. Strongly agree

8. My college provides ample opportunities to learn more about our CMS.  
   a. Strongly disagree  
   b. Disagree  
   c. Agree  
   d. Strongly agree

9. I would increase my CMS use if I had greater support from the college.  
   a. Strongly disagree  
   b. Disagree  
   c. Agree  
   d. Strongly agree

10. My college’s CMS professional development activities are effective.  
    a. Strongly disagree
11. CMS use allows me to have greater control over my teaching.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

12. CMS use allows me to have greater flexibility over my teaching.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

13. Using a CMS takes too much time.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

14. My work load is such that I don’t have time to learn new technologies like a CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

15. Using a CMS helps to reduce my teaching load.
   a. Strongly disagree
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

17. My supervisor (i.e. dean, department chair, etc.) encourages the utilization of a CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

18. My colleagues encourage CMS use.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

19. My students encourage CMS use.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

20. My college rewards faculty teaching innovation.
a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

21. I feel adequately rewarded/compensated for integrating a CMS into my teaching practices.
   a. Strongly disagree
   b. Disagree
c. Agree
d. Strongly agree

22. I would increase my CMS use if I was rewarded/compensated more.
   a. Strongly disagree
   b. Disagree
c. Agree
d. Strongly agree

23. Faculty at my college who use a CMS have more prestige than faculty who do not use a CMS.
   a. Strongly disagree
   b. Disagree
c. Agree
d. Strongly agree

24. The subject area in which I teach is not well suited for using a CMS.
   a. Strongly disagree
   b. Disagree
c. Agree
d. Strongly agree
25. A CMS fits well with my teaching style.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

26. A CMS is compatible with my teaching philosophy.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

27. The availability of a trial CMS course would be helpful in encouraging instructors to utilize a CMS in their instruction.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

28. I am aware of opportunities to try out our college’s CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

29. I am aware of how others are using a CMS in their teaching.
   a. Strongly disagree
   b. Disagree
   c. Agree
30. The benefits of using a CMS are apparent to me.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

31. My college expects me to use a CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

32. My supervisor expects me to use a CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

33. The CMS at my college is constantly unavailable and I can’t access it when I need it.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

34. The CMS at my college is very inflexible and I can’t modify it to suit my instructional approach.
   a. Strongly disagree
   b. Disagree
c. Agree
d. Strongly agree

35. The CMS at my college is always changing because of upgrades, new versions, different CMSs, etc., which affects my CMS adoption.

a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree
Appendix B

Faculty Research Recruitment Email

Greetings,

A doctoral student from the University of Toledo is conducting research on the factors that influence community college instructors’ course management system (CMS) use. The researcher is interested in capturing the perceptions of instructors with or without experience using a CMS (e.g., Blackboard, Moodle, Desire2Learn, etc.). Your participation in this research project would be greatly appreciated. To participate, please click on the link below within the next 10 business days to complete the online questionnaire that will take no longer than 20 minutes. Thank you.

https://www.surveymonkey.com/s/7769YLR
Appendix C

Primary Study Online Questionnaire

Course Management System Adoption – Questionnaire

Part I. Informed Consent

You are invited to participate in a study to examine the factors that influence community college instructors’ course management system (CMS) use. You were chosen for this study because you currently teach at a community college.

This form is part of a process called “informed consent” to allow you to understand this study before deciding whether to participate.

Jeffrey Peters, a doctoral student at the University of Toledo, is conducting this study and has received approval from your institution to request your participation.

Purpose:

Through my literature review, I determined that there is a gap in the research related to community college instructors and their adoption of course management systems (CMS). The majority of existing research on CMSs and faculty use focuses on 4-year higher educational institutions.

For the purposes of this questionnaire, a course management system (CMS) is defined as a web-based system that provides features for course content presentation, communication, student assessment, grading, and materials and activities management (Morgan, 2003). Common course management systems include Blackboard, Moodle and Desire2Learn.

Procedures:

If you agree to be in this study, please complete the SurveyMonkey questionnaire within the next two weeks. The questionnaire will take approximately 15-20 minutes to complete. A reminder email will be sent out in the next 5 days requesting your participation, even if you have already completed the questionnaire. This is done because the questionnaire is anonymous and the researcher cannot tell who has or hasn’t completed the questionnaire.

Voluntary Nature of the Study:

Your participation in this study is voluntary. Your decision to participate or not participate in the study will be respected. Your questionnaire responses will be
anonymous. If you decide to join the study now, you can still change your mind during the study and opt out. If you feel stressed during the study you may stop at any time. You may skip any questions that you feel are too personal.

Risks and Benefits of Being in the Study:

There are no risks associated with participating in this study. This study may help fill a gap in educational technology literature as well as literature documenting community college instructor practices. Findings from this study can be used by administration and faculty development professionals to encourage instructor adoption and implementation of course management systems at community colleges.

Compensation:

There is no compensation provided to complete this questionnaire.

Confidentiality and Anonymity:

Any information you provide will be kept confidential. The researcher will not use your information for any purposes outside of this research project. This questionnaire is anonymous. No one will be able to identify you, nor will anyone be able to determine the institution at which you teach. No one will know whether you participated in this study. A reminder email will be sent out in the next 5 days requesting your participation, even if you have already completed the questionnaire. This is done because the questionnaire is anonymous and I cannot tell who has or hasn’t completed the questionnaire.

Contacts and Questions:

If you have any questions before, during or after the study, please contact me via e-mail at jdpeters@monroeccc.edu or 734-384-4129. If you have questions or comments about the study, but don’t wish to identify yourself to me, you can contact my adviser and the principle investigator of this student, Dr. Berhane Teclehaimanot at Berhane.teclehaimanot@utoledo.edu or 419-530-7979.

If you have questions beyond those answered by the research team or your rights as a research subject or research-related injuries, the Chairperson of the SBE Institutional Review Board may be contacted through the Office of Research on the main campus at (419) 530-2844.

**You may print out a copy of this form for your records.

Statement of Consent:
I have read the information provided above and feel I understand the study well enough to make an informed decision regarding my involvement. By clicking on the “I agree” button below, I agree to the terms described previously and can proceed with the questionnaire.

Part II. Demographic Information

1. Which of the following best describes your gender?
   a. Male
   b. Female

2. Which of the following best describes your work status?
   a. Full-time faculty member
   b. Part-time instructor

3. Which of the following best describes the department in which you teach?
   a. Arts
   b. Business
   c. Education
   d. Engineering
   e. Health sciences
   f. Humanities
   g. Mathematics
   h. Science
   i. Social science
   j. Vocational/Trades
   k. Other, please specify _______________________.


4. Which of the following best describes your years of college-level teaching experience?
   a. 0-1 year
   b. 2-4 years
   c. 5-9 years
   d. 10+ years

Part III. Technology Skill Level

1. Which of the following best describes your computer technology skill level?
   a. Non-User (i.e., use computer technology as little as possible.)
   b. Basic (i.e., low degree of comfort using a few software programs and minimal internet browsing. Require assistance with technology on a regular basis.)
   c. Intermediate (i.e., moderate degree of comfort using a variety of software programs and internet browsing. Require occasional assistance with technology.)
   d. Proficient (i.e., high degree of comfort using a variety of software programs and internet browsing. Rarely need assistance with technology.)

2. Which of the following best describes your Course Management System (e.g., Blackboard, Moodle, etc.) skill level?
   a. Non-User (i.e., I don’t use a course management system)
   b. Basic (i.e., low degree of comfort performing basic CMS functions. Require assistance with CMS on a regular basis)
   c. Intermediate (i.e., moderate degree of comfort performing a variety of CMS functions. Require occasional assistance with CMS.)
   d. Proficient (i.e., high degree of comfort using a wide variety of CMS functions. Rarely need assistance with CMS.)
Part IV. Course Management System (CMS) Adoption

1. Using a CMS is easy.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

2. Learning to use a CMS is easy.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

3. Using a CMS enhances teaching effectiveness.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

4. Using a CMS makes it easier to teach.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree
5. There are advantages to using a CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

6. My comfort level with technology directly affects my CMS use.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

7. I have the technology skills necessary to effectively use a CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

8. My college provides ample opportunities to learn more about our CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

9. I would increase my CMS use if I had greater support from the college.
10. My college’s CMS professional development activities are effective.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

11. Using a CMS allows me to have greater control over my instructional materials.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

12. Using a CMS allows me to have greater flexibility in my teaching.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

13. Using a CMS is time consuming.
   a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

14. My work load does not allow time to learn about new technologies, such as a CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

15. Using a CMS helps to reduce my teaching work-load.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

16. My college encourages faculty to use a CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

17. My supervisor (e.g., dean, department chair) encourages faculty to use a CMS.
   a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

18. My colleagues encourage me to use a CMS.
a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

19. My students encourage me to use a CMS.
a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

20. My college rewards faculty who use a CMS.
a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

21. I feel adequately rewarded/compensated for integrating a CMS into my teaching practices.
a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

22. I would increase my CMS use if I were rewarded/compensated more.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

23. Faculty at my college who use a CMS have more prestige than those who do not use a CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

24. The subject area in which I teach is not well suited for using a CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

25. A CMS fits well with my teaching style.
   a. Strongly disagree
26. A CMS is compatible with my teaching philosophy.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

27. The availability of a CMS course for a trial period would help to encourage faculty who currently do not use a CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

28. I am aware of opportunities to try out my college’s CMS.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

29. I am aware of how others are using a CMS in their teaching.
   a. Strongly disagree
b. Disagree

c. Agree

d. Strongly agree

30. The benefits of using a CMS are apparent to me.
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree

31. My college expects me to use a CMS.
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree

32. My supervisor expects me to use a CMS.
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree

33. The CMS at my college is constantly unavailable and I can’t access it when I need it.
    a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

34. The CMS at my college is very inflexible and I can’t modify it to suit my instructional approach.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

35. The CMS at my college is always changing (e.g., upgrades, new versions, different CMSs, etc.) which affects my CMS use.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree