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Perceived attributes and organizational support influencing course management system adopter status in Historically Black Colleges and Universities

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ABSTRACT

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by

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M.Ed., Augusta State University, 1999

B.A., Augusta College, 1981

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Abstract

The rapid growth of online learning fueled by technologies including course management systems (CMS) has transformed the traditional educational landscape. Little research shows why faculty members at Historically Black Colleges and Universities (HBCUs) have been slow to adopt this new teaching paradigm. This quantitative, nonexperimental study utilized Rogers's diffusion of innovation theory as the theoretical base. Research questions explored faculty perceptions of the CMS's attributes (relative advantage, compatibility, complexity, trialability, observability) and organizational support (policies, procedures, and norms) in order to predict adopter status. The study used a convenience sample of 137 full-time faculty from 3 public and 2 private HBCUs in the southeastern U.S. Survey data were analyzed using descriptive statistics and logistic regression. The findings provided evidence that faculty in different adopter categories have varying characteristics and needs related to adoption and use of the CMS. Predictors for innovators were compatibility and complexity; for early adopters, relative advantage, complexity, and observability; and for early majority adopters, the predictor was complexity. For late majority adopters, compatibility, complexity, trialability, and observability were predictors; and predictive attributes for laggards were relative advantage, compatibility, complexity, and organizational support. Several individual factors were significant for each adopter category. The findings may be used to promote positive social change by providing a means for administrators and faculty development staff to predict adopter levels in order to develop initiatives that address differences in adopter needs, thereby facilitating adoption of the CMS and online learning.

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Dedication

This dissertation is dedicated to my grandfather, who paved the way for my graduate journey and constantly reminded me that “They can’t take your education away from you.” I wish he could have seen me walk across the stage.

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Many thanks to the following people for helping me get this far in my educational journey:

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Chapter 1: Introduction to the Study

Internet information and communication technologies (ICT) have proven to be significant agents of social change (Sousa, 2006), influencing education, business, health, and communication across the world (Hawkins, 2005; Jackson, et al., 2006). Proponents consider online/distance education as opportunities not only to increase access to postsecondary education but also to revolutionize higher education by altering the appearance of both the classroom and the institution. In the forward to *Power of the Internet for Learning: Moving from Promise to Practice*, Senator Bob Kerrey and Representative Johnny Isaakson asserted, “For education, the Internet is making it possible for more individuals than ever to access knowledge and to learn in new and different ways. At the dawn of the 21st Century, the education landscape is changing” (Web-Based Education Commission, 2000, p. 1).

Because of the growing interest in online education, higher education faculty members have been increasingly expected to use an ever-changing array of technologies to support instruction, from discipline-specific applications to institutionally-administered systems (Baldwin, 1998; Cornell, 1999; Gandolfo, 1998). However, teaching practices have not always maintained the same pace, nor benefited from these recent technological advances. “Over the last decade, schools have made impressive strides in technology initiatives, but there is an alarming gap between technology’s presence and its effective integration into instruction” (Bryant, 2000, ¶ 1). Compared to K-12 teachers, higher education faculty members, in general, have been relatively slow to integrate technology with only about 50% of the faculty on board even at the most advanced institutions (Petherbridge, 2007; Sauser, 2005).

Historically Black Colleges and Universities (HBCUs), while small in number, graduate the majority of African Americans who earn higher education degrees in America. Although these institutions constitute only 3% of U.S. colleges and universities, they enroll 28% of all African American college students and graduate 40% of the African Americans who earn doctorates or first professional degrees (Hubbard, 2006). With respect to technology, however, a number of studies have found inequalities of computer and Internet access across socioeconomic and racial lines (Morgan & Van Lengen, 2005; Snipes, Ellis, & Thomas, 2006). Jackson, Ervin, Gardner, and Schmitt (2001) reported that exposure to technology education and technology-facilitated education by minority students from lower socioeconomic conditions was most often limited to drill and practice exercises. On the other hand, White students from higher socioeconomic backgrounds were more likely to utilize technologies designed to both help build and require the use of critical thinking skills.

Buzzetto-More and Sweat-Guy (2006) found that although HBCU students entered college less technologically prepared, their use of online learning is slowly rising in popularity as more students perceive online learning positively. Nevertheless, online learning has not been a priority for HBCUs. Howard University's Digital Learning Lab (2009) noted that only 43 out of 104 HBCUs offered 100% online courses and/degrees. Of those, only 12 offered credit and/or noncredit distance education programs. Rogers (2003) argued that, "innovations do not inevitably widen socioeconomic gaps within a system. But such gap-widening inequality will usually occur unless a change agency devotes special efforts to prevent it" (p. 464). However, as noted previously, online teaching practices have not been adopted at the same rate at HBCUs as they have at

Primarily White Colleges and Universities (PWCUs), which could lead to widening the socioeconomic gap between students who are becoming technologically literate and those who are not (Rogers, 2003; Schroll, 2007).

As online learning has evolved, so have the choices involved in the creation and delivery of instruction. A variety of options continues to be added to the online instructor's repertoire especially related to the use of CMS. Morgan (2003) noted, "A major goal of course management software is to integrate a suite of teaching technologies into a powerful set of tools that make it easy for faculty to use technology in instruction" (p. 16). As evidenced by the growing number of institutions that have adopted course management software such as Blackboard, e-College and Moodle, CMS have been viewed as a means of supporting distance education courses and as a tool for supplementing traditional class instruction through the use of web-based communication, assessment, and administrative tools. T. Harrington, Staffo, and Wright (2006) noted an increased interest in the effectiveness of CMS and suggested that the proliferation of CMS in higher education indicates that more research on their effectiveness is required.

Green (2003) indicated that CMS continue to play an increasingly significant role in institutional instructional infrastructures as both the number of institutions with a campus standard for a CMS, and the percentage of courses utilizing CMS tools continues to rise. *The 2003 Campus Computing Survey* revealed that a growing number of institutions conceded that CMS were "very important" in their institutional information technology planning. Over half (51.4%) reported that their institutions had a strategic plan for deploying course management tools. Of the institutions surveyed, 82.3% indicated that they already had established a "single product" standard for course management software, an increase over the 73.2% in 2001 and 58.8% in 2000. The survey also indicated that 33.6% of all college courses used CMS resources, an increase from 26.5% in 2002, 20.6% in 2001, and more than double the level in 2000 (14.7%).

The 2008 Campus Computing Survey found that although Blackboard continues to dominate the CMS market with 56.8% of the campuses identifying Blackboard as their product standard, the percentage is down from 66.3% in 2007. Moodle was the CMS of choice for 13.8% of the respondents, up from 10.3% in 2007. Howard University's Digital Learning Lab (2009) reported that out of 43 HBCUs that offered distance education courses and/or programs, 31 used Blackboard/WebCT, down from 38 out of 40 HBCUs utilizing Blackboard in 2007. Two used e-College and four used Moodle to deliver their distance learning courses.

In colleges and universities, course management software is often adopted for the entire institution. In some cases, professors might be required to use the adopted software, in other cases, use might be voluntary. For institutions that want instructors to utilize a common software package, it is important to understand whether or not individual differences impact the willingness to use the software. If individual differences do impact the utilization, it then becomes necessary to determine how these factors influence faculty members' decisions to adopt or not adopt the CMS. Hoskins and van Hooff (2005) noted that as the systematic evaluation of course management software has become imperative as online learning as continued to grow.

Statement of the Problem

HBCUs are minority serving institutions that in spite of often lacking resources are better at supporting African American students than PWCUs (DeSousa & Kuh, 1996;

Flowers, 2002; Flowers & Pascarella, 1999). However, despite student perceptions of the benefits of instructional technology, many HBCUs have remained reluctant to offer online courses and/or programs. Much of the research related to faculty perceptions of online learning and CMS has failed to include minority serving institutions, preferring to focus attention on traditionally White institutions. Little or no research analyzed how faculty at HBCUs use CMS in their teaching practices and how their attitudes toward the CMS can help or hinder adoption of online teaching at their institution.

Brown and Freeman (2002) noted that, "there is a need for a contemporary body of literature which documents the history and practices of HBCUs" (p. 237). Their study indicated a lack of knowledge among institutional researchers and educators about the successes, challenges, and practices among HBCUs. They pointed out that although HBCUs graduate the majority of African American students in the United States, "research on HBCUs appears in the extant literature on student diversity, institutional quality, and cost-benefit studies" (p.238). A "majority of research conducted on faculty at HBCUs was completed between 1940 and 1970, with little research being published during the last quarter of the century" (Johnson & Harvey, 2001, p. 298). In addition, this researcher found no study that explored the perceptions of faculty at HBCUs regarding online learning and use of CMS for teaching and learning.

The results from this study may help fill a gap in the educational technology literature concerning how attitudes toward the CMS can help or hinder adoption of online teaching practices and how faculty implement the CMS. The study also addressed a specific gap in the literature regarding the adoption of online learning and CMS in HBCUs.

Purpose of the Study

As colleges and universities allocate significant resources to support the integration of technology and online learning ranging from purchasing CMS licenses to paying salaries of IT staff, quickly diffusing the adoption of CMS has become a priority on many higher education campuses (Bennett & Bennett, 2003). Students enter college with expectations about the use of technology in teaching and learning (Green, 2003). Recent research indicated that Web-enhanced teaching enhances instruction and course management and provides many pedagogical benefits for students (Salaway & Caruso, 2007). According to Nycz and Cohen (2007) online learning is a key factor in building a not only a technologically literate workforce prepared to meet society's rapidly growing demand for learning opportunities delivered by increasingly more convenient methods.

Given societal changes related to online learning, the expectations of students and employers regarding the use of technology in learning, the use of CMS to facilitate adoption of online learning, the reluctance of HBCUs to offer online learning options, and the underuse of CMS by instructors, this nonexperimental, quantitative study sought to identify factors that influenced faculty members in their decision to adopt a CMS into their teaching practices for the purpose of predicting membership in one of five adopter categories. The primary focus of the study was to determine faculty members' perceptions of the CMS's attributes and organizational policies, procedures and norms, and how these factors influenced the likelihood of their adopting the CMS as part of their teaching practices. The research drew upon Rogers's (2003) diffusion of innovation theory as the framework for interpreting and presenting the results of the study. In order to isolate key issues involved, the study was designed to determine:

1. adopter levels for faculty at each institution;
2. their ratings of the perceived attributes of the CMS;
3. their perceptions of institutional characteristics (i.e., policies, procedures, or norms) that hinder or encourage adoption of the CMS.

Research Questions

I sought to identify characteristics of faculty members and their perceptions of the CMS and organizational characteristics of the college/university in order to determine the influence of these attributes on instructors' adoption of the CMS in their teaching practices. In order to achieve this objective, the following research questions guided the study.

1. What is the connection between the adopter status of faculty members and their perceptions of the relative advantages of adopting the CMS?
2. What is the connection between the adopter status of faculty members and their perceptions of compatibility issues related to adopting the CMS?
3. What is the connection between the adopter status of faculty members and their perceptions of the complexity/difficulty of adopting the CMS?
4. What is the connection between the adopter status of faculty members and their perceptions of the trialability of the CMS?
5. What is the connection between the adopter status of faculty members and their perceptions of the observability of the CMS?
6. What is the connection between the adopter status of faculty members and their perceptions of organizational policies related to adoption of the CMS?

7. What is the connection between the adopter status of faculty members and their perceptions of organizational procedures related to the adoption of the CMS?
8. What is the connection between the adopter status of faculty members and their perceptions of organizational norms related to adoption of the CMS?

Nature of the Study

The design of this study involved a quantitative paradigm and nonexperimental research. The study employed an online survey to obtain data about the relationship between adopter status and perceived attributes of the CMS, perceptions of the organizational and institutional support, and norms related to CMS adoption. Quantitative data were gathered via a web-based, self-administered electronic survey. Three instruments as well as data from the literature review formed the basis for many of the items. The three surveys included: the Perceived Attributes Instrument developed by McQuiggan (2006) to measure faculty perceptions regarding the course management system, ANGEL; Davis's (1989) technology acceptance model (TAM); and Moore and Benbasat's (1991) Adoption of Information Technology Innovation Survey. McQuiggan was consulted requesting permission to modify her survey for use in this study and permission was granted (Appendix A). Demographic information and questions allowing for participant comments and clarification were also added. The survey consisted of both closed and open-ended questions.

The general population of this study was higher education faculty at five HBCUs in the Southeast. This study used a convenience sample of full-time faculty at these institutions. Faculty members were defined as adults serving in an instructional role at the institution on a full-time basis on 10- or 12-month contracts during a given academic year. These HBCUs were chosen because they represented public and private, 4-year, liberal arts institutions.

I analyzed categorical data using frequency statistics. Logistic regression was used to predict group membership (i.e., adopter status) and to provide information about the relationship and strengths among the variables. I tested whether a positive perception could be used to predict adopter status. The eight independent variables (relative advantage, compatibility, complexity, trialability, observability, policies, procedures, and norms) were used as predictors. The data collected from the Web-based survey were numerically coded by variables. SPSS was used to analyze the data.

In chapter 3, the detailed procedures for gathering and analyzing the data will be provided.

Theoretical Framework of the Study

Zaltman and Duncan's (1977) resistance/adoption model, Hall and Hord's (1987) concerns-based adoption model (CBAM); and Burkman's (1987) user-oriented instructional development process all added to the literature related to decision making and the process of diffusion. However, Rogers's (2003) framework emerged as most related to this study. First published in 1962, Rogers's diffusion of innovations described the relationship between five perceived attributes of an innovation—compatibility, relative advantage, trialability, observability, and complexity—and the adoption and implementation of varying innovations in different organizations, disciplines, and socioeconomic classes. Diffusion of innovations theory includes the following four principal components: innovations, time, social systems, and communication channels.

Time includes the following three factors: (a) innovation-decision process; (b) innovativeness of the individual adopter/system relative to the earliness or lateness of adoption, compared to other members of the system; and (c) the innovation's rate of adoption.

The applicability of Roger's (2003) diffusion theory is that it provides a means for understanding the technology adoption process in order to identify faculty perceptions of the innovation for the purpose of developing training programs and communication methods that facilitate adoption. Diffusion theory demonstrates that adoption is not a singular, irrational act, but an ongoing process that can be scrutinized, assisted, and supported.

Rogers's (2003) diffusion of innovation model suggested that researchers simultaneously examine characteristics of the individual adopter, the institutional setting, and the technology itself (p. 11). In this way, it is a useful model for conceptualizing the experiences of the instructors at the HBCUs where the study was conducted. Chapter 2 contains a detailed discussion of Roger's diffusion of innovations theory.

Definition of Terms

For the purposes of this study, the following terms are defined.

Course management systems. "A CMS is Internet-based software that manages student enrollment, tracks student performance, and creates and distributes course content. In this way, the CMS enables teachers to extend the classroom beyond its traditional boundaries of time and space" (Ullman & Rabinowitz, 2004).

Diffusion. "Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003, p. 35).

Distance education. This phrase refers to "The acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance" (United States Distance Learning Association, n.d.).

Historically Black Colleges and Universities (HBCU). The Higher Education Act of 1965 defines an HBCU as: "...any historically black college or university that was established prior to 1964, whose principal mission was, and is, the education of black Americans, and that is accredited by a nationally recognized accrediting agency or association determined by the Secretary [of Education] to be a reliable authority as to the quality of training offered or is, according to such an agency or association, making reasonable progress toward accreditation" (qtd. in White House Initiative on Historically Black Colleges and Universities, 2010, section 3).

Hybrid/blended learning. In these courses, the instructor combines elements of online distance learning courses and face-to-face (f2f) delivery. A substantial proportion of the content (30-79%) is delivered online, usually includes online discussions, and typically has a reduced number of f2f meetings (Allen & Seaman, 2008).

Innovation. Rogers defined innovation as "anything perceived as new by an individual or group" (p. 11). Hall and Hord (1987) explained that innovations related to education can either be products (computers, multimedia presentations, assessment techniques) or processes (student-centered learning, asynchronous communication, or principles of self-esteem in character education).

Innovation-decision process. The innovation-decision process includes the following phases: knowledge, persuasion, decision, implementation, and confirmation. According to Rogers's model, potential adopters of an innovation (a) learn about the innovation, (b) are persuaded as to the merits of the innovation, (c) decide to adopt the innovation, (d) implement the innovation, and (e) confirm (reaffirm or reject) the decision to adopt the innovation (Rogers, 2003).

Learning management system. Similar to course management systems, "LMS refers to software that primarily acts as an electronic registrar by electronically performing various enrollment and related tasks" (Carliner, 2005). LMS and CMS are often used interchangeably.

Online courses. A course where all or most of the content is delivered online. Typically, there are no requirements for f2f meetings between students and instructor, either in the classroom or electronically (Allen & Seaman, 2008).

Organizational support. This term refers to institutional support for training and the use of technology, the level of college funds and availability of technological materials and staff development programs for the use of technology and the CMS (Kelly, 2005). Organizational support also relates to institutional policies and procedures that encourage the use of technology and the CMS.

Perceived attributes. Perceived attributes are factors that explain variations in rates of adoption. They include:

a) *Relative advantage* refers to "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, 15).

b) *Compatibility* refers to “the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of the potential adopters” (Rogers, 2003, 15).

c) *Complexity* refers to “the degree to which an innovation is perceived as relatively difficult to understand and use” (Rogers, 2003, 16).

d) *Trialability* refers to “the degree to which an innovation may be experimented with on a limited basis” (Rogers, 2003, 16).

e) *Observability* refers to “the degree to which the results of an innovation are visible to others” (Rogers, 2003, 16).

Professional (faculty) development. “An ongoing effort to improve, upgrade or impart skills to the faculty in the use of technology. Included in this effort are workshops, information sessions, just in time support by phone, E-mail, or in person” (Guskey, 2000, as cited in Kelly, 2005).

Social system. A social system is defined as the set of interrelated units with a common goal (such as an educational institution) and structure. The social system includes (a) norms, its sets of behavior patterns; (b) opinion leadership, the degree an individual is able to informally influence others; (c) change agents, individuals who attempt to influence others innovation-decisions; (d) change agency/agencies, a unit or units whose purpose is to use change agents; and (e) aides, individuals used by change agents to intensively interact with the clients (Rogers, 2003).

Technology integration. According to the International Society for Technology in Education’s (ISTE) National Educational Technology Standards for Students (NETS-S), “Effective integration of technology is achieved when students are able to select technology tools to help them obtain information in a timely manner, analyze and synthesize the information, and present it professionally. The technology should become an integral part of how the classroom functions—as accessible as all other classroom tools" (as cited in U.S. Department of Education [DOE], "Technology in Schools," Chapter 7).

Traditional courses. Courses where no online technology is used. All content is delivered in writing or orally (Allen & Seaman, 2008). These are often referred to as f2f courses.

Web-enhanced (web- facilitated) courses. In these courses, instructors use web-based technology to facilitate an essentially f2f course. Instructors may use a CMS or web pages to post the syllabus and assignments. Less than 30% of the instruction occurs online (Allen & Seaman, 2008).

Assumptions of the Study

For the purpose of the research, I assumed the following:

1. Respondents will provide honest and forthright responses to the questionnaires and in the interviews.
2. CMS are products designed to support faculty in different content areas with different teaching philosophies and instructional styles.
3. Graduates of HBCUs are more likely to obtain higher paying jobs with adequate preparation in the application of computing technologies.
4. Faculty members listed in each institution's E-mail list have access to a computer and the Internet at home or in the office to read E-mails.

5. Logistic regression does not assume a linear relationship between the dependents and the independents. Furthermore, the error term does not have to be normally distributed, but the distribution is within the range of the exponential family of distributions.
6. Logistic regression assumes either interval scaled or binary independent variables. However, logistic regression does not require equal variance between the categorical variables.

Limitations of the Study

One limitation of the study was that while there are 103 HBCUs, the population being studied was limited to five HBCUs in the Southeast. Because a convenience sample was used, there was a limitation in generalization and inference about the entire population. The universities in the study were primarily undergraduate institutions, although they also offered graduate programs. Only full-time faculty members were surveyed, regardless of level of instruction. These limitations had an impact on the study in that the findings were specific to these settings and may not hold true for all HBCUs in the country. However, it is important to note that, in spite of the limitations, the findings are useful for improving course management software use at these specific universities and others of similar size and demographics and for providing improvement opportunities and further research prospects on the topic.

Another limitation was the lack of response from faculty members who may not have had access to the Internet and E-mail or may not have chosen to participate. As the survey link was distributed through E-mail, it was limited to the willingness of respondents to take the initiative to read the E-mail and answer the survey. Although E-mail is now a common tool for individuals, there is little incentive for the respondents to answer if they are not interested in the results or not interested in the research at all. This may mean that the responses generated were from more highly adept faculty in terms of technology proficiencies.

Another important point related to the limitations of this study relates to the statistical analysis technique used. Logistic regression seeks to determine a predictive relationship between the variables. As Thomas (2005) noted, although

> regression analysis is sometimes interpreted to suggest that the independent variables cause the outcomes, a more accurate term to use is "affect" the outcomes. The magnitude of these effects can be quantified, but this does not suggest other, unmeasured or latent, factors don't play important roles as well (p. 84).

An additional limitation is that the characteristics and factors were self-reported on a Likert scale. Individuals may not have had the same internal definitions of scale rankings. Such self-reporting can lead to different definitions and interpretations of the characteristics. In addition, when people self-report data, they are conveying what they believe to be true or even what they think the researcher wants to hear. "Furthermore, people's descriptions of their attitudes and opinions are often constructed on the spot [because] they haven't really thought about certain issues until a researcher poses a question about them (Leedy & Ormrod, 2005). Therefore, responses may have been colored by recent events or current contexts.

Scope and Delimitations of the Study

The scope of this study included full-time faculty members, male and female, employed at five HBCUs in the Southeastern United States employed during the 2009-2010 academic year. The five institutions represented both public and private, 4-year liberal arts institutions. I hoped to get 25% return rate from a sample of 1070 faculty members. However, the final response rate was 14.2% from a sample of 1038 faculty members discounting those whose E-mails bounced or who opted out. An online survey was used to gather data. I statistically analyzed the data for relationships between adopter status and perceptions of the CMS's attributes and of organizational policies, procedures, and norms.

Significance of the Study

Despite the growing demand for online learning and the ubiquitous influence of CMS, there is a gap in the literature about why many HBCUs are not embracing online learning and CMS. One reason is that the perceptions of faculty members may be prohibiting its wider use. Another may be that faculty may not be receiving adequate support or that institutional norms are hindering adoption. While several studies focus on computer integration and elements that are included in a CMS, such as Web-based communication tools, (Dobbs, 2004; Signer, Hall, & Upton, 2000), few studies have specifically explored higher education faculty members' perceptions of the CMS from Roger's diffusion of innovation theory (Dugas, 2005; McQuiggan, 2006). Furthermore, fewer studies have examined faculty perceptions of institutional support of technology that may be important in gaining an understanding of faculty members' CMS adoption patterns (Dobbs, 2004; Signer, et al., 2000). The results of the study may contribute to the educational technology literature dealing with CMS and online learning.

This study sought to determine whether a predictive relationship between the independent variables and the dependent variable exists. If so, the results of this study could be used by administrators, professional development personnel, researchers, and policymakers to determine ways to improve adoption of online learning and CMS. In addition, this study may contribute to current knowledge about adoption of CMS at HBCUs and contribute to the existing literature. No study has addressed the perceptions of faculty at HBCUs regarding online learning and use of CMS for teaching and learning.

Faculty training and professional development opportunities have been found to be crucial ingredients in successfully implementing new technology in higher education (Butler & Sellbom, 2002; Bates, 2000). Because of the number of faculty who begin to teach online with little knowledge of the process of designing, developing, and teaching an online course, support for faculty is an important factor in online initiatives (Irani & Telg, 2002). According to a National Center for Education Statistics report (Lewis, Alexander, & Farris, 1997), 40% of the institutions offering online courses expected faculty to teach without any prior training or preparation. The failure to provide adequate guidance and preparation ultimately produces online instruction that lacks quality and continuity (Johnsrud, Harada, & Tabata, 2006). Vaughan (2002) observed, “When policymakers and school personnel adopt appropriately designed concerns-based professional development delivered in logical progression, it will result in reducing teachers’ resistance to change.” Hall and Hord (2001) noted, if faculty needs and concerns are addressed in the initial phases of adoption, they are more likely to adopt and employ an innovation. No single approach to training online faculty is being taken by institutions although internal training courses (65%) are the most common (Allen & Seaman, 2009). The findings of this study can assist faculty development personnel in developing appropriate training interventions to meet the needs of different faculty adopter levels.

This study has many implications for society. First, the provision of adequate technology education for individuals in any segment of the society for the purpose of employment plays a significant role in the individual's ability to compete in the global workplace as well as the United States's ability to compete with other countries. As online teaching and learning continue to expand, the use of CMS to facilitate distance education will continue to be important (Camp, DeBlois, & 2007 EDUCAUSE Current Issues Committee, 2007). "Diffusion is a kind of social change defined as the process by which alteration occurs in the structure and function of a social system" (Rogers, 2003, p. 5). The diffusion of the use of CMS at HBCUs could possibly prevent the socioeconomic gap from widening by giving students at HBCUs the opportunity to learn the technological skills needed for the 21st century. The findings would provide other researchers with a knowledge base containing relevant data, information, and answers to questions that will expand the literature regarding both HBCUS and faculty perceptions of CMS. The findings from this study can assist administrators at HBCUs in determining faculty perceptions of online teaching and the CMS in order to reduce, minimize, or overcome perceived barriers to online teaching. The study will also determine various adopter levels in order to assist faculty development personnel in the development of appropriate interventions to facilitate adoption.

Summary

This chapter presented an introduction to the study, provided an explanation of the problem being investigated, and outlined the purpose of the study. Background information was presented on online learning, course management systems, and HBCUs. Online education has grown exponentially in the last two decades, viewed as a means of expanding student access and developing critical technology skills. CMS have been viewed as a means of facilitating adoption of online teaching practices, and each of the HBCUs identified in this study employs a CMS. HBCUs, while small in number, graduate the majority of African Americans who earn higher education degrees in America. However, HBCUs trail PWCUs in the adoption and integration of online learning, which could lead to widening the socioeconomic gap between students who are becoming technologically literate and those who are not (Rogers, 2003; Schroll, 2007). Despite the growing body of research related to online learning, little or no research has included or specifically targeted HBCUs. No study explored the perceptions of faculty at HBCUs regarding online learning and use of CMS for teaching and learning.

The purpose of this nonexperimental, quantitative study was to identify characteristics of faculty members relative to their perceptions of the perceived attributes of the CMS and organizational policies, procedures, and norms of the college/university in order to determine their influence on faculty's use of the CMS in their teaching practices. Eight research questions were identified that guided the study, and a theoretical framework was identified based on Roger’s diffusion of innovations theory. The study employed an online survey to gather data, and logistical regression was used to predict the relationship between adopter status and adopter perceptions. Assumptions, delimitations, and limitations of the study were listed as well as definitions of terms.

Finally, the significance of the study and how the study may affect positive social change were outlined. The results of this study could be used to assist administrators and faculty development personnel at HBCUs in determining faculty perceptions of online teaching and the CMS in order to reduce, minimize, or overcome perceived barriers to online teaching, especially at HBCUs. The findings provide other researchers with a knowledge base containing relevant data, information, and answers to questions that expand the literature regarding both HBCUS and faculty perceptions of CMS.

Chapter 2 provides an overview of online/distance education in the United States, data about CMS, and background information on Historically Black Colleges and Universities (HBCUs). An analysis is included of Rogers's theory of the diffusion of innovations related to technology integration, and related studies regarding factors that influence faculty members' adoption of online teaching and learning practices and CMS. The final section discusses studies which utilized a survey approach to determine faculty motivations and barriers to adoption of CMS as a means of integrating online teaching practices. Chapter 3 describes the research paradigm and design, as well as specific data collection and data analysis procedures about this survey. Specifically, information about the target population, sampling procedure, data collection procedures, instrumentation, and data analysis will be discussed. Chapter 4 contains the results of the survey. Chapter 5 contains the summary and final conclusions of the study and its social change implications.

Chapter 2: Organizational Structure of the Chapter

Chapter 2 contains the literature review of the theoretical support for the research, research questions, and the methods of analysis as described in Chapter 1. The problem of this research deals with higher education faculty's attitudes toward technological change and the influences that affect their willingness to adopt the CMS and online teaching practices.

The first section of the chapter provides an overview of online/distance education and an introduction to course management systems. The second section provides background information on HBCUs in the United States. The third section includes a discussion of Rogers's theory of diffusion of innovations related to technology integration. The fourth section presents scholarly research regarding factors that influence faculty members' adoption of online teaching and learning including personal, institutional, and technological issues. The final section discusses studies which utilized a survey approach to determine faculty motivations and barriers to adoption of course management systems as a means of integrating online teaching practices.

The research studies selected for this literature review focused on attitudes of teaching faculty regarding online education and, more specifically, faculty perceptions regarding motivators and obstacles to teaching online related to CMS. Five databases were employed to search for relevant research studies. These databases included Academic Search Premier, ProQuest Dissertations and Theses, Education Research Complete, ERIC - Educational Resource Information Center, and Questia. The following online journals were reviewed for online research articles: *Journal for Asynchronous Learning*, *Online Journal of Distance Learning Administration*, *American Journal of*

Distance Education, Campus Technology, Australasian Journal of Educational Technology, Journal of Distance Education, The Journal of Interactive Online Learning, The Turkish Online Journal of Educational Technology, and *EDUCAUSE Quarterly*. The following organizational sites were also consulted: The Campus Computing Project, National Education Association, EDUCAUSE, the Department of Education's National Center for Education Statistics, and the Sloan Consortium. The author attempted to review relatively current research. Therefore, the range of dates for the studies was between 1998 and 2009.

The keywords used in searching these databases and websites included: faculty, distance education, distance learning, online education, online learning, motivators, incentives, obstacles, barriers, attitudes, perceptions, factors, course management system, Blackboard, WebCT, learning management system, HBCU, historically black colleges and universities, adoption, diffusion, technology, integration, teaching practices. A search of the reference lists of the research articles yielded additional articles as well as three previously published literature reviews. Research on faculty perceptions of course management systems was limited and nonexistent for HBCUs. Five research studies specifically dealing with faculty adoption of course management systems were found. Several articles discussed technology integration with a sideline about course management systems. One dissertation studied the adoption and diffusion of computing and Internet technologies at HBCUs. One article on incorporating the hybrid learning model in HBCUs was found.

The 2008 *Campus Computing Survey* (Green, 2008) was based on data provided by senior campus IT officials, including the CIO, CTO, or other ranking campus IT officer, from 555 two-and four-year, public and private institutions across the United States. Surveys were completed during September and October, 2008. Results indicated that a small but growing number of colleges and universities (13.8%, up from 10.3% in 2007) switched from a commercial CMS to an Open Source CMS (either Sakai or Moodle), establishing the Open Source CMS as the single standard for the campus. Moodle was particularly popular in private four-year colleges: almost one-fourth (23.7%) of private four-year institutions have designated Moodle as the campus standard CMS, up from 17.2% in 2007. “The recent gains for Moodle and Sakai suggest that ten years after the deployment of the first commercial CMS applications, campus officials and faculty committees are reviewing seriously the various CMS offerings from both commercial providers and the collaborative Open Source movement” (Green, 2007).

Online/Distance Education: Entering the Mainstream

Bates (2000) noted that

> New technologies such as the World Wide Web and multimedia have the potential to widen access to new learners, increase flexibility for ‘traditional’ students, and improve the quality of teaching by achieving higher levels of learning, such as analysis, synthesis, problem solving, and decision making. (p. 1)

Not only has online education been touted for it potential to increase access to postsecondary education, but it has also been viewed as a catalyst for revolutionizing higher education institutions and teaching. In fact, the customary path for acquiring a college degree is quickly becoming the exception rather than the rule. Promises of improved student access, attracting students from new markets, growing and continuing professional development, and increased degree completions lead the reasons for offering online learning as alternatives to traditional brick-and-mortar formats (Allen & Seaman, 2007).

Initially funded by the Alfred P. Sloan Foundation, the Sloan Consortium (or Sloan-C) is a nonprofit organization “dedicated to integrating online education into the mainstream of higher education, helping institutions and individual educators improve the quality, scale, and breadth of online education” (Sloan-C, n.d.). Since 2002, the Sloan-C has surveyed chief academic officers of the nation’s higher education institutions regarding the prevalence of and attitudes toward online education in their institutions (Allen & Seaman, 2003, 2004, 2005, 2006, 2007). These reports provide hard data about online students and a variety of institutions involved in online learning. In fall 2003, 1.98 million students were enrolled in at least one online course. In the fall 2006, the number had grown to almost 3.5 million students (nearly 23% of all U.S. higher education students) were taking at least one online course. A large majority (69%) of the academic leaders believed that student demand for online learning will continue to grow. Of the institutions currently offering online courses, 83% expected their online enrollments to increase over the coming year (Allen & Seaman, 2007).

The Sloan-C reports also revealed that private colleges and universities are less likely to offer fully online courses than public and private for-profit institutions. Both public and for-profit institutions have found that online courses can help fulfill mission mandates and open up new market opportunities. In contrast, many private liberal arts colleges, which serve largely residential, undergraduate populations, tend to offer hybrid courses that provide both face-to-face and online components. Just over half of the 1,170 respondents participating in the 2004 Sloan-C survey (typically chief academic officers) agreed that “online education is critical to long-term [institutional] strategy” (Allen & Seaman, 2004). The 2009 report indicated that 74% of public institutions indicated that online education was a part of their long-term strategy. The most negative opinions towards online education have consistently been reported by baccalaureate institutions (Allen & Seaman, 2009).

The National Center for Education Statistics (2008) collected information on distance education at 2-year and 4-year Title IV postsecondary institutions. Distance education was defined as “a formal education process in which the student and instructors are not in the same place. Thus, instruction may be synchronous or asynchronous, and it may involve communication through the use of video, audio, or computer technologies, or by correspondence.” The Center found that 66% 2- and 4-year Title IV institutions offered online (61%), hybrid/blended online (35%), or other distance education (26%) options (Parsad & Lewis, 2008). Allen and Seaman (2005) noted that “online learning is thriving in the southern states” (p. 2) following similar patterns of growth and acceptance as the national sample. Furthermore, the data also indicated that online learning had made greater strides in the Southern states than in the nation as a whole. In fact, the online enrollment growth rate was over ten times that projected by the National Center for Education Statistics for the general higher education student population. “Penetration rates are consistently higher and attitudes towards online education are consistently more positive” (Allen & Seaman, p. 2). Nationally, 89% of all institutions surveyed offered f2f undergraduate-level courses, and 55% offered comparable online undergraduate-level courses, which equates to a 62.5% national penetration rate for undergraduate-level courses. In other words, 62.5% of all institutions nationally that offered undergraduate f2f courses also provided an online version of the same-level course. The undergraduate penetration rate for Southern states was 69%. With over 1.1 million online students, the sixteen Southern states represented over one-third of total online enrollments in the fall 2005 (Allen & Seaman, 2006). The overall percentage of Southern institutions indicating online education was a critical element of their long-term strategy grew from 52% in 2003 to 64% in 2005. Of the remaining 1,000 institutions (largely small schools, private not-for-profit institutions, and baccalaureate colleges), three-quarters did not indicate that online education was important to their long-term strategy (Allen & Seaman, 2006).

In 2006, Sloan-C agreed to share data from HBCU respondents with the Digital Learning Lab (DLL), a component of Howard University Continuing Education. DLL intended to incorporate insights derived from descriptions of online education courses and programs provided on HBCU with the data supplied in response to the Sloan-C survey. However, not enough HBCUs responded in order for Sloan-C to perform the requested analysis (DLL, 2007).

The ever-increasing interest in online education means that higher education instructors are progressively using and expected to use an ever-changing array of web-based technologies to enhance instruction. The pressure to integrate technology emanates from top-down administrative mandates as well as bottom-up student expectations. However, despite billions of dollars in technology expenditures and the growing use of web-based technologies, online education has failed to become widely accepted by higher education faculty. According to the 2009 Sloan-C report, *Learning on Demand: Online Education in the United States, 2009*, 31% of the Chief Academic Officers believed that faculty at their institution "accept[ed] the value and legitimacy of online education" (p. 12). The acceptance level has varied little over the course of the research (28% in 2002, 30% in 2004, 28% in 2005, 33% in 2006, and 33.5% in 2007). The 2009 figure actually represents a drop in acceptance. The majority of institutions with no online programs/courses (58%) also believe online education to be inferior to f2f offerings. This contrasts with institutions offering fully online programs where only 14% indicated that the learning outcomes were inferior (Allen & Seaman, 2009).

The *Campus Computing Survey*, which began in 1990, is the largest ongoing study of information and computing technology in American higher education. The reports are based on data provided by campus IT officials representing over 500 two- and four-year, public and private U.S. colleges and universities. The *2006 Campus Computing Survey* indicated that for the third year in a row campus IT officers considered network and data security as the "single most important information technology issue confronting their institution" over the next two-to-three years. This trend remains in contrast to the focus on the "instructional integration of information technology," which topped the list from 2000-2003. In 2000, 40.5% of the respondents identified "assisting faculty with the instructional integration of technology" as the top IT challenge for their institution. However, in fall 2006, instructional integration fell to a distant second (17.3%), well-behind network and data security (30.5%) and only slightly higher than "upgrading/replacing the campus ERP (Enterprise Resource Protocol, or administrative information) systems (16.3%)" (Green, 2006).

Course Management Systems

Several university and commercial CMS were launched during the mid- to late 1990s either as fully online or as supplemental systems for traditional f2f courses (C. F. Harrington, Gordon, & Schibik, 2004). WebCT was developed at the University of British Columbia while Blackboard was the result of collaboration between students and faculty at Cornell University. LearningSpace, on the other hand, was developed in the private sector (Morgan, 2003). Course management systems became widely available in 1997 and have dramatically increased in popularity and use by colleges and universities across the country as a means to meet the needs of faculty, especially those with few technological skills, to manage and organize their online courses (Ullman & Rabinowitz, 2004).

CMS allow instructors to perform the following tasks, which enable them to extend their classroom beyond the traditional boundaries of time and space. First, instructors can upload course materials such as course syllabus, course schedule, and course resources linked to specific lessons, such as readings and PowerPoint presentations. Second, instructors can track student progress through assessment features, such as online tests and surveys, and an online grade book for posting student grades. Third, discussion boards allow instructors and students to discuss readings and to prolong class discussions between class sessions. Other communications tools also allow instructors to send announcements to classes and communicate individually with students. Finally, instructors can track course statistics, including who accessed the course and when (Carliner, 2005, para. 5).

Examples of CMS include the commercial products Blackboard, WebCT, e-College, and ANGEL, along with open source systems such as Sakai and Moodle. Each functions a little differently, but two main companies have dominated the CMS market: Blackboard and WebCT. The two companies merged in 2006 and now collectively control 60-75% of the CMS market (Essa, 2008) with more than 3,700 clients, including elementary and secondary schools, nonprofit and for-profit colleges/universities, government agencies, and corporations (Carnevale, 2005).

LMS were initially designed for workplace learning environments. Most perform some or all of the following tasks: (a) registration; (b) track participation (classroom attendance, sign-ons and sign-offs of online courses); (c) track of completions (including final scores or grades); (d) testing, (e) follow-up discussions with participants; (f) aggregated reports, such as the number of people registered for particular courses; (g) transfer of information to other systems, such as human resource information systems; (h) process charges for courses, including tuition payments and transfer payments among departments; (i) course catalog; and (j) skills management (Carliner, 2005, par. 8). A variety of LMS are available, including NetDimensions EKP, Saba, and SumTotal Systems (Carliner, para 10).

Distance education has undergone several distinct generations. The first generation, sometimes called the “correspondence model”, was exemplified by mass-production of paper-based materials. The next generation expanded the model to include multimedia such as audio and video tapes, interactive video, and computer-based learning. The third generation or “telelearning model” incorporated the features of the previous generation but added broadcast TV and audio/videoconferencing. The first generation of e-Learning from 1994-1999 was marked by a passive use of the Internet. Traditional materials were simply converted to an online format with simple graphics. The emphasis was on access to resources via the Internet with little real change in teaching pedagogy. The next generation transpired from 2000-2003 and was characterized by the use of more advanced technologies such as higher bandwidths, rich streaming media, online assessment, and virtual learning environments (such as those created by course management systems) which integrated access to course documents, communications, and student services. The generation currently in process reflects a more constructivist philosophy by promoting greater collaboration, socialization, and reflective practices, through such tools as e-portfolios, wikis, blogs, and social networks and interactive technologies such as online games and simulations. The next phase in distance education, mLearning (mobile learning), has just begun using devices like PDAs, mobile phones, and Smartphones (Connolly & Stansfield, 2006).

Maeroff (2002) argued that hybrid courses, which combine the features of traditional classrooms and online courses, will become the rule rather than the exception in higher education, and faculty not using a CMS to support their f2f classes will be viewed as behind the times.

As CMS have increased in popularity, research into the potential impacts using these tools may have on learning outcomes have had mixed findings. Researchers have found that a CMS can benefit students in a number of ways. CMS can improve course communication and collaboration (Hutchins, 2001); increase student preparation for class and improve the quality of in-class interactions (Massimo, 2003); and provide students with greater access to resources (Yip, 2004). However, Vessell (2001) reported no significant difference between the grades of students who did not use the CMS and who did. Dutton, Cheong, and Park (2004) noted that the advantages of employing a CMS can be offset by flaws in the software, causing delays or instability.

Other studies have indicated that students have responded positively to the quality of resources made available through course management systems (Buzzetto-More, 2008; Kendall, 2001; Kvavik & Caruso, 2005; Rivera, McAlister, & Rice, 2002; Wernet, Olliges, & Delicath, 2000). Wernet, et al. surveyed 39 social work students to determine their satisfaction with and perception of WebCT. All respondents considered the resources posted on the course website helpful. The nontraditional students stated use of the CMS did not represent a disadvantage and that they preferred access to Web-based courses. Buzzetto-More also reported that, overall, most students indicated satisfaction with the course materials available on the course site. Kendall reported that students in a course converted to units in WebCT indicated overall satisfaction with the CMS as the primary delivery mechanism and with the organization and content of the units. Rivera, McAlister, and Rice (2002), studied student satisfaction, student performance, and instructor experiences between course sections taught using three different approaches (traditional face-to-face, online teaching using WebCT, and hybrid model). They found that student satisfaction was the highest with the hybrid learning model. Exam scores for all three approaches evidenced similar results. However, the results showed that effectiveness was hindered by technical issues, difficulty learning to use the CMS, inadequate technical skills among students, which explained the lower satisfaction ratings for the fully online sections.

Studies of student experiences with CMS indicated that content features such as posted syllabi and readings are used by more students than interactive features such as discussion boards and sharing materials (Caruso, 2006). Kvavik and Caruso (2005) also found the top ways that students used the CMS were to access the syllabus, online readings, and links based to text-based course materials and to keep track of grades and assignments. These student findings agreed with faculty CMS use reported by Morgan (2003), where the top three uses were announcements, syllabus, and course documents.

Respondents in Kvavik and Caruso's (2005) study indicated that the convenience of online learning allowed for greater flexibility and access to more courses. They valued the ability to keep track of grades and assignments, yet they rated online discussion boards as the least valuable. They indicated that well-administered, engaging online discussions, while useful, did not happen often. Bonnell (2004) reported that undergraduate students at the University of Southern Indiana considered access to grades the most useful aspect of using the CMS. A 2005 University of Michigan study reported similar results with students reporting that out of the 13 functions, four were most helpful: syllabus, online readings, sample quizzes/exams, and turning in/getting assignments online. Logistics, chat, and online office hours were deemed least helpful (Berger).

Lioa (2005) sought to explain student adoption of the CMS, ANGEL, using Rogers's (2003) diffusion of innovations model to assess the impact of the adoption on interactions between students, instructors, and course materials and on student learning. Lioa found that simplicity was the most significant predictor of adoption. In other words, the user-friendly nature of the CMS encouraged student usage. Combining the factors of relative advantage and compatibility with simplicity proved to be significant predictors of interaction between students, instructors, and course materials. These features actually increased the interactions, which directly affected student learning.

Much of the self-reported data indicate that the CMS is largely perceived as valuable because if its “management” functions and enhances communication/feedback (i.e. access to faculty, grades, exam scores), which seem to increase student satisfaction and potentially lead to improved learning. Kvavik and Caruso (2005) concluded that “The fact that the interactive elements of a CMS are getting such little use and mixed results suggest that the real potential of the CMS as a learning platform must await a maturation in the pedagogies with which they are bundled.”

While numerous studies have been conducted on course management systems impact on students, research directed at the faculty side is lacking. Morgan’s 2003 study of CMS use in the Wisconsin University System provided background for analyzing several recent studies incorporating faculty and CMS usage. Morgan found, like Kvavik and Caruso (2005) that much of the usage was concentrated in the content presentation tools. Faculty adopted the more complex or interactive tools such as discussion boards, assessment tools, and grade books more slowly. “Faculty look to course management systems to help them communicate easily with students, to give students access to class documents, and for the convenience and transparency of the online gradebook” (Morgan, p. 2).

Various studies indicated that faculty often utilized the CMS to enhance their f2f courses (Al-Ali, 2007; Gastfriend & Finnegan, 2005; Oliver & Moore, 2008; Woods, et al., 2004). Oliver and Moore noted “faculty will choose to work with tools that are grouped, readily available, accessible, and supported on campuses" (p. 18). The tools that have traditionally been packaged in CMS have emphasized instructor-centered tools over student tools. Gastfriend and Finnegan's findings supported that faculty primarily use the CMS to supplement their lectures, create more interactivity between students and the teaching materials, and to provide prompt feedback. Woods, et al. (2004) reported that faculty primarily used Blackboard as a management/ administrative tool which allowed them to manage course grades and make course documents more accessible for students.

Santilli and Beck (2005), focusing their research on graduate faculty perceptions and experiences regarding online teaching and use of WebCT for course interactions and assessment of student work, found that faculty utilized most of the tools offered by WebCT, largely the discussion area (89%), chat rooms (78%), WebCT E-mail (65%). The test generator and whiteboard were the least used tools; however, the researchers noted that few graduate level courses used tests to assess student learning and these tools were also not generally part of the faculty training program. The findings revealed that 51% of faculty considered the discussion area to be instrumental in building learning communities and 34% indicated that it promoted the development of communication skills by students.

According to Gastfriend and Finnegan (2005), the two most common reasons for not using the CMS were lack of pedagogical need and lack of adequate training. The main reasons for adopting the CMS were training opportunities (24.9%), administrative requirements (22.9%), because of a specific teaching or pedagogical challenge (19.8%), and recommendation from peers or others (18.4%). It is interesting to note that the top reason provided for both not using and using the CMS related to training and pedagogical issues. Faculty reported learning new uses for the CMS through discussions with colleagues and in training sessions (Morgan, 2003). When the training sessions included practical examples, they seemed particularly effective in promoting adoption and continued use of the CMS. All respondents indicated they would use the CMS more if it were easier to use and if the institution provided training, both for themselves and for their students. Al-Ali (2007) reported that personal interest, Sakai's pedagogical advantages, and increased course flexibility were the main reasons cited for using the CMS. Woods, et al. (2004) reported that, in general, faculty was positive about the classroom management features of Blackboard; however, they were neutral or undecided regarding its instructional or psychosocial advantages. Few utilized the CMS beyond simple course management operations, and even fewer utilized Blackboard to foster community within their f2f classes.

Flosi (2008) utilized Davis's technology acceptance model (TAM) to study faculty perceptions of CMS at their universities. Like Al-Ali (2007) and Morgan (2003), she found that faculty primarily used the content management tools with E-mail, grade book, discussion board, and assignment submission/distribution gaining the largest percentages. Flosi's findings did not corroborate Davis's TAM (1989) which indicated that an individual's perception of the usability and ease of use of the CMS directly impacts his/her use of the technology. Two factors, however, did significantly impact use of course management software: experience with the CMS and anxiety regarding the use of the CMS. Flosi did not adequately define anxiety, however, and there are many variables that influence why someone would be apprehensive or uneasy about using a new technology.

Faculty was also influenced by peer recommendations or by the need to set an example by using technology. Pressure by administration and the availability also enhanced adoption. Morgan (2003) noted that student demands or requests for CMS use were not a strong factor in faculty decisions to adopt the CMS. Nearly two-thirds of the faculty surveyed indicated that as they continued to use the CMS, they identified additional ways to use it in their teaching. Woods, et al. (2004) also reported that the primary factor determining usage of the CMS, whether for course management or instruction, was experience with the software.

T. Harrington, et al.'s (2006) study was influenced by Santilli and Beck (2005). The researchers interviewed seven faculty members to determine how they used the CMS to improve content and teaching and how their attitudes facilitated or impeded that effort. Results of the study indicated that communication and organization played key roles in course improvement. Commitment and support by the university's administration were critical in securing faculty involvement. However, contrary to Morgan's (2003) findings, bottom-up pressure from students desiring content online was more important than pressure from above. Discussion boards and student tracking were the primary non-assessment methods for determining student learning. The instructors cited the ability to extend the class beyond the class period as one of the most important features of the online component.

Despite the research on faculty usage of CMS, little research directly studying faculty adoption and diffusion of CMS technologies in higher education exists. The research that has been conducted is narrow in scope. For example, Bennett and Bennett (2003) studied faculty perceptions as they participated in a CMS training program. The researchers administered a pre- and post-version of a survey to 20 instructors, measuring their perceptions of their own abilities in using the tool, the impact the technology could have on student learning, and the usefulness of the tool. The results indicated that training that included hands-on learning of the technologies and showcasing of pedagogical approaches to integrating the tool into courses would improve the likelihood of instructor adoption. However, the study was narrowly focused on faculty using the CMS in training.

West, Waddoups, and Graham (2007) studied faculty at Brigham Young University. They found that instructors rarely adopted all of the features of Blackboard; instead, they initially experimented with one or two tools, which reflects Rogers's trialability attribute. At this stage, intuitive usability was crucial because the instructors had not yet committed themselves enough to the tool to spend time ''being trained.'' As they attempted to adopt each new feature, they faced many smaller adoption decisions as they had to weigh the advantages and disadvantages of the tool. Early efficiency payoffs were necessary for faculty to continue using a tool because of the time and energy involved in overcoming technical challenges. The researchers also noted that instructors often consulted their colleagues for feedback and support when encountering challenges. "Instructors who experience[d] success in integrating the feature effectively into an aspect of their practice often then experience[d] new excitement and enthusiasm for the tool or for their job" (p. 12). Many instructors chose to use the CMS because of the relative advantage of using a particular tool, such as the grade book. Like participants in T. Harrington, et al.'s study (2006), several were persuaded to try the CMS because of pressure (real or perceived) from students, colleagues, or administration.

McQuiggan (2006) utilized Rogers's perceived attributes and Hall and Hord's concerns-based adoption model as the basis for her study of faculty adoption of the CMS ANGEL. She noted a significant difference between attribute perceptions of the CMS between adopters and nonadopters. Adopters indicated they perceived a greater pedagogical advantage in using the CMS and that it was more compatible with their teaching styles. They also felt a sense of ease to learn and use the CMS and even exhibited a willingness to see it demonstrated and to try it before using it. Nonadopters expressed that they had no need to adopt the CMS, even though they used technology for their research and publication activities. McQuiggan surmised that the CMS was not compatible with their philosophy of teaching and that the CMS would take away from their f2f interactions with their students. Rogers (2003) had indicated that relative advantage and compatibility were the most important characteristics in explaining and predicting adoption of an innovation. McQuiggan also found that observability was important to nonadopters in this study. As with Al-Ali's study (2007), female faculty members demonstrated a higher rate of adoption overall.

Dugas (2005) examined the effects of innovativeness and teaching styles on faculty members' decisions to adopt or not adopt the CMS, ANGEL. The findings indicated no relationship between innovativeness of teaching styles; however, the pattern of adoption followed Rogers's stages. The primary factor influencing adoption was the perceived relative advantage of adopting the CMS. Two-thirds of the adopters indicated that it was more advantageous to adopt the CMS; however, 25 out of 31 of the nonadopters indicated that there was no added advantage to adopting the CMS. The next most important factor was complexity. Over two-thirds of the nonadopters indicated that

ANGEL was too difficult to use or would take too much time to learn. Once again, adopters indicated that the primary features used were related to content management: syllabus, course schedule, assignments, and materials and resources. The least used features were the chat room and what's new.

Historically Black Colleges and Universities

Federal law (20 USCS 1061) defined HBCUs as institutions of higher education [established prior to 1964] whose principal mission is the education of African Americans. HBCUs comprise a diverse set of institutions located primarily in 19 states, the District of Columbia, and the Virgin Islands. HBCUs comprise private and public, 4-year and 2-year, undergraduate and graduate degree granting institutions. Of the 103 HBCUs currently in operation, approximately 75% were established between 1865 and 1899. Over 90% are located in the South (Jackson & Nunn, 2003). The White House Initiative on HBCUs (2010) lists 39 publicly funded four-year institutions and 50 private four-year institutions.

Whether located in the South or the North, HBCUs were established as a "byproduct of systemic social discrimination" (Kim, 2002; Roebock & Murty, 1993) and in response to lack of access to White institutions (Jackson & Nunn, 2003; Nichols, 2004). According to Fleming (1984), "the majority of black public colleges…evolved out of state desires to avoid admitting blacks to existing white institutions" (p. 5). Evans, Evans, and Evans (2002) noted that "Historically Black Colleges and Universities (HBCUS) were begun, in most instances, because of racism…." (Introduction, para. 1) They were not expected to succeed, but were considered *holding institutions* so that African Americans would not matriculate in historically White colleges and universities

(HWCUs). They were established where large African American populations resided, primarily in the Southeast, Southwest, and Northwest (Evans, et al.). Many began as elementary and high schools and evolved into institutions of higher education. Others began as trade schools, providing education and training in agriculture, teaching, and the ministry. For over 160 years, HBCUs, especially in the Southeast, served as the educational, intellectual, political, cultural, and social centers of African American communities (Jackson & Nunn, 2003).

Allen, Epps, and Haniff (1991, as cited in Nichols, 2004) identified six goals of HBCUs: (a) maintain the African American historical and cultural traditions;(b) provide key leadership for the African American community; (c) provide African American role models for social, political and economic purposes in the African American community; (d) assure economic function in the African American community; (e) provide African American role models for social, political and economic purposes in the African American community to address issues between minority and majority population; (f) produce African American agents for research, institutional training, and information dissemination in the African American and other minority communities.

The majority of private HBCUs were founded immediately following the Civil War, primarily by churches and Northern philanthropists. The Freedmen's Bureau also assisted with the development of educational institutions for former slaves. In Georgia, seven private HBCUs were founded: Atlanta University and Clark College became Clark-Atlanta University, Morehouse College, Spelman College, Paine College, The Interdenominational Theological Center, and Morris-Brown College. North Carolina became home to six private HBCUs: Barber-Scotia College, Bennett College, Johnson C.

Smith University, Livingstone College, Saint Augustine's College, and Shaw University (Jackson & Nunn, 2003).

Atlanta University was founded in 1867 as a liberal arts college by the American Missionary Association with help from the Freedmen's Bureau. In 1929, the institution became what was then the only Black graduate and professional institution. Clark College, established in 1869, was the first Methodist-affiliated (Methodist Episcopal Church) to serve African-Americans. Clark-Atlanta University was formed in 1989 with the merger of Atlanta University and Clark College. The Interdenominational Theological Center was founded in 1958 as a private seminary. Morehouse College was founded in 1867 in Augusta, Georgia and later moved to Atlanta. Morehouse is one of the premier undergraduate institutions for African American males. The Morehouse School of Medicine was established in 1975, and ten years later became of separate degree-granting institution. Morris Brown College, established by the AME Church in 1881, is the only surviving college founded by blacks in Georgia. The United Methodist Church and the CME Church joined together to establish Paine College in 1882. Founded in 1881, Spelman College is the oldest undergraduate liberal arts college for African American women (Jackson & Nunn, 2003).

According to Roebuck and Murty (1993), Clark Atlanta University, Spelman College, Morris Brown College, Morehouse College, Morehouse School of Medicine, and the Interdenominational Theological Center comprise the Atlanta University Center (AUC), the oldest and largest consortium of Black private higher education institutions. The six campuses are all located less than a mile from downtown Atlanta and form a unique arrangement of undergraduate, graduate, and professional education which began in 1929. The consortium coordinates over a dozen programs delegated to AUC (all programs involving two or more institutions) and provides leadership in cooperative planning for all member institutions. By pooling resources, the AUC is able to provide a richer educational experience than any single HBCU could provide.

Barber-Scotia College was founded by the Presbyterian Church in 1867. Bennett College was founded as a coed liberal arts college in 1873 affiliated with the United Methodist church; however, since 1926, the college has been devoted to the education of African American women. Johnson C. Smith University was originally organized by two Presbyterian ministers in 1867 to prepare men for the Presbyterian ministry. The institution became coed in 1942 and grants degrees primarily in liberal arts and business. Livingstone College was founded in 1879 as a private coed college affiliated with the African Methodist Episcopal Zion church. Livingstone grants bachelor's degrees as well as degrees from its graduate school of theology. St. Augustine's College was founded by the Episcopal Church in 1867. Shaw University is affiliated with the Baptist church and was founded in 1865 at the end of the Civil War (Roebuck & Murty, 1993).

Unlike their private counterparts, most of the public HBCUs were created "for three reasons: to get millions of dollars in federal funds for the development of White land-grant universities, to limit black education to vocational training, and to prevent blacks from attending White land-grant colleges" (Roebuck & Murty, 1993, p. 27). The Morrill Act of 1862, also known as the Land Grant College Act, was designed to provide a practical education in agriculture, home economics, mechanical arts, and other professions open to all social classes. However, the Act did not specifically address issues of race, and many states chose to create only White institutions. This inequality was corrected with the passage of the Second Morrill Act in 1890, which required states with segregated higher education systems to also establish land-grant schools for blacks (Lightcap, 2004). Seventeen of the nineteen land-grant HBCUs were thus established. Initially, HBCU land-grant institutions focused on vocational and technical teacher training, while the White schools concentrated on research. Jackson and Nunn (2003) noted that many of the Black public universities began as poorly equipped seminaries, vocational or normal (teacher training) schools. In light of how these institutions were formed, Southern officials often ignored blacks' requests for additional funds and opportunities.

The University System of Georgia boasts two 4-year HBCUs. Fort Valley Normal College, now Fort Valley State University (FVSU), was established in 1869. Today, FVSU boasts that it is the only senior college or university in the University System of Georgia (USG) with a mission in all four disciplines: academics, research, extension and service (Thurgood Marshall College Fund, 2008). Savannah State College, the oldest publicly funded institution in Georgia, was established in 1890 as the Georgia State Industrial College for Colored Youth (Jackson & Nunn, 2003; Williams, 2008).

North Carolina currently has a sixteen-campus public university system, of which five are HBCUs: North Carolina Agricultural and Technical State University (NC A&T), North Carolina Central University, Winston-Salem State University, Elizabeth City State University, and Fayetteville State University. North Carolina Agricultural and Technical State University (NC A&T), founded in 1891 as The Agricultural and Mechanical College for the Colored Race, is the largest publicly funded HBCU in North Carolina. The institution became a member of the University North Carolina System (UNCS) in

1972 (*Brief History*, n.d.). Founded in 1910 as a private school for religious training, North Carolina Central University became the first state-supported liberal arts college for African Americans in the United States in 1923. Winston-Salem State University was founded as the Slater Industrial Academy in 1892. The North Carolina Board of Education granted the institution the authority to grant baccalaureate degrees in 1925. Elizabeth City State University, founded in 1891 as a normal/teacher training school, became a part of the UNCS in 1972. Considered the oldest teachers college for African Americans in the South, Fayetteville State University was founded in 1867 by seven Black men. It became a part of the UNCS in 1969. In 1972, it joined the UNCS (Jackson & Nunn, 2003). With the six private HBCUs and five public HBCUs, North Carolina hosts the largest contingent of minority serving institutions in the nation.

In 1993, North Carolina recognized the potential role that these minority institutions could have on the state's future workforce. Therefore, they voted to fund the Historically Minority Universities (HMU) Bioscience and Biotechnology Program Initiative, which brings together the five public North Carolina HBCUs and the University of North Carolina at Pembroke, and historically Native American institution in the innovative initiative. The HMU initiative represents a collaborative effort among the public minority higher education institutions, state government, and the North Carolina Biotechnology Center, a private, nonprofit corporation. The primary goal is to increase the number of minorities graduating in the sciences in order to recruit biotechnology companies to North Carolina and improve employment opportunities. An outgrowth of this initiative is that North Carolina ranks among the top five biotechnology regions in the country (Jackson & Nunn, 2003).

Until the middle of the 20th century, HBCUs enrolled 90% of the African American students matriculating in higher education institutions in the United States. However, in part a response to public pressures for desegregation, the numbers began to decline (Kim & Conrad, 2006). In 1960, 65% of African American college students attended HBCUs; however, by the 1970s, the number had dropped to 34%. In 1996, just 20% of African American students attended America's 103 HBCUs (Jackson & Nunn, 2003). Today, HBCUs represent less than 3% of all U.S. colleges and universities and account for 16% of all African-Americans enrolled in institutions of higher education (Hubbard, 2006).

Over the last ten years, enrollment of African American students has shifted from University System of Georgia (USG), HBCUs to predominantly White USG institutions. "In 1990, over 3.2 times as many African American males enrolled in non-HBCUs as HBCUs, but by 2000, over 4.4 times as many African American males enrolled in non-HBCUs" (Hudson, et al., 2003, p.13). On the other hand, Jackson and Nunn (2003) noted that the majority of African Americans and Native Americans who graduate from high school in North Carolina enroll in the state's historically minority institutions.

HBCUs award 28% of all bachelor's degrees, 16% of all professional degrees, 15% of all master's degrees, and 9% of all doctoral degrees conferred on African Americans. They have produced such luminaries as Booker T. Washington, Betty Shabazz, W.E.B. Dubois, Toni Morrison, Ruth Simmons, and Martin Luther King, Jr. (Jackson & Nunn, 2003). HBCUs are performing proportionately better than their non-HBCU counterparts in educating African American students by fostering an environment that encourages student engagement, retention, and success (Flowers, 2002; Outcalt &

Skewes-Cox, 2002). Studies comparing various aspects of the undergraduate experience of African-Americans at HBCUs versus the experiences of African Americans at HWCUs found that HBCUs, in spite of often lacking resources, are better at supporting African American undergraduates, which resulted to higher graduation rates and more positive learning outcomes for students (DeSousa & Kuh, 1996; Flowers, 2002; Flowers & Pascarella, 1999;). “Black schools serve a purpose of offering not only programs but an atmosphere conducive to Black students graduating. The challenge is not only getting African American students in but keeping them in” (Fort, as qtd in Salzer & White, 2008, para. 17).

HBCUs enroll 300,000 students (Jackson & Nunn, 2003) and employ 60,000 faculty and staff nationwide (Peters, 2008). HBCUs have never restricted enrollment based on race, these institutions have historically been at the forefront of enrolling and employing diverse populations (Jackson & Nunn; Peters, 2008). Jackson and Nunn reported that in 1993, 24% of staff and 34% of faculty at HBCUs were nonblack. No historically White institution reported similar percentages of faculty and staff diversity. The researchers also noted that the general attitude of nonblack faculty toward teaching at HBCUs is that the faculty could not get hired at a White institution or that they are waiting for something better.

A limited number of studies have reported on differences between HBCUs and HWCUs. Students at HBCUs are traditionally from lower socioeconomic conditions with lower high school GPAs and SAT scores than students at HWCUs or even African Americans enrolled in HWCUs (Buzzetto-More & Sweat-Guy, 2007; Kim & Conrad, 2006). The quality of the faculty and facilities, availability of academic programs, and opportunities for advanced study are often inferior at HBCUs (Allen, Epps, and Haniff, 1991 as cited in Kim & Conrad, 2006).

HBCUs and Online Learning

Although online opportunities continue to increase (Butler & Sellbom, 2007), the incorporation of online courses and programs into the curriculum at HBCUs has significantly lagged behind HWCUs (Arnone, 2000; Buzzetto-More, 2008; Buzzetto-More & Sweat-Guy, 2006). Bruce N. Chaloux, Director of the Electronic Campus of the Southern Regional Education Board noted that historically Black and predominantly Black institutions “confront the same challenges as other institutions as they work to train professors, improve infrastructure, and find scarce money and time to develop online content” (as cited in Arnone, para. 4). However, for many HBCUs, whether to offer online courses and programs comes down to mission and money.

Arnone (2002) reported that online learning is a “hard sell” at HBCUs. This reluctance is often ascribed to the nature of HBCUs, who pride themselves on small class sizes, high levels of student support, and targeted instruction (Buzzetto-More & Sweat-Guy, 2007). This environment may also contribute to the strong preference reported by HBCU students for the hybrid model of instruction (Buzzetto-More, 2008; Buzzetto-More & Sweat-Guy, 2006). Allen and Seaman (2006) noted that participation and faculty acceptance of online learning at both predominately White and predominantly Black smaller institutions in the South continues to trail behind the nation. Dillard University, a small private HBCU in New Orleans, for example, indicated that while integrating technology into classrooms and libraries was important, it did not foresee ever offering distance education courses, largely because they could not replicate the nurturing, individualized environment online (Arnone).

HBCUs must also deal with limited endowments and other funding. Money, or lack of it, continues to play an important role in the development of online learning opportunities at HBCUs. Based on funding, HBCUs can be categorized as public, state institutions, larger private institutions, and small private institutions. State institutions have access public money and often have administrative support for distance education, and the larger private universities have endowments and other resources to support online programs, according Diane Bowles, Director of the Visual Technological Research and Education Center at Georgia Institute of Technology (Arnone, 2002). For public HBCUs, state funding is supplemented by student tuition, grants, and corporate and individual donations. Evans et al. (2000) argued that because money HBCUs receive from the state has been tied to accountability measures, such as enrollment, retention, graduation rates, excess course credit, and research funding the money has often been inadequate. However, both the public and larger private institutions are more likely to offer distance education than are smaller private institutions, which are often in rural areas and have fewer financial and manpower resources.

Okpala and Okpala (1997) found that a majority of faculty at three southern HBCUs indicated that instructional technology was important in their teaching, especially by those who owned a computer at home. E-mail (87%) and word processing (75%) were the two technologies with which faculty members were most experienced. Faculty indicated little knowledge and experience with technologies such as software presentation, multimedia and distance learning. While most of the faculty used word processing at least weekly, none of the respondents reported using distance learning in their teaching.

Historically Black Colleges and Universities: An Assessment of Networking and Connectivity, a report prepared by the National Association for Equal Opportunity in Higher Education (NAFEO, 2000) for the US Department of Commerce assessed the computing resources, networking and connectivity of HBCUs. This study, which found HBCUs trailing in IT development, was the foundation for federal legislation focused on reducing the technology gap. After years of consideration and revisions, the legislation was recently incorporated into the Higher Education Act reauthorization (Roach, 2008).

Of the 80 HBCUs responding, 98% reported having basic Internet access for their students. However, students were less likely to own their own computers and to have Internet access through campus networks than students nationwide. More than 75% of the students relied on access not only to computers but also to the Internet through public computers in labs or lobbies/lounges in their dorms (NAFEO, 2000). Since students relied on institutionally-owned computing resources, their access depended on institutional funding, scheduling, staffing, and availability. The finding regarding the lack of student ownership of computers deviates from the *1999 Campus Computing Study*, which reported that overall, 49% percent of higher education students owned their own desktop or notebook computer (Green, 1999).

Myers, who was the principal investigator for the NAFEO study, recently commented that,

> …with technology changing constantly, the HBCUs need lots of help to keep pace with the advances in Web-based education and infrastructure. In

> 2000, we found that not many students were coming to school with their (own) computers, so they had to rely on campus laboratories. There has been some improvement, but there's still a long way to go to ensure that all students have 24/7 connectivity (as qtd. in Roach, 2008).

Although she did not have the statistics to prove her assumption, Myers indicated that she thought the number of students owning their own computer at an HBCU had probably doubled since 2000 (Roach, 2008). Buzzetto-More and Sweat-Guy (2007) reported on a study conducted using 748 freshmen students at two HBCUs in the fall of 2005. The researchers found that most of the students attending the HBCUs entered college owning a computer and considered themselves to be intermediate computer users. The statistics indicated growth from earlier studies conducted at minority serving institutions; however, they were still lower than percentages reported in the studies performed at majority serving institutions. Buzzetto-More (2008) reported that 74% of student respondents at the HBCU studied indicated that they had studied keyboarding and 82.9% said that they owned a computer. These findings support Myers' contention that student computer ownership had increased at HBCUs in the last eight years.

The EDUCAUSE Center for Applied Research has conducted a longitudinal study (Kvavik & Caruso, 2005; Kvavik, Caruso, & Morgan, 2004; Salaway & Caruso, 2007; Salaway, Caruso, Nelson & Ellison, 2008; Salaway, Katz, Caruso, Kvavik, & Nelson, 2006; Smith, Salaway, & Caruso, 2009) that examines student uses, perceptions, and preferences with respect to technology which utilizes web-based surveys, focus group responses, qualitative analysis of student comments, and longitudinal comparisons. According to the *ECAR Study of Undergraduate Students and Information Technology*, *2007* (Salaway & Caruso) student experiences with CMS increased from 72% in 2006 to 82% in 2007 with most (76.5%) saying that their experiences were positive. The *ECAR Study of Undergraduate Students and Information Technology, 2008* (Salaway, Caruso, et al.), revealed that 80.5% of students nationwide owned their own computers and 82.3% utilized a CMS as part of their curriculum. Half (50.4%) indicated they were mainstream technology adopters, 34.4% indicated they were early adopters (usually male), and 13.2% felt they were late adopters. The results of the *ECAR Study of Undergraduate Students and Information Technology, 2009* (Smith, et al.) indicated that 91% of the respondents from the 39 institutions that participants in the last four years of studies had used a CMS. For the term when the survey was administered, 70.7% were currently enrolled in a course that used a CMS. Although the ECAR studies offer the educational community vital information, it is important to note that they have consistently neglected to include minority serving institutions preferring to concentrate on HWCU (Buzzetto-More, 2007). Therefore, the findings are skewed.

Institutional expectations regarding student computer training and usage are important indicators of an institution's technology readiness. Fifty-five percent of the HBCUs surveyed indicated they had a computer competency requirement, usually an introductory course in computer usage (NAFEO, 2000). In *The 1999 Campus Computing Study* (Green, 1999), 39.3% of all colleges and universities nationwide had a computer competency requirement, a percentage lower than that at HBCUs.

T. Harrington, et al. (2006) found that pressure from students desiring content online was an important consideration in faculty adoption of online teaching practices. Buzzetto-More and Sweat-Guy (2006) found that although HBCU students entered college less technologically prepared than their White counterparts, online education is slowly gaining popularity. Students overwhelmingly indicated they would enroll in future hybrid courses and approximately half indicated they would take a totally online course in the future.

Another barrier to technology integration and online learning at HBCUs is technology infrastructure. Only 41% of the respondents to the NAFEO survey indicated that all of their faculty offices were wired for both voice and data. E-mail and voice mail tended to be the primary means of intra-campus communication, and respondents indicated that they were “somewhat effective” at using the Internet as a resource for curriculum and instruction in the classroom. Although most of the colleges surveyed had T-1 lines, only 30% used higher-bandwidth connections, which could prevent HBCUs from taking full advantage of the Internet for instructional purposes and to reach wider audiences. Over 85% did not offer distance learning degree programs; however, 31% indicated plans to offer online programs within the next three years. The survey team reported that private HBCUs with student populations of less than 999 and located in rural areas evidenced a substantial difference in student access, equipment, connectivity, and overall computing resources (NAFEO, 2000).

The NAFEO (2000) findings were also supported by a report released by the Thurgood Marshall Scholarship Fund (TMSF) organization in 2001. *An Assessment of Current Information Technology Usage* was the first all-encompassing study of information technology practices among the 44 public HBCUs affiliated with the Marshall Scholarship Fund. Most reported that their faculty offices were wired. Nearly one-third of the institutions surveyed also reported that more than 90 % of their students did not own a computer (*Chronicle of Higher Education Online*, 2001, April 11). Eight institutions had more than 50% of their courses utilizing the Web to enhance instruction although only two had more than 50% of their classes with materials on the Web (Roach, 2001). Half of the students indicated that less than one-fourth of their courses employed E-mail (*Chronicle*).

The *Fall 2008 Directory of HBCU Distance Learning Programs* (DLL, 2008) indicated that 45 out of 102 HBCUs provided credit or non-credit distance learning programs, up from 40 HBCUs in 2007 and 29 in 2006 (DLL, 2007). In 2007, two-thirds (67%) were public, compared to only 12% of private institutions. Those most committed to serving nontraditional students had a higher percentage (57%) offering online learning degree programs. In 2007, 82.5% of all HBCUs (33 out of 40) used either Blackboard or WebCT as the course management systems for their distance learning courses (DLL, 2008). DLL indicated that these percentages only indicated those courses and programs that were totally online and were derived based on whether the institution's website indicated the existence of online programs or the accessibility to a list of online courses by an outside entity. Since hybrid or web-enhanced courses are not readily identified in course descriptions, they were not included in the listing.

Snipes, et al. (2006) focused largely on the software application usage by faculty. While basic computer competency skills, such as competence with Windows (90.3% used it on a regular basis) and Microsoft Word (83% used it regularly), were comparatively high, other software, such as Microsoft Excel (43.9%), and PowerPoint (26.9%), were low. In terms of web-based software, E-mail (87.8%) and general Internet (80.5%) usage was also high, but use of educational technology such as Blackboard

(24.4%) was minimal. One obstacle to the use of Blackboard was that the institution failed to purchase a campus-wide license. Almost 75% of the faculty, however, indicated they were familiar with and interested in using the CMS, if and when a site license was obtained. Two other infrastructure problems caused barriers to faculty use of technology. Half of the faculty was using computers that barely met minimal standards; therefore, they could not run all software applications available to them.

Diffusion of Innovations

Several relevant change and innovation-adoption models provide a useful framework for identifying factors that lead less enthusiastic faculty to become engaged in online teaching and learning. Rogers's (2003) diffusion of innovation model suggests that researchers simultaneously examine characteristics of the individual adopter, the institutional setting, and the technology itself.

In 1962, Rogers (2003) summarized 405 research studies and published the book *Diffusion of Innovations*, which formally defined diffusion of innovation theory. Diffusion is "the process by which an innovation is communicated through certain channels over time among the members of a social system" and innovation as "an idea, practice, or project that is perceived as new by individuals or their unit of adoption" (pp. 10-11). Rogers's theory was based on recognized theories in sociology, psychology, and communications. Rogers distinguished between the diffusion process and the adoption process. The diffusion process occurs as a group process within society; the adoption process, on the other hand, relates to individuals. Rogers defined "the adoption process as the mental process through which an individual passes from first hearing about an innovation to final adoption" (p. 11).

Carr (2001) noted that adoption of interactive technology in education differs from previous types of innovations in three ways: (a) a critical mass of adopters is needed to convince “mainstream” teachers of the usefulness of the technology, (b) regular and repeated use is necessary to ensure the success of the adoption process, (c) Internet tools can be repurposed and used in different ways. Adoption may ultimately involve significant change, alteration, and reinvention by individual adopters.

For the purpose of this discussion, this section will be organized around Rogers’s four components: innovations, time, social systems, and communication channels.

Innovations

Rogers (2003) defined an innovation as “anything perceived as new by an individual or group” (p. 11). For this paper, the use of the term innovation applies to educational technology designed to expand the teaching and learning process expressly related to online teaching and learning. For this review, educational technology is defined as devices and materials including the Internet; database, simulation, statistical computing, presentation software; E-mail, computer conferencing, and bulletin boards, course management software; and multimedia software, i.e. computer-mediated integration of text, audio, or video implemented to achieve instructional objectives. Hall and Hord (2001) stated innovations can be either products (computers, multimedia, and assessment methods) or processes (inquiry-based learning, asynchronous communication). Widely adopted innovations typically possess five characteristics. They exhibit relative advantages over other products or processes. They are congruent with existing social, cultural, and social systems and norms. They are easy to use. They can be tested and tried out. The results of their use can be demonstrated and observed (Rogers, 2003).

Time

For the purpose of this paper, time refers to the length of time required for a faculty member to pass through the innovation-decision process, i.e., from the time when the instructor is first exposed to web-based teaching and learning until the instructor finalizes his/her decision to continue to use the innovation. Time also refers to the time frame with which the institutional system adopts online teaching and learning. Time comprises the following three factors: (a) innovation-decision process, (b) innovativeness of the individual adopter/system relative to the earliness or lateness of adoption, compared to other members of the system, and (c) the innovation's rate of adoption in the system, usually measured by the number of adopters at a given time (Rogers, 2003, p. 11).

Innovation-Decision Process

Rogers proposed the innovation-decision process model, which outlines a linear process for innovation adoption and diffusion.

Stage 1: Knowledge. The individuals are exposed to the innovation but lack complete information about how to use the innovation properly or the underlying principles governing how the innovation works. They begin to learn about the innovation, which results in increased knowledge and skill.

Stage 2: Persuasion. Potential adopters discuss the innovation with others and forms an attitude or image (positive or negative) about the innovation based on the innovations perceived attributes: complexity, trialability, observability, relative advantage, and compatibility.

Stage 3: Decision. Potential users decide to seek more information, mentally apply the innovation to his/her present and anticipated future situation, and then decide whether or not to try it.

Stage 4: Implementation. Users put the innovation to regular use to determine the usefulness of the innovation. They may also seek out additional information.

Stage 5: Confirmation: Users acknowledge the benefits of continued use, routinely integrate the innovation into practice, and advocate its use to others.

Because Rogers's research focuses on adoption of an innovation, four of the five stages of Rogers's model deal with issues leading up to adoption. Rogers's model fails to adequately address *how* people implement an innovation that they have chosen to adopt and what happens *after* they begin to implement the innovation (T. Harrington, et al., 2006). His labels for individuals and organizations also reflect his focus on pre-adoption characteristics and issues.

Adopter Categories

Rogers (2003) labeled individuals and organizations as (a) innovators, (b) early adopters, (c) early majority, (d) late majority, and (e) laggards based on their innovativeness. An individual's innovativeness depends both on the individual's characteristics and the social system in which the individual is a member. They can fall into different categories for different innovations.

Innovators comprise about 2.5% of the target population. They tend to be risk-takers and active-information seekers, demonstrating a high degree of exposure to mass media. They are willing to invest time and energy to learn new technologies. They are able to manage a higher degree of uncertainty than other adopters and quickly adapt to new technologies. They are usually the first to adopt an innovation and, therefore, do not rely on the subjective evaluations of other members of the system before adoption. They are often considered as deviants in the social system and accorded dubious credibility.

Early Adopters comprise approximately 13.5% of the target population. Early adopters are more a part of the social system than are innovators. They are often opinion leaders who also have a high risk tolerance. They quickly recognize the potential of an innovation and try it out. As respected leaders, they are role models who provide information and advice about innovations to others in the system.

Early majority adopters comprise 34% of the target population. These individuals are cautious and deliberate toward change and new technologies. These people are adverse to risk. Early Majority generally rely on first-hand recommendations from Early Adopters. They are willing to adopt, but only after they are sure their experience will be free of hassles and/or they will have access to Early Adopters for technical support or advice. Early Majority seldom have leadership positions within the social system.

Late majority adopters also comprise 34% of the target population. These individuals approach change with skepticism. They often adopt an innovation only when they are pressured, or when the innovation becomes mainstream and the social system's norms favor adoption. Peer pressure is often a necessary motivator. "Late Majority segments are typically triggered to purchase when a service is packaged or bundled together, thus inferring value and ease of use" (KZero, 2007).

Laggards comprise 16% of the target population. Their decisions are made on what has been previously done. They tend to be critical of change. These individuals may either be very traditional or isolated from the social system. As traditionalists, they are suspicious of innovations, often interacting only with others with similar values. As isolates, they remain unaware of the innovation's demonstrated benefits because they lack social interaction with adopters. It takes laggards much longer to adopt innovations, if they ever do.

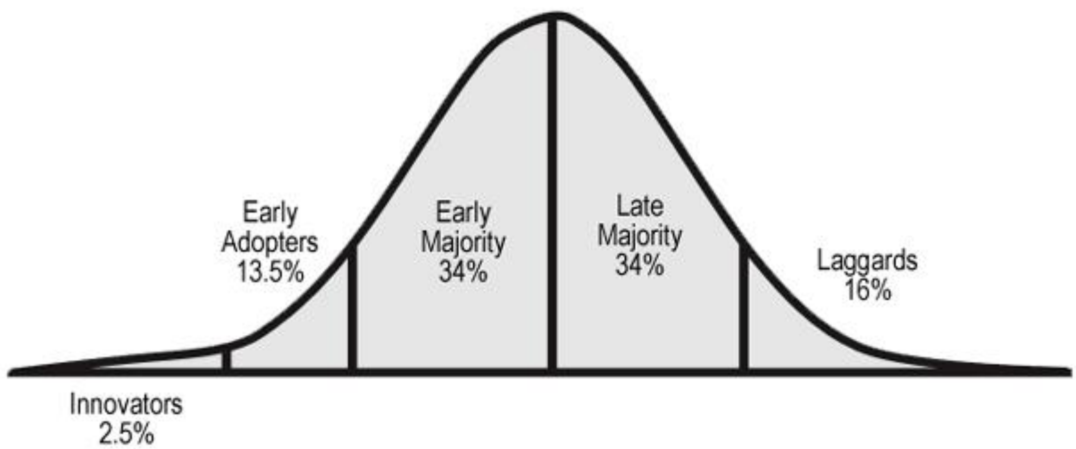

Figure 1. Adopter categorization based on degree of innovativeness (Rogers, 2003)

According to Al-Ali (2007), faculty at institutions of higher learning tend to fall into the last three categories when it comes to using technology because, despite the range of access on most campuses, the use of innovative technologies continues to be low. The use of such technologies as word processing and E-mail are pretty much ubiquitous; however, the integration of technology as a teaching/assessment tool remains low.

Rate of Adoption

Rogers (2003) claimed that the relative speed with which an innovation is adopted goes through a slow, gradual growth period before experiencing a period of dramatic and rapid growth. According to the pattern, only a few innovators initially try the innovation, but adoption slowly increases as other individuals receive positive feedback from the first group. As more and more individuals jump on the bandwagon, the graph jumps up rapidly, forming the middle of the S. During the rapid growth period, nonusers experience and observe a social and environmental change in their work environment. This change leads to the planned and sometimes unprompted adoption by nonusers. There eventually comes a point in the adoption process at which the innovation reaches a critical mass, i.e., when enough individuals have adopted the innovation to ensure that adoption is self-sustaining.

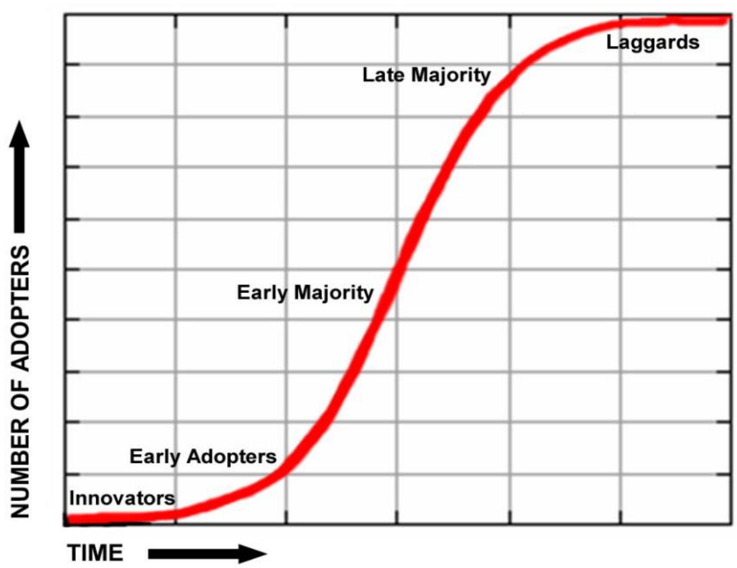

Figure 2. Rate of Adoption S Curve (Rogers, 2003).

The success of online technology integration depends on the Early Adopter category achieving a critical mass, which usually occurs when 15-30% of the group adopts the innovation, representing the transition to the next adopter group. Hall and Hord (2001) concurred with Rogers that change happens in stages as individuals “come to understand and become skilled and competent in the use of the new ways (p. 4). Changes in education usually take 3-5 years to implement at the high level. With each new adopting unit, such as a state, district, school, or department, the countdown begins all over again for another 3-5 years.

Mort (1964) recounted educational innovations from the 30s to the 50s and concluded that a “considerable time lag was required for the adoption of educational innovations,” usually 25 years (Rogers, 2003, p. 61). Rogers noted there is a adoption rates vary significantly for different educational innovations. He indicated that it only took 50 years for the adoption of kindergartens in the U.S. Heavily promoted by change agents, drivers’ education only took 18 years and modern math only 5 years to gain widespread adoption.

Perceived attributes. The change process may be time or resource consuming or relatively quick and simple to implement depending on the type of innovation and its perceived features (Rogers, 2003; Hall & Hord, 2001). Rogers indicated that the characteristics of an innovation, as perceived by the potential adopters will determine the rate of adoption. The more positively the innovation is perceived, there are fewer concerns for the faculty audience and the likelihood of a favorable adoption decision exists. The speed of technology adoption is influenced by two characteristics: *p*, the speed at which adoption takes off, and *q*, the speed at which subsequent growth occurs. A cheaper technology might have a higher *p*, for example, while a technology that has network features (like a fax machine, where the value of the innovation increases as others obtain and use it) may have a higher q.

The characteristics of various innovations, as perceived by individuals, help explain the different rates of adoption. Rogers (2003) identified five attributes: (a) complexity, (b) trialability, (c) observability, (d) relative advantage, and (e) compatibility (2003, p. 15-16). According to Rogers, complexity refers to the degree to which an innovation is easy or simple to use or understand. New ideas that are less complex are more likely to be adopted than those that require adopters to develop new skills and understandings. Trialability refers how much an innovation may be tested and experimented with on a reduced basis. Innovations that can be tried out on an installment basis are more likely to be adopted. Observability pertains to the degree the results of adoption are visible to others. Visibility stimulates peer discussion of an innovation and fosters adoption. Relative advantage refers to the degree to which an innovation is viewed as better than the option it supplants. Important factors include economic advantages, social prestige, convenience, and satisfaction. Innovations perceived to be more advantageous have a higher rate of adoption. Compatibility refers to the degree to which an innovation is perceived as conforming to the adopter's existing values, past experiences and practices, and needs. An innovation which is viewed as incompatible with the values and norms of a social system will be slow to be adopted. Adoption of an incompatible innovation often requires the adoption of a new value system (a relatively slow process) prior to the adoption of the innovation.

Wilson, Sherry, Dobrovonly, Batty & Rider (2000) developed the acronym STORC in order to help change agents remember Rogers's perceived attributes.

Accordingly, the following questions should be addressed by faculty development staff (change agents) to facilitate the adoption process.

Simplicity (complexity): How difficult is the innovation to understand and employ? Innovations that are perceived as more complex or difficult to use are likely to be adopted more slowly. Venkatesh (2000) noted that perceived ease of use is tied to the user's perceptions of the "availability of knowledge, resources, and opportunities required to perform the specific behavior" (346). Hall and Hord (2001) also indicate that size also relates to complexity. Some innovations are small in scale and simple such as a new edition of a familiar textbook; others are large scale, requiring significant role changes for teachers, administrators, or educational institutions. Systemic reforms, for example, are innovations that simultaneously change all areas of curriculum and teaching in an entire program or institution. Hall and Hord note that "*complexity misperception* is a serious problem for educational innovations" (p. 75). If innovations are perceived as too simple, then the need for extensive implementation support is not easily understood.

Another aspect of complexity related to CMS adoption is the continuous change/modification inherent in any web-based application. Rogers (2003) calls this reinvention. Innovations that are relatively more complex are more likely to be reinvented in an effort to simplify them. Course Management Systems, for example, were originally designed to assemble a number of technology tools into one application to simplify the online teaching process. As technology continues to change, companies are able to provide additional features and modify previous ones to make them more useful to adopters. With each reinvention of the CMS, adopters go through a mini innovation-decision process.

Trialability: Can people "try out" and experiment with the innovation before having to adopt? Or do they have to commit to it all at one time? If the latter, adopters will be far more cautious. Many change agents create samplers, trial activities, or partial implementations to address potential limitations.

Observability: How visible are the results of using the innovation? Can the difference between adoption and nonadoption be easily discerned? If an innovation can be seen in use by others or the results readily demonstrated, then it is more likely to be adopted.

Relative advantage: Is the innovation better than the existing practice or product? Does the perception that the innovation will have greater outcomes or profits exist? Relative advantage may be related to other factors such as the perceived cost and or time benefits or perceived increase in status. Favorable perceptions of the benefits of the innovation increase the rate of adoption.

Compatibility: How does the innovation agree with existing habits, values, norms, and procedures? If members of the social system feel as though they have to assume different philosophies or personas to adopt an innovation, they will be more opposed to it. If social norms do not encourage adoption and use of the innovation, adopters, especially later adopters, will be hesitant to adopt.

Wilson, et al. (2000) also suggested adding **S**upport to the STORC model, recognizing that if support from administration and peers is lacking, the innovation may not be utilized even when all the other factors are present and influential. Faculty members have indicated that additional instructional and technical support is needed in order to ensure the quality of distance education (DE) courses (Betts, 1998; Schifter, 2000). Bates (2000) stated that an institution's overall approach to technology use in teaching strongly influences how faculty is assisted to integrate technology. Support for faculty and student use of technology should permeate the culture through a wide-range of strategies. "Without leadership [usually in the form of a collective approach] and a strong sense of support for change in an organization, the barriers of inertia will be too great" (Bates, p. 43).

Hall and Hord (2001) asserted that instead of being centered on a single innovation, change initiatives often encompass a bundle of innovations. In other words, several innovations are disguised under a single title or concept, such as online education, when each is actually a collection of smaller innovations and technologies. Hall and Hord noted that the integration of technology in science might entail the use of computers, the Internet, streaming videos, spreadsheets, and word processing. Each of these is "an innovation with its own requirements for implementation, training, and user supports" (p. 7). When the different technologies incorporated in online education are "unbundled" and considered as individual innovations, it is apparent that some of these innovations (such as E-mail communication and word processing) have reached a critical mass of adopters. However, others such as discussion boards, blogs, or wikis, are still in the early stages of educational adoption. In addition, "technology is nested within the broader vision of teaching and learning" (Bates, 2000). Therefore, not only are faculty members adopting new technological innovations (*products*), but they are also having to change their notions regarding teaching and learning (*process*).

Ranking of Importance of Attributes. Tornatzky and Klein (1982) proposed that relative advantage, compatibility, and ease of use are the most relevant attributes for adoption research. Rogers (2003) indicated that relative advantage and compatibility are the most significant constructs for explaining and predicting adoption of an innovation. Relative advantage and compatibility items have loaded together in several IT adoption studies (Carter & Belanger, 2004; Karahanna, Starub, & Chervany, 1999; Moore & Benbasat, 1991). Moore and Benbasat concluded that although the two attributes are conceptually different, respondents viewed them the same or a causal relationship exists between the two attributes. Agarwal and Prasad (1997) found that compatibility was relevant for current users; relative advantage and result demonstrability (observability) were significant for intended use.

Social Systems

Rogers (2003) defined social system as a set of interrelated units working together with a common goal (such as an educational institution) and structure. The units of a social system may include individuals, groups, organizations, and/or subsystems. In the case of higher education, the social system can include a variety of units ranging from individual faculty members, departments, faculty organizations within and outside the institution, or the institution as a whole. Rogers and Shoemaker (1971) noted that "[a]n important factor affecting the adoption rate of any innovation is its compatibility with the cultural beliefs of the social system." Maguire (2005) pointed out that social pressures such as institutional, peer, student, and community pressures can either help or hinder faculty participation in online learning. Bates (2000) maintained that the cultural environment is important since "the introduction of new technology is usually accompanied by major changes in the organization of work" (p. 1). Liu (2005) reiterated that administrators need to develop long-term strategic plans that incorporate all stakeholders and should work to improve the campus culture so that technology adoption is sustained.

The topic of systemic change in education began in the 1990s, largely due to the influence of Reigeluth and Garfinkle's *Systemic Change in Education* and continues to be studied in the K-12 sector but is largely neglected in higher education (West, et al., 2007). Systemic adoption of new technologies and ideas can also create more permanent change, because, ''a fundamental change in one aspect of a system requires fundamental changes in other aspects in order for it to be successful. In education, it must pervade all levels of the system'' (Reigeluth, 1994). The introduction of new technology often challenges deeply held beliefs, requires modifications to long-established practices, and entails the reinforcement of different ways of thinking.

The success of change initiatives fundamentally depends on the extent to which the organizational culture is willing and prepared to reconsider existing operations and potential improvements. Furthermore, "an organization does not change until the individuals within it change" (Hall & Hord, p. 7). The rate of change and development of the necessary skills and level of competence differ from individual from individual. Some, such as early adopters are able to grasp the new way almost immediately while others, such as late majority adopters, avoid making the change even when it is mandated. As a result, successful change agents anticipate and support change at both the individual level the organizational level.

A college or university represents a larger social system with many subsystems. The schools and departments within a university create smaller subsystems around content areas and research interests. There is also a formal structure created by the type of contract under which faculty is employed and their academic rank. As an institution, the college or university exists within the context of higher education in the United States, with all its norms and traditions, as well as a singular organization in its own right. Individual faculty members also exist within the context of their disciplines and fields of study both within the institution and outside. Each of these subsystems influences how individual members perceive an innovation.

Communication Channels

The process of diffusion of an innovation involves the innovation, someone with knowledge or experience using the innovation, someone else without knowledge of the innovation, and a communication channel between the two people. Communication channels are the "means through which knowledge about innovations are conveyed" (Rogers, 2003, p.18). Rogers initially identified two forms of communication of an innovation: *mass media channels* and *interpersonal channels;* however, in his recent edition, he indicated that *interactive communication* via the Internet has become a more important channel of communication for some innovations in recent years. Mass media channels such as radio, television, newspapers, and magazine are usually the fastest and most effective ways of creating awareness/knowledge about an innovation because a single avenue can potentially reach many. On a higher education campus, mass media channels can include campus newsletters, campus-wide E-mail bulletins, and websites. With regards to adoption of online learning and course management systems, when administrators, students, parents, and peers reinforce information also available through mass media channels, there is a better chance that instructors will decide to adopt the innovation. Interpersonal channels relate to face to face exchanges, both formal and informal. Research indicates that interpersonal channels involving a f2f communications between two or more people more effectively persuade individuals to adopt new ideas. Van der Merwe noted that "Faculty members are often more readily convinced by peers than by external change agents" (as qtd. in Ferrazzi, 2003). Rogers noted that mass media channels are often more effective in knowledge stage; however, increasingly in the persuasion stage and especially in the decision stage, interpersonal communication is more likely to provide potential adopters with the necessary information they need to make a decision.

According to McGee, Carmean, and Jafari (2005), technologies are disseminated to faculty members through the following measures: 1) online technology materials, 2) instructor-led or self-paced f2f and online training programs, 3) recommendations by IT professionals and colleagues, 4) technology seminars and workshops, 5) faculty showcases and sharing of experiences, 6) monthly brown bag lunches, 7) online faculty testimonials and profiles, and 8) faculty listserv also open to IT personnel. The authors reiterated that if technology-related information is conveyed effectively, then faculty will be convinced that technology can help them overcome educational challenges and support problem-solving. They indicated that the most effective way is to provide samples. This conclusion supports the concept of observability as one of Rogers's perceived attributes of the innovation.

Although innovative ideas may be introduced from the outside or created from within a social system, in order to bring about change, the innovation must be successfully communicated throughout the culture. Innovators may be the first to introduce an innovation; however, they are often viewed as techno-geeks ready to jump on any new idea. Therefore, they are not sought out for advice. In any social system capable of impacting a societal or an organizational change, there exists a central core of dynamic, visionary pioneers. These pioneers are the ones who are willing to acquire preliminary and sufficient knowledge of an innovation for the purpose of providing organizational leadership in the direction of experimenting with early innovative adoption. These Early Adopters are opinion leaders integrated into the social system. If they adopt the innovation and have favorable ideas about it, then they will influence others. Since Early Adopters are critical in the communication of information about the innovation, a faculty development plan which supports and encourages the adoption and implementation of online education by these adopters also informally influences later adopters.

Current Research

With over 100,000 faculty involved in online teaching and learning, it is no longer just for the technically-elite. Higher education in the United States has reached the point in the adoption process in which the early adopters are largely already engaged in online education (Shea, 2007). However, many of the studies including incentives and obstacles to faculty adoption of DE were conducted when online education innovation's demonstrated benefits was still in its infancy between 1998-2002 (Berge, 1998; Betts, 1998; Rockwell, Schauer, Fritz, and Marx, 1999; Schifter, 2000; Pajo & Wallace, 2002; O'Quinn & Corry, 2002). In addition, the results of many of these studies were limited to faculty perceptions as a whole without allowing for variations in responses correlating with variables such as gender, faculty rank, teaching experience, or institution type.

Factors Impacting Faculty Use of Technology

The range and variety of barriers addressed in the literature makes it difficult to study or draw meaningful conclusions. Therefore, a framework with fewer categories for discussion is needed. Rockwell, et al. (1999) formulated 8 categories of faculty concerns listed by higher education administrators: (a) time issues, (b) cost factors, (c) instructor-student relationships, (d) instructional design, (e) reward structures, (f) degree program planning, (g) institutional policies, and (h) training. Gellman-Danley and Fetzner (1998) sorted policy concerns related to technology integration into 7 areas: (a) academic, (b) fiscal, (c) geographic service area, (d) governance, (e) labor-management, (f) legal, (g) student support services. Muilenburg and Berge (2001) developed a survey of 64 barriers based on a literature review and previous personal research. They're factor analysis determined 10 factors that accounted for more than 50% of the overall variance. These factors include the following: (a) administrative structure, (b) organizational change, (c) technical expertise, support, and infrastructure, (d) social interaction and program quality, (e) faculty compensation and time, (f) threat of technology, (g) legal issues, (h) evaluation/effectiveness, (i) access, and (j) student-support services. Muilenburg and Berge also found that *faculty compensation, time* and *threat of technology,* were categorized under larger headings in previously developed frameworks; however, these two items were significant enough to divide into separate factors in their study. Piotrowski and Vodanovich (2000) categorized barriers to web-based instruction (whether actual or perceived) into four groups: *personal* (e.g., perceived personal benefits, faculty/student technological proficiency, attitudes toward acceptance), *institutional* (e.g., financial support, reward systems, training), *technical* (equipment dependability, software adequacy, technology competence), and *instructional* (e.g., time requirements, pedagogical issues, and interpersonal interactions). This literature review will utilize the framework developed by Piotrowski and Vodanovich to organize the incentives and barriers for faculty engaging in online education because it closely aligns with Rogers's perceived attributes: complexity, trialability, observability, relative advantage, and compatibility.

Personal Motivators

Faculty satisfaction is a complex issue that is difficult to describe and predict. A variety of variables such as changes in lifestyle (transfer to a new position, change in rank), demographics, or environmental conditions may individually or collectively influence satisfaction. For the context of this study, faculty satisfaction is defined as the perception that teaching online is "effective and professionally beneficial" (Bolliger & Wasilik, 2009). Most participants in a phenomenological study indicated that online teaching "gave them some type of satisfaction" (Conceição, 2006, p. 40).

Incentives that promote faculty adoption of online education primarily encompass intrinsic or personal rewards for the faculty member (Betts, 1998; Rockwell, et al., 1999; Schifter, 2000; Schifter, 2004). Faculty also expressed an interest in getting involved with online teaching in order to encourage their students' engagement with technology. They also considered online teaching as an opportunity to use technology more innovatively to improve course quality (Betts; Rockwell, et al.; Schifter, 2002; Shea, 2007).

Shea (2007) also found that younger faculty considered teaching online as an opportunity to demonstrate competencies for tenure while more "mature" faculty (45 or older) and those with higher technology skills were more motivated by opportunities to experiment with new technology. Rockwell, et al. (1999) identified the following personal motivators: fulfillment of the desire to teach, self-gratification, peer recognition, and recognition of work. Shea found that these incentives more accurately reflected faculty who had volunteered to teach online more than those who were required or asked to do so. Flexibility and convenience were significant motivators for females and part-time/nontraditional faculty members to teach online.

Hiltz, Kim & Shea (2006) found that all four focus groups of experienced online instructors listed “flexible scheduling” as their primary reason for teaching online. Intrinsic factors including the personal motivation to use technology, intellectual stimulation, the ability to reach new audiences, and the opportunity to develop new ideas promoted faculty participation in online education (Betts, 1998). Betts further found that the more experienced faculty members were with technology and online education, the more likely they were to participate in DE. Ulmer, Watson, and Derby (2007) reported statistically significant differences in faculty perceptions of the value of online education between faculty with and without distance education experience. Seaman’s (2009) findings support that faculty with experience developing or teaching online courses have a much more positive view towards online instruction than those without such experience.

Parker (2003) reviewed 102 articles dated from 1989-2001 and found that despite the lengthy list of motivators, only three factors were statistically significant (i.e., cited in more than half the articles reviewed). They were self-satisfaction, flexible scheduling, and wider audience. Personal/intrinsic factors were often the primary determinants of faculty participation; however, if the necessary extrinsic and institutional factors were not manifest, then intrinsic barriers may have been less influential. Personal concerns may also have been outweighed by social pressures (e.g., institutional, community, peer, or student pressures), which either encourage or hinder participation in distance education (Maguire, 2005).

Personal Barriers

Two main intrinsic barriers were fear of technology and resistance to change. Of the 42 faculty members surveyed by Berge (1998), 31.9% indicated a reluctance or inability to cope with the organizational changes such as beliefs, values, expectations, language, motivation, and cultural norms for which technologically-mediated teaching and learning is often the catalyst. These instructors generally had little expertise with technology both in their daily lives and in their f2f classrooms. Therefore, teaching an entire course online was an extremely intimidating concept. Faculty accustomed to being regard as experts also feared feeling incompetent (Hutchins, 2003). They were concerned about having the time to learn the new technology and become proficient users (Butler & Sellbom, 2002). Other faculty members were both threatened by the technology and concerned that online learning would replace the on-campus learning experience. They were concerned about their careers, the changes within the field, and the effect of those changes on their job security (Dooley & Murphrey, 2000).

Vaughan's (2002) mixed methods study utilized Hall and Hord's Stages of Concerns Questionnaire (SoCQ) and involved teachers participating in a two-week training session. He found that as teachers became more experienced with the technology, their concerns progressed from personal to task to impact concerns. Shea (2007) found that less experienced teachers who had taught only once or twice online showed more personal concerns (e.g., lack of opportunity to experiment with technologies, lack of familiarity with effective online pedagogy, and inadequate time to learn about teaching online). Hogan and McKnight (2007) found that online instructors in university settings experienced average emotional burnout levels, high levels of depersonalization, and low levels of personal accomplishment.

Institutional Motivators

Current and future institutional support can be considered both an inducement and a deterrent for adoption of online education (Butler and Sellbom, 2002). Administrative recognition and encouragement of online efforts was often cited by faculty as an incentive for participation. Monetary incentives were also cited. In the 102 studies reviewed by Parker (2003), the three most frequently cited extrinsic motivators were monetary stipends, release time to develop and teach online courses, and decreased workload.

Dooley and Murphrey (2000) surveyed administrators, faculty members, and support employees. Based on their findings, three areas require consideration: (a) administrative support, (b) training, and (c) incentives. Administrative support included providing an infrastructure to support both faculty members and students in a virtual learning environment. Training should include instructional design and learning theories as well as technology. Adequate support staff should also be present. Administrators should not overlook the weight of faculty rewards as a relative advantage. In the words of one respondent, “Just because it is a good thing - is not enough of a reason” (qtd. in Dooley & Murphrey, Summary, para. 2). Incentives such as release time, mini-grants, stipends, and recognition in the promotion and tenure process provide more than verbal encouragement to use online technologies; they also provide extrinsic reasons to do so.

"A Survey of Traditional and Distance Education Higher Education Members" (National Education Association (NEA), 2000) reported that online courses were compensated as part of their regular course load for 63% of respondents, while 84% also indicated they received no course reduction or workload adjustment. Schifter (2000) found that expenses most often paid for faculty members developing courses were for Internet Service Provider charges. Faculty also indicated that they received no additional compensation for teaching online courses, even though online instruction took more preparation time. Schifter (2004) reported that according to respondents, the primary expense reimbursed by the institution was for software purchases. In both studies, the institutions rarely paid overload pay or release time. Schifter (2000; 2004) noted faculty members were more like to receive special funding for *developing* a course than for *teaching* a course.

Zhen, Garthwait, and Pratt (2008) suggested that institutions should give credits toward promotion and tenure, as well as rewards or merit pay depending on how effectively faculty used technology in their teaching practices. Sellani and Harrington asserted that faculty compensation should be based on one online course being equal to two campus-based courses with regard to the resources needed to ensure high quality, meaningful learning for students (cited in Kosak, et al., 2004).

Current online faculty, nonparticipants, and administrators concurred that monetary incentives including stipends, release time, overload pay, and increased salaries would persuade faculty to teach online (Betts, 1998; O'Quinn & Corry, 2002; Rockwell, et al, 1999; Schifter, 2002). In general, financial incentives motivate younger faculty, who may be more willing to pioneer distance education courses than older faculty (Bruner, 2007; Seaman, 2009). Part-time faculty were motivated by the potential of online teaching being a condition of employment which provided more job security (Shea, 2007). McCarthy and Samors (2009) noted, “The fact that faculty are teaching online in spite of the weakness of support and resources indicates that they may respond to incentives that promote, enhance, and enrich opportunities to teach courses online for the benefit of students” (p. 34). The data suggest that combining financial and nonfinancial incentives to persuade faculty to participate in online teaching and development opportunities might be effective. For example, about 61% of the respondents indicated that inadequate compensation was a barrier to teaching online; however, only 36% indicated that “earn additional income” was an important motivator to teach online.

Shea (2007) reported that motivators differed by institutional settings. The potential for online teaching supporting other life needs and being able to teach a new subject were motivators for faculty at four-year institutions. On the other hand, pedagogical opportunities to reflect on and improve their teaching and job security issues were motivators for faculty at two-year institutions.

Institutional Barriers

Seaman (2009) found that online teaching is no longer relegated to a small subset of the faculty population. Faculty involvement spans the entire range of faculty including full-time and part-time, experienced and beginners, tenured and outside tenure-track ranks. Therefore, institutional policies such as mission statements, strategic plans, hiring and tenure polices, and performance assessment need to recognize that online instruction is now a faculty-wide issue. In addition, technology issues such as adequate computer labs, technology-enhanced classrooms, and new/updated software applications can also help or hinder adoption. Dooley and Murphrey's (2000) study supports Bates' claim that in order to take advantage of the growing interest in DE, Research 1 institutions must revise policies that focus on research agendas in order to establish the institutional capacity to support online teaching.

Understandably, faculty members have been reluctant to publish comprehensive evaluations of online initiative failures at their own institutions. However, several anecdotal accounts (Epper & Bates, 2001; Brown, 2003: Shepard, Alpert & Kohler, 2007 cited in Wiesenmayer, Kupczynski, and Ice, 2008) indicate that administrative failure to provide faculty with satisfactory support has led to extensive dissatisfaction, resistance to new online initiatives, and an overall sense of apathy toward all forms of technology-mediated learning.

Respondents in the Association of Public and Land-grant Universities (APLU) study rated campus support structures as a primary deterrent for online learning initiatives. Except for technological infrastructure, the average ranking for seven of the eight dimensions, which included support for online development, delivery, and students; policies on intellectual property; and recognition in tenure and promotion decisions, was "below average. Incentives for developing and delivering online instruction ranked the lowest. By examining case studies from the University of Central Florida, the State University of New York, Virginia Tech, and Colorado State University, Zotti (2005) found that the transition from traditional to online instruction had been best accomplished by systematically addressing faculty needs for pedagogical guidance and technical support.

Faculty workload (i.e., time devoted to developing and maintaining materials for online courses and participation and grading online discussions) has been repeatedly noted as an issue with faculty (Bender, Wood & Vredevoogd, 2004; Berge et al. 2002; Betts, 1998; Cavanaugh, 2005; Schifter, 2000; Lazarus, 2003; O'Quinn & Corry, 2002; Seaman, 2009). Cavanaugh found that it took over twice the amount of time to teach an online course, as opposed to the f2f version, even when there were fewer students in the online course. He suggested that uploading and maintaining materials and exams, communicating with students, and familiarizing students with the online course generate additional time burdens for online faculty. Lazarus found that the biggest time commitment for online faculty members was participation in and grading of online discussions. Bender, et al. found that time spent grading in distance education courses was greater than the comparable classroom course. They indicated that university facilities were utilized for electronically grading the classroom assessments; however, because the online course was offered more like a correspondence course in which students watched a series of MP3 lectures and corresponded via E-mail and Internet conferencing software, the instructor assumed the grading responsibilities. One of the advantages of using a CMS is that the grade book feature is embedded within the system so feedback can be automated.

Mcguire (2005) noted, "Time is considered to be an administrative issue because of the institution's ability to offer release time for development and maintenance of online courses" (*Institutional Inhibitors*, para. 4). The findings from the study conducted by Zhen, et al. (2008) “point to the value of administrational supported- and controlled- strategies in terms of reducing time and pressures toward online teaching and learning” (Role of Administrator, para. 1). Based on the results of the annual Sloan surveys on online learning (Allen & Seaman, 2004, 2005) and the APLU study (Seaman, 2009), both chief academic officers and faculty agreed that it takes more time and effort both to create and to teach an online course. Over 80% of the faculty respondents from the public and land-grant institutions surveyed agreed that teaching an online course does not take as much time as developing one. The deans surveyed by Betts (1998) agreed that lack of release time deterred many faculty members from teaching online.

Sahin (2005) interviewed Mary, who indicated that

> to integrate technology in teaching, faculty members need time… [and the] opportunity … to think about the way technology can be used most effectively to expand the curriculum and not just do what we’re already doing. And probably time to think very carefully about what we’re building by increasing our use of technology: what are we saying and what are we getting into (Sahin, para 3-4).

Mary also indicated that administrators “should take the lead on using technology responsibly” and should facilitate better access (Sahin, para 5).

In conflicting research, Parthasarathy and Smith (2009) and Zhen, et al. (2008) found that instructors did not perceive distance education as requiring more preparation time than a comparable on-campus course; therefore, it was not a determinant in their adoption decision. Zhen, et al. noted that faculty members who believed that teaching online is a useful option and students could learn as well or better online as f2f more often overcame time-related issues. Nonusers, on the other hand, tended to succumb to the barriers. Ultimately, time was not the real reason for failure to adopt online teaching practices; it simply masked deeper reasons.

Concerns of faculty at four-year institutions included lack of recognition of online teaching in tenure decisions, perceptions that online teaching is confusing, and inadequate time to modify online courses (Shea, 2007). Hiltz, et al. (2006) noted an irony among participants' responses. Faculty acknowledged they worked harder online. They thought they were able to reach more students with a greater diversity and that most of their online students learned more. However, many considered their efforts not only unrewarded but actually underrated by their institution and many of their peers.

The requirement to do research and publish is still the principal concern in large universities, followed by promotion and tenure (Bates, 2000). Although most faculty members take their teaching assignments very seriously, teaching is considered less important and interferes with their research activities. Rockwell, et al. (1999) found that time spent teaching or developing online courses was not regarded as highly as time spent on research or even teaching "traditional" f2f courses.

Traditionally, tenure has been a primary means of reward in higher education. It is estimated that 90% of all four-year higher education institutions and 99% of public universities in the United States have a tenure track system (Brown, 1999). However, August, Hollenshead, Miller, and Waltman (2006) reported that between 1987 and 2003, the percentage of faculty members who were tenured/tenure-track decreased by 15%. By 2003, 28% of all full-time faculty in higher education were in non-tenure track positions.

Although extrinsic factors including merit pay, credit toward promotion and tenure, and recognition and awards had minimal effect on faculty members' decisions to participate in online education, (Betts, 1998), Johnsrud, et al. (2006) found that tenure status did have an effect on the number of participants and nonparticipants in online education. Participants were split evenly between those with tenure (43%) or not on tenure-track (42%). Those on tenure-track but without tenure formed the smallest group (16%).

"Tenure and promotion usually does not recognize excellent off campus teaching which, in fact, takes valuable time from research agendas" (Sherritt, 1996, quoted in Valentine, 2002). Shea (2007) determined that the age of the instructor correlated with concerns about lack of recognition for teaching online in decisions about tenure and pay increases and perceptions of administration's undervaluation of online teaching. These concerns may suggest that tenure-track faculty may view the increased amount of time necessary to adequately prepare for online teaching detracts from the tenure-related activities such as research, grant writing, and publishing. Factors such as lack of release time, lack of technical support from the institution, and lack of grants for materials/expenses negatively influenced faculty participation (Betts, 1998; Dooley & Murphrey, 2000; O'Quinn & Corry, 2002; Schifter, 2000).

Rockwell, et al. (1999) and Schifter (2002) found that administrators and faculty disagreed on which incentives were more likely to encourage faculty to teach online. Administrators deemed financial support and release time to be most important to faculty; however, faculty responded that intrinsic incentives such as intellectual challenge rated higher (Schifter). Rockwell, et al. also found that "administrators were more likely to see monetary awards as an incentive than were the teaching faculty" (para. 32). Schifter noted, "Overall, the administrators in this study did not appear to truly understand what would motivate faculty who do participate in DE, but had a clear perception of what would inhibit faculty from DE participation" (Discussion, para. 3). This difference of opinion is noteworthy because administrators directly impact many of the extrinsic and institutional incentives and barriers. That faculty and support units and not administrators identified administrative support and encouragement as important motivators suggesting that administrators were unaware of their effect on the adoption process (Dooley & Murphrey, 2000).

Technical Motivators

Support for utilizing different technologies and delivery methods is essential for success of online initiatives (Rockwell, et al., 2000). Faculty members who considered technology and their skill in using technology as important aspects of their work were more inclined to participate in online education. Furthermore, as Rogers (2003) noted, faculty members who were able to try out the technology, testing it to see how easy or difficult it was to use and whether it fit their current teaching practices, were more likely to participate in online education (Johnsrud, et al., 2006).

The links between technology proficiency, attitudes toward technology, and the likelihood of faculty participating in online education emphasize the need to provide varied training and development opportunities. Faculty development strategies and interventions should change to reflect changes in instructors' concerns as they work with the technology (Vaughan, 2002). Initial faculty development should focus more on providing relevant information about the technologies involved in online education and less on the impact on students. Once instructors gain experience with the technical aspects, then development strategies would address concerns about integration and classroom management.

Technical Barriers

The lack of technical support topped the list of barriers most frequently cited (Berge, 1998; Betts, 1998; Rockwell, et al, 1999; Schifter, 2002). Butler and Sellbom (2002) observed that motivators and deterrents were tied to instructors' levels of technology adoption. Nevertheless, instructors with high technology competencies typically identified the same barriers as those indicating low proficiency levels. Four of the top seven barriers cited related to technical barriers: unreliable technology, not knowing how to use the technology, and difficulty using and learning to use the technology. Instructors thought that teaching online required more time and energy than teaching f2f (Hiltz, et al., 2006; Sahin, 2005).

The need to provide technology training and development to encourage faculty to participate in online education is often cited in the literature (Betts, 1998; Bower, 2001; Dooley & Murphrey, 2000; Zhen, et al., 2008; Zotti, 2005). Zhen, et al. suggested that scheduling of faculty-centered workshops and training programs should include faculty input regarding times and type of support. Johnsrud, et al. (2006) noted that faculty members who were less likely to participate in online education indicated that the availability of institutional resources to support technology needs was adequate, suggesting that technology training and development were not the reasons these faculty did not participate.

Instructional Motivators

Hiltz, et al. (2006) found that the second most mentioned motivator regarding online instruction had to do with the pedagogical advantages of teaching online including being able to build a learning community, more personal interaction, “the challenge and stimulation of learning new technology to create new pedagogical strategies, and improved course management capabilities (largely due to software tools)” (p. 6). Faculty also noted that DE helped them better meet student needs by increasing student access to college curricula (Betts, 1998; Dooley & Murphrey, 2000; Rockwell, et al, 1999; Schifter, 2002; Hiltz, et al.). Rockwell, et al. also identified two additional incentives: opportunity to provide innovative instruction and opportunity to employ new teaching strategies.

In additional to technical training, faculty members also need support in designing online courses and developing teaching strategies and instructional content appropriate for online teaching (Rockwell, Schauer, Fritz, & Marx, 2000). For online instructors to be effective, they must reconsider their approach to communicating information to students, be willing to alter their pedagogical assumptions, and adopt new strategies specifically designed for the online learning environment. The online course must effectively integrate technology with appropriate pedagogy. However, many new online faculty struggle with designing and developing the courses to be offered because they often lack a background in adult learning theory and instructional design (Kosak et al., 2004). Instructors are expected to facilitate online interactions between the student and instructor and between the student and the instructional content; however, if they have never participated in an online course, they may lack knowledge on how to do this. Support and training in effective online communication and feedback were considered critical for online success (Rockwell, et al.).

Instructional Barriers

Faculty perceptions toward online education are mixed at best. The Sloan-C reports indicate faculty members generally agree that the quality of online courses are equal to or better than f2f courses with only one-in-five institutions disagreeing with the statement that “online degrees have the same level of respect as f2f degrees,” and about one-half were neutral (Allen & Seaman, 2007). However, the perception that online courses are of lower quality and that distance education is second best still persists (Giannoni & Tesone, 2003). Instructional concerns were largely related to the quality of online courses; however, many of the concerns regarding course quality originated with faculty members who were nonparticipants, less experienced, or required to teach online (Betts; 1998; O’Quinn & Corry, 2002; Schifter, 2000, Seaman, 2009, Shea, 2007). Ulmer, et al. (2007) examined perceptions of faculty pertaining to the value of distance education and reported statistically significant differences in findings between faculty with and without distance education experience. Experienced faculty viewed distance education as effective in terms of student performance and instructor-to-instructor interaction. Participants in the qualitative study conducted by Yick., Patrick and Costin (2005) felt that much of the criticisms of online learning originate from lack of understanding and knowledge about distance education. “It is not easy…to completely understand the impact of online teaching until a faculty member actually employs the technology and then becomes of “‘convert’” (p. 7).

Yick, et al. (2005) observed that negative attitudes and prevailing myths may be changing as online education becomes more pervasive and commonplace. "Commonplace" carries connotations of normalcy and correctness. However, Siebold's (2007) qualitative study of hiring personnel from five different industries: "telecommunications, data systems, insurance, finance, and rental businesses" (p. 32) indicated that even with the increase in online education and nearly a decade of research, perceptions in the hiring process even outside academia still exist that online degrees are inferior to traditional degrees. Siebold also found that "personal experience with online education [on the part of the hiring person] had positively influenced the perceptions of those involved in this study" (p. 57).

Lack of adequate faculty training to prepare them for teaching online and concerns about poor course quality were considered two of the top five hindrances to faculty participation in online education. Instructors were more concerned with how to ensure quality and achieve their learning objectives when teaching in the different environment than with the technology used. Jones, Lindner, Murphy, & Dooley's (2002, cited in Kosak, et al., 2004) study found that the attitude of faculty toward DE affected their willingness to teach online. Faculty members who were philosophically opposed to online education generally thought online learning was not educationally equivalent to f2f courses. In addition, some faculty questioned whether the technology was actually "worth it" since they were unable to easily identify evidence that technology and online education actually facilitated learning in higher education (Butler & Seabom, 2002).

Osika, Johnson, and Buteau (2009) noted that the decision to adopt new teaching practices is attributed to the instructor's personal beliefs, perceptions, attitudes, and orientations related to their teaching practices. Ferguson (2004, cited in Osika, et al.) indicates that instructors' decisions to integrate technology into their teaching practices are based on teaching styles and strategies which were often developed early in their academic careers either as teachers or students. A common concern among faculty was with the lack of direct interpersonal contact and feedback from students (Bower, 2001; Bruner, 2007; Shea, 2007). Bower maintained that one reason why many higher education faculty had problems with the lack of was that their primary teaching and learning experiences had been in f2f situations. Shea (2007) found those who felt required to teach online and those with less experience worried about the absence of f2f interaction and lack of student access. Bruner (2007) also noted that both younger and older faculty felt their role as teachers would diminish as the role of technology increased.

Discussion and Implications

As Bates (2000) noted, "technology is nested within the broader vision of teaching and learning." Therefore, online educators have not only been expected to adopt new online technologies (*products*), but they also have been required to alter their beliefs regarding teaching and learning (*process*). Research focusing on the interactions between these two factors has not been conducted.

Furthermore, online education continues to have both supporters and critics within the academy. In the early stages of online education, the detractors were more numerous supporters. Research indicates that the continued existence and success of an innovation (i.e., online programs) depends on the support of the faculty leadership, administrative leadership, and a critical mass of active faculty participants. Rogers (2003) indicated that Innovators and Early Adopters do not approach the adoption process the same way that early majority and late majority adopters do. In other words, the motivators and barriers to adoption differ depending on adopter categories. However, many of the studies conducted on motivations and barriers to participation in online education were conducted between 1998 and 2002 during the initial adoption phases. Therefore, the concerns reported would seem to be those of early adopters or nonadopters. Not only is there a lack of research regarding concerns of later adopters, but a paucity of research on the implementation phase of adoption also exists.

Until recently, many of the research studies did not separate participant demographics into variables such as gender, age, tenure status, faculty rank, full-time/part-time status, experience teaching, or type of institution. Several studies did break down respondents into faculty and administrators, and one study reported findings separated by types of institution. Few studies distinguished between faculty who taught solely online, faculty who taught a combination of f2f and online courses, faculty who taught hybrid/blended courses, and nonadopters.

The research failed to address the hybrid model vs. totally online. Many instructors have adopted the blended learning model to overcome concerns regarding the lack of student/faculty interaction and community building. The hybrid model provides an chance for adopters to experiment with online learning tools to gain an understanding of relative advantages and ease of use, determine compatibility with their teaching philosophy and practices, and define observable results. Future research regarding motivators and obstacles differentiate between adopters of the hybrid model of teaching and adopters of exclusively online teaching.

Methodology

Bradburn and Sudman (1988) indicated that survey research has emerged as a primary approach both in the social sciences and in the applied fields. Singleton and Straits (2004) noted that while "experiments are used almost exclusively for explanatory, hypothesis-testing research; survey research is used extensively for both descriptive and explanatory purposes" (p.226). Another justification for the choice of survey research as the most appropriate method for this study, was that it offers the researcher the most effective means of describing the attitudes and perceptions of faculty members in a social setting of the target population and thus, allowing the researcher to focus on the specific aspects of the research design. Much of the research conducted on faculty motivations and use of course management systems has utilized survey methodology (Al-Ali, 2007; Dugas, 2005; Flosi, 2008; Huang, 2001; McQuiggan, 2006; Morgan, 2003).

Both Dugas (2005) and McQuiggan (2006) sought to determine faculty perceptions of the course management system, ANGEL. Both also utilized Rogers's diffusion of innovations theory as the basis for their studies. Dugas used a mixed-methods design; however, the primary means of gathering data were the Grasha-Reichman Teaching Styles Inventory, an Adopter Category Rubric, and the ANGEL Use Checklist. Not all respondents participated in the interview process. The Grasha-Reichman Teaching Styles Inventory utilizes a 7-point Likert scale. McQuiggan employed a self-developed survey to determine faculty members' views regarding the perceived attributes of the CMS. The survey was based on a 5-point Likert scale. McQuiggan also utilized the Stages of Concern Questionnaire developed by Hall and Hord (1987).

Al-Ali (2007) employed an electronic survey to gather data from faculty at four institutions. She used descriptive and inferential statistics to analyze the data. The self-developed survey represented a combination of the survey used by Huang (2001) and Morgan (2003). Huang utilized descriptive and inferential statistics including means, standard deviations, *t* tests, and one-way analyses of variance (ANOVAs). Key findings for Morgan's survey did not indicate the reliability or validity data for the 5-point Likert survey. Al-Ali analyzed the data collected using descriptive and inferential statistics, which included frequencies, percentages, and a one-way ANOVA. Tukey's Honestly Significant Difference (HSD) was used to test the one significant finding. All ANOVAs and the Tukey's HSD were set at a significant level of .05.

Flosi (2008) studied faculty use of course management software in higher education institutions using a modified version of Davis's technology acceptance model. Multiple regressions were employed to analyze the data to test relationships among variables.

A survey research design is well suited for the exploration of the research questions outlined in chapter 1. Compared to experiments, participant observation, or archival records, survey-based research studies are easier to structure so as to ensure the reliability and validity of results (Singleton & Straits, 2005). Survey research is easy to replicate and to test for sampling bias and sampling error. These factors make survey research in the form of self-administered questionnaires ideal in the exploration of CMS adoption.

Methods Considered for This Study and Not Selected

I considered other research design options for this study including the use of qualitative methods. This method would have been effective in terms of having the ability to explain questions and having respondents explain their answers. However, the number of respondents would have been greatly reduced because of time commitments of faculty. Also, the different categories of respondents would have been underrepresented or not represented at all. Because one of the research questions was to determine adopter characteristics, then it was important to have a broad range of faculty represented.

The research could have been conducted using experimental research design. However, as pointed out by Singleton and Straits (2004), experimental research design methodology, "is intended for the purpose of testing hypothesized causal relationships" (p.183). This method was rejected because of its requirement for hypothesized causal relationships and for the inherent problem associated with the limitation imposed on the generalization of results and findings originating from the limited sample selection. Another reason for not considering a nonexperimental design was because there will be no manipulation of the variables (Johnson & Christensen, 2004). The dependent variable is faculty adoption of the course management system. The independent variables all relate to Rogers's diffusion of innovations theory: perceived attributes, social system, and channels of communication.

Conclusion

Having an education plays a central element an individual's social and economic mobility, affecting access to resources that may be handed down to subsequent generations. Increasingly an undergraduate degree has become a requisite for this mobility. The rewards of a higher education are both tangible and intangible, benefitting both the individual and society through increased income, improved health, and enhanced moral reasoning. In order for HBCUs to remain a viable resource for African American students, they will have to address closing the Digital Divide, a term coined by Lloyd Morrisett (Hoffman, Novak, & Schlosser, 2000), referring to concern that Internet technologies may not equally benefit everyone resulting in information “haves” and “have-nots” that exists on many of their campuses. Furthermore, as distance learning programs continue to grow worldwide, HBCUs need to re-evaluate their strategic plans regarding technology and online learning; otherwise, the important education role they have played in educating African Americans may become obsolete in the 21st century.

Course management software has been endorsed as a means of supporting distance education courses and as a tool for supplementing traditional class instruction through the use of web-based communication, assessment, and administrative tools. Morgan (2003) noted, “A major goal of course management software is to integrate a suite of teaching technologies into a powerful set of tools that make it easy for faculty to use technology in instruction.” Research has shown that the introduction of a CMS correlated with faculty’s levels of adoption of online teaching (Elgort, 2005; Mitchell, Clayton, Gower, Barr, & Bright, 2005).

The adoption of a CMS is not simply process of learning and using the new technology; more importantly it represents a challenge to the mindset of the ‘higher education mission that has been the subject of refinement and protection for nearly a millennium’ (Katz, 2003, p. 9). All the HBCUs in this study currently utilize either Blackboard or WebCT to facilitate their distance education programs. However, online courses and programs at HBCU lag behind those at HWCU. The purpose of this study was to identify adopter levels and characteristics and their perceptions of the CMS based on Rogers's perceived attributes: relative advantage, compatibility, complexity, trialability, and observability. In addition, the study sought to identify institutional policies and procedures that hinder or encourage adoption, including faculty development opportunities.

In chapter 3, the methodology of the study will be discussed in further detail. The topics include research design and approach, settings and population, instrumentation and materials, data collection as well as measures taken for the protection of the participants.

Chapter 3: Research Methods

Given the many benefits made possible by online learning as well as the expressed value placed on CMS adoption by universities, the purpose of this nonexperimental, quantitative study was to identify factors that influence faculty members in their decision to adopt a CMS into their teaching practices for the purpose of predicting membership in one of five adopter categories. This chapter describes the research design and approach; setting and sample; treatment, instrumentation, and materials; data collection procedures; data analysis; and measures to protect the participants' rights. This chapter delineates the ways in which the investigation was conducted and includes the procedures that were used to analyze the data.

Research Questions

I sought to identify characteristics of faculty members and their perceptions of the CMS and the organizational characteristics of the college/university in order to determine the influence of these perceptions on the instructors' use of the CMS in their teaching practices. In order to achieve this objective, the following research questions guided the study.

1. What is the connection between the adopter status of faculty members and their perceptions of the relative advantages of adopting the CMS?
2. What is the connection between the adopter status of faculty members and their perceptions of compatibility issues related to adopting the CMS?
3. What is the connection between the adopter status of faculty members and their perceptions of the complexity/difficulty of adopting the CMS?

4. What is the connection between the adopter status of faculty and their perceptions of the trialability of the CMS?

5. What is the connection between the adopter status of faculty and their perceptions of the observability of the CMS?

6. What is the connection between the adopter status of faculty and their perceptions of organizational policies related to adoption of the CMS?

7. What is the connection between the adopter status of faculty and their perceptions of organizational procedures related to the adoption of the CMS?

8. What is the connection between the adopter status of faculty and their perceptions of organizational norms related to adoption of the CMS?

Research Design

This study employed a quantitative paradigm and non-experimental research design. The design included a cross-sectional online survey aimed at obtaining data about the college instructors' perceptions of the CMS and organizational policies, procedures, and norms influencing adoption of the CMS and the relationships between these constructs. No treatments were given in this non-experimental design.

Survey methodology is well defined and has precise procedures that yield valid and easily interpretable data. Survey research entails gathering information such as characteristics, opinions, attitudes, or previous experiences about one or more groups of people by asking questions of participants and then tabulating the results (Leedy & Ormrod, 2005). Pinsonneault and Kraemer (1993) stated that "survey research is a quantitative method, requiring standardized information from, and or, about the subjects being studied. The subjects studied might be individuals, groups, organizations or communities; they also might be projects, applications, or systems" (*Characteristics of Survey Research*, para. 1).

The choice of survey research as the most appropriate method for this study is because it has been used in the past with accuracy by many scholars to provide the answers to the questions "what is happening?" and "how and why it is happening?" Singleton and Straits (2004) noted that while "experiments are used almost exclusively for explanatory, hypothesis-testing research; survey research is used extensively for both descriptive and explanatory purposes" (p. 226).

Survey research methodology is particularly effective in producing quantitative descriptions of the defined variables of the target population in order to explore the relationships that may exist between the variables. The findings or results can be extended generally to the larger part of the population under study. Although the information is collected about a fraction of the target population, it is collected is such as way as to allow the findings to be generalizable to the larger population (Pinsonneault & Kraemer, 1993).

Quantitative data were gathered via a web-based, self-administered electronic survey. The online survey component was an appropriate choice because Web survey data can be tracked more easily than paper surveys and has greater flexibility in the design of the questionnaires. Web-based surveys also provide significantly quicker response times compared to other distribution methods (Schaefer & Dillman, 1998). Surveys require fewer resources per survey, allow more surveys to be sent out, and include more participants. Electronic surveys also generally obtain much longer responses to open-ended question than paper versions. According to Gunn (2002),

> Advantages of Web surveys are a faster response rate; easier to send reminders to participants; easier to process data, since responses could be downloaded to a spreadsheet, data analysis package, or a database; dynamic error checking capability; option of putting questions in random order; the ability to make complex skip pattern questions easier to follow; the inclusion of pop-up instructions for selected questions; and, the use of drop-down boxes. These are possibilities that cannot be included in paper surveys. (para. 7)

One potential issue is that an online survey could attract a disproportionate number of faculty members who are technologically confident. It could be argued that the descriptive results were not as accurate because the participants were not a true random sample. However, all of instructors contacted had college-provided E-mail accounts and had equal access to the online survey. A mailed survey could have been another approach, but Gunn (2002) pointed out that online surveys are easier for the respondents to fill out and do not require the respondents to mail them. Eysenbach and Wyatt (2002) found that "the validity and reliability of data obtained online are comparable to those obtained by classical methods" (para. 7).

Initially, the case study was considered an alternate research method for this study. "Case studies emphasize detailed contextual analysis of a limited number of events or conditions and their relationships" (Soy, 2006). Case study research is an excellent method for providing an understanding of a complex issue or object or extending knowledge and adding strength to what is already known through previous research. However, based on the literature review, I concluded that a survey designed to investigate college instructors' attitudes and perceptions would be more appropriate. A survey would allow for collecting a broader number of responses in order to gain a better understanding of the phenomena. The literature review supported the need for descriptive statistics because no study was found that presented quantitative data on the topic of this study at HBCUs. Several researchers (Al-Ali, 2007; Dugas, 2005; McQuiggan, 2006; West, et al., 2007) had used a quantitative approach and a survey to collect data for the same line of investigation with primarily White institutions (PWIs). In addition, survey methodology was more appropriate for determining factors that would predict adopter status. Therefore, I decided on a quantitative study that would employ a cross-sectional online survey to obtain descriptive data about college instructors' current CMS use and their perceptions regarding its attributes and organizational support and norms related to its adoption.

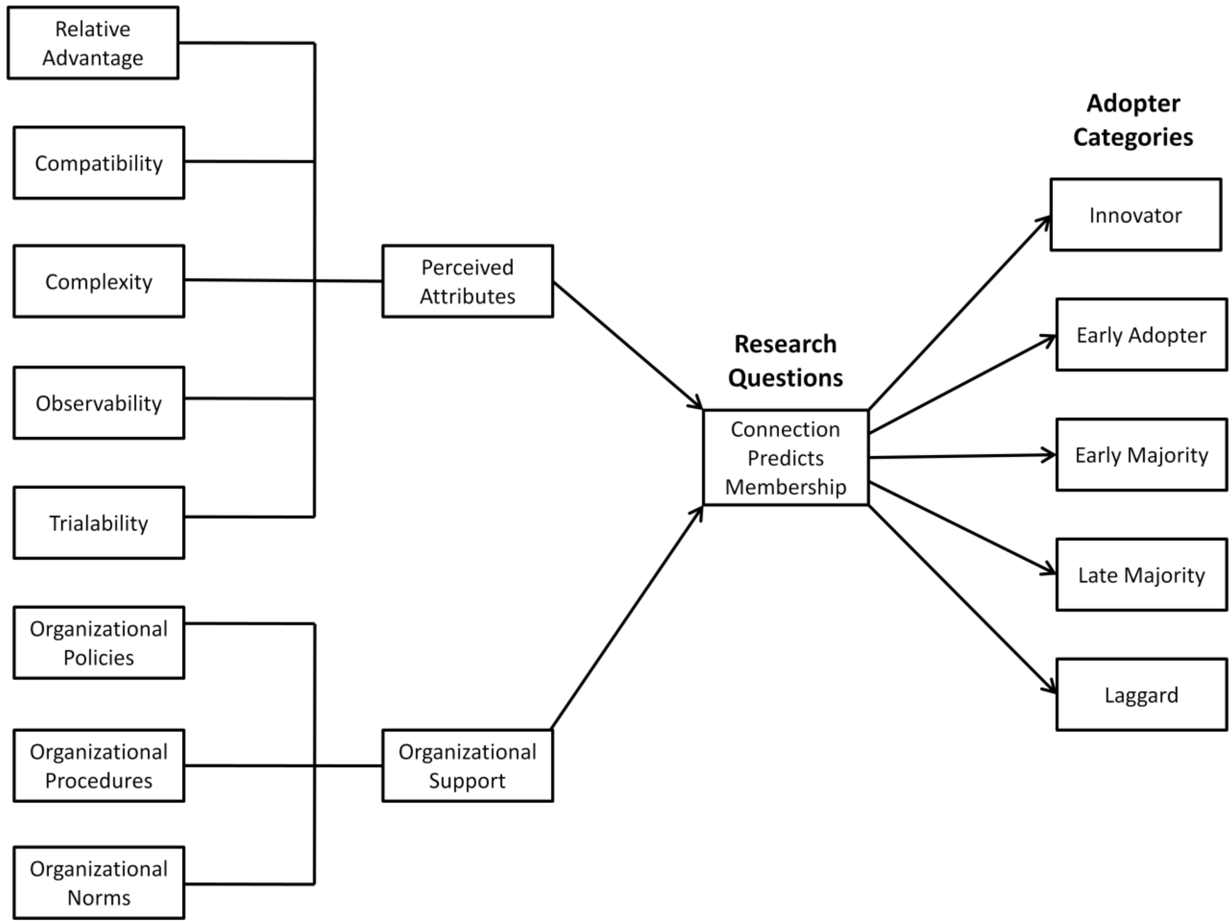

Figure 3. Conceptual model of factors and their effects on adopter category.

Figure 3 provides a visual representation of the research design for this proposal. The independent variables are on the left with the research questions in the middle and the dependent variable on the right. Based on the diagram, the factors on the left predict the outcome on the right. Each of the variables was measured in the *CMS Diffusion of Innovations Survey*.

Setting and Sample

Target Population

The general population of this study was higher education faculty at HBCUs. This study used a convenience sample of full-time faculty at five HBCUs in two Southeastern states. Faculty members were defined as adults serving in an instructional role at the institution on a full-time basis on 10 or 12 month contract during the given academic year. Faculty members included those who taught fully online, a combination of online and face-to-face, and traditional f2f courses. The five institutions represented both public and private, 4-year liberal arts institutions. All five institutions utilize a course management system.

Sampling Procedure

In contrast to sampling, in which data from only a subset of the population is obtained, census gathers information about every member of a population. As such, census is used to collect statistical data commonly used for research, business marketing, and planning purposes. By census, the population consisted of all of full-time faculty members, male and female, in five HBCUs in two Southeastern states.

By census, every full-time faculty member in the institutional E-mail list from each of the universities was surveyed except at Institution C. Letters of cooperation were received only from the deans of the College of Business Administration and the College of Liberal Arts and Social Sciences. The population size from each of the selected institutions is shown in Table 1. The number of full-time faculty at Institutions A and D was derived from data published by StateUniversity.com (2009) as a resource for students. The number of faculty at Institutions B, C, and E was derived from the departmental web pages at each institution.

Table 1

Faculty Population From Five HBCUs

Institution	Population
Institution A	258
Institution B	433
Institution C	38
Institution D	178
Institution E	163
Total census population	1,070

Sample Size

This study used a convenience sample of all full-time faculty members at five HBCUs in the Southeastern United States. Faculty members were defined as adults serving in an instructional role at the institution on a full-time basis on 10- or 12-month contracts during the 2009-2010 academic year. Faculty members could teach fully online, a combination of online and face-to-face, or traditional f2f courses. The five institutions represented both public and private, 4-year liberal arts institutions.

In many cases, Web-based surveys fail to reach response rate levels of postal surveys and may threaten the use of electronic surveys (Schafer & Dillman, 1998). Couper (2000) noted several reasons for the low response rate when compared to traditional survey methods. Incentives and techniques used for postal surveys to increase response rates are often not possible in electronic formats. Technical difficulties may also keep response rates low. In addition, a lack of perceived importance and/or timeliness with a specific topic to a potential survey subject can also reduce responses (Sheehan & McMillian, 1999; Watt, 1999). Archer (2008) reported response rates of 84 Web-based surveys deployed over 33 months. Response rates varied by survey type: Meeting/Conference Evaluations, 57%; Needs Assessments, 40%; Output/Impact Evaluations, 52%; Ballots, 62%. I identified several techniques for increasing response rates including advance notice of the intent to survey, personalized E-mail invitations, follow-up reminders, and simplified survey formatting (Cook, 2000; Solomon, 2001). I sought to utilize these techniques and expected at least a 25% response rate. However, additional barriers including timing of the survey distribution, the inability to personalize the E-mail invitations and reminders, and reliance on internal distribution of the invitations and reminders at two institutions resulted in a lower than expected response rate of 14.3%.

Instrumentation

The name of the instrument is CMS Diffusion of Innovations Survey, which is available in Appendix B. This survey measures eight dimensions (independent variables) related to perceived attributes of the CMS and organizational policies, procedures, and norms that potentially influence adoption from the faculty member’s perspective. The first five constructs measure perceived attributes (Rogers, 2003) of the CMS. The first construct measures faculty members’ perceptions of the relative advantages of using the CMS. The second construct measures faculty members’ perceived compatibility issues. The third construct measures the faculty member’s perceptions of the degree of complexity associated with using the CMS. The fourth construct measures faculty member's perceptions of the trialability of the CMS. The fifth construct measures faculty member's perceptions of the observability of the CMS. The sixth, seventh, and eighth constructs measure the level of organizational support perceived by faculty members in the form of policies, procedures, and norms.

Survey development. The instrument used in this study was developed in a series of stages. Below is a summary of steps employed in developing the CMS diffusion survey:

1. Reviewed the literature to determine motivators and barriers to teaching online and CMS adoption.
2. Identified instruments measuring perceived attributes of an innovation
3. Generated items representing adopter characteristics, perceived attributes, and organizational policies, procedures, and norms.
4. A panel of four experts familiar with survey construction and/or Roger's diffusion of innovations theory reviewed the survey items.
5. Reassigned and restructured items where necessary.
6. Revised survey reduced to 85 items representing the eight variables.
7. Collected 38 perceptions from a sample of 143 respondents, each of whom works full-time at a postsecondary institution in a different state and uses a CMS.
8. Revised questions and survey design to reflect comments from field study respondents.

A combination of existing validated scales was used to develop the survey for this study. A breakdown of the survey questions and their origin is included as Appendix C. Three questionnaires as well as data from the literature review formed the basis for many of the items. The development of an instrument using existing instruments is common in survey research, because existing instruments have already been assessed for validity and reliability (Kitchenham & Pfleeger, 2002). The three surveys were McQuiggan's (2006) Perceived Attributes Instrument developed to measure faculty perceptions of the course management system, ANGEL; Davis's technology acceptance model (TAM); and Moore and Benbasat's (1991) adoption of information technology innovation survey. McQuiggan's survey is specific for perceived attributes for a CMS. Davis's TAM has been closely identified with Rogers's perceived attributes of relative advantage and complexity. Moore and Benbasat based their survey instrument on Rogers's attributes and also used items from the TAM. They expanded the attributes to eight by dividing observability into Result Demonstrability and Visibility and adding voluntariness and image. No surveys that specifically examined organizational policies, procedures, and norms with regard to the adoption of an innovation were found. Therefore, the items in that section derived from the literature review. I considered the items identified by Moore and Benbasat as attributes of *voluntariness* and *image* to relate to organizational policies and norms.

The primary instrument used as a model for developing the instrument used in this study was the Perceived Attributes Instrument developed by McQuiggan (2006). The forty-item instrument was constructed from the researcher's knowledge of the CMS and a review of the literature. Many of the items included in McQuiggan's instrument were found to be variations of those developed by Davis (1989) and Moore and Benbasat (1991).

In studying user acceptance and use of technology, the technology acceptance model (TAM) is one of the most cited models. Davis (1989) developed the instrument to explain computer-usage behavior. Several researchers have replicated Davis's original study to provide empirical evidence on the relationships that exist between usefulness, ease of use and system use. TAM is one of the most influential extensions of Ajzen and Fishbein's theory of reasoned action (TRA). TRA predicts rejection or acceptance of specified behaviors (rather than objects or things) based on attitude and normative influences on intentions to perform these behaviors. Attitude toward use of innovation is the degree to which users evaluate and relate their use of the innovation to their job performance. When users have a favorable attitude toward the target innovation, they may use it more frequently and for longer timer periods. Social norms (also known as subjective norms) refer to the user's beliefs as to whether others important to them want them to perform the behavior and their motivation to comply with these outside forces. TRA contends that intentions are formed through weighted combinations of attitude and subjective norms and behavior directly depends on intention.

Rooted in TRA, the technology acceptance model (TAM) developed by Davis (1989) identifies two distinct constructs, perceived usefulness and perceived ease of use that directly affect a person's attitude toward use of technology and indirectly affect actual use of the technology (Davis, 1993).

Each of the factors is defined as follows:

- Perceived Ease of Use: the degree to which the individual users perceive that their use of the innovation would be mentally and physically effortless (Davis, 1993).
- Perceived Usefulness: the degree to which individual users perceive that their use of the innovation would enhance their job performance (Davis, 1993).

However, TAM omits the subjective norm component of TRA that correlates with attitude to determine intention. Davis asserted that technology acceptance does not depend on normative beliefs. However, Wolski and Jackson (1999) contended that omission of the subjective norm component may work for some organizations; however, in educational contexts in which members identify themselves closely with their communities of fellow practitioners, it does not seem plausible to assume that the decision to use technology is made without consideration of others' approval or disapproval of its use. In addition, various conditions relating to support for use of the CMS (e.g., ease of access to the system, relationship of the user with support staff, and rewards/incentives) could influence use and performance. Rogers's definition of a social system includes the organization's norms, opinion leadership, change agents, change agencies, and change aides. An individual's innovativeness depends both on the individual's characteristics and the social system in which the individual is a member.

Although their study focused on personal work stations, Moore and Benbasat (1991) found that most existing instruments designed to test the perceived attributes of an innovation lacked reliability and validity; therefore, they created their own instrument. Their instrument measures users' perception of adopting an information technology innovation as a tool for studying the initial adoption and eventual diffusion of any new innovation within organizations. The instrument was based on Rogers (2003) five attributes of an innovation: relative advantage, compatibility, complexity (renamed ease of use), observability, and trialability. Moore and Benbasat (1991) identified two additional constructs as important in the decision to adopt new technologies. The first construct, image, was defined by "the degree to which use of an innovation is perceived to enhance one's image or status in one's social system" (p. 195). The second construct, voluntariness, was defined as "the degree to which use of innovation is perceived as being voluntary or of free will" (p. 195). This researcher chose to retain *image* under the *relative advantage* attribute as previously defined by Rogers (2003) and included *voluntariness* under characteristics of the *social system* (organizational support).

In addition to existing instruments, the CMS Diffusion of Innovations Survey also included data collected from a review of literature on motivations and barriers to faculty adoption of online teaching practices.

Survey Software Program

SurveyMonkey software was used to create and design the survey. SurveyMonkey is a software program available to the public and it can be accessed via the Internet at: https://surveymonkey.com. SurveyMonkey not only records and stores participants' responses to individual questions posed in the survey, but also provides data analysis of survey responses in terms of percentages and frequency counts. Data collected can also be downloaded into a statistical program for further analysis. The E-mail invitation included a unique link to access the survey tied to each E-mail address. The E-mail invitation sent to full-time faculty through SurveyMonkey can be found in Appendix D. SurveyMonkey also facilitates sending follow-up E-mail reminders. A minimum of three E-mail reminders was sent out. Examples of these reminders are located in Appendix E and Appendix F.

Instrument Validity

The next stage assessed the construct validity of the instrument. Validity is concerned with what the test measures and for whom it is appropriate (Gay, 1996). Face validity refers to the "degree to which a test appears to measure what it purports to measure" and content validity refers to the "degree to which a test measures an intended content area" (Gay, 1996, p. 139-140).

Three experts on Rogers's diffusion of innovations theory reviewed the SurveyMonkey version of the CMS Diffusion of Innovations Survey to provide feedback pertaining to the representativeness, clarity, and comprehensiveness of each of the questions with regard to Rogers's diffusion of innovations theory. A written version was also provided for their convenience. The invitation to participate in the expert panel is included as Appendix G.

Members of the expert panel had to demonstrate knowledge of Roger's diffusion of innovations theory through one of the following means:

- Publications related to Rogers's theories or diffusion of innovations
- Presentations related to Rogers's theories or diffusion of innovations
- Research/teaching activities related to Rogers's theories or diffusion of innovations
- Relevant training related to Rogers's theories or diffusion of innovations

Appendix H includes the instructions to members of the expert panel. The experts independently assessed the content validity of the survey instrument and determined how well each item supported the research questions for this study and the clarity of the wording. One reviewer suggested that since the questions were presented in the positive, they were leading questions; however, after discussion with the dissertation committee, I decided to maintain the wording. “In addition to maintaining question objectivity to control for bias, shorter sentences are better for reading on the screen” (Andrews, Nonnecke, & Preece, 2001). As Nielsen (2000) demonstrated, people scan web pages, looking for key words and phrases instead of reading them. Therefore, survey questions and instructions became shorter as I made changes to reflect feedback.

Since a high attrition rate is often associated with surveys that are too long or irrelevant to the respondent, I also worked to eliminate redundant questions and refine the ones kept. Based on comments from the expert panel, the following changes were made:

- Relative advantage from 23 questions to 15
- Compatibility from 15 questions to 10
- Complexity from 20 questions to 10
- Trialability remained at 7 questions
- Observability from 11 questions to 6

The questions for organizational support were organized into three categories to represent the independent variables: policies, procedures, and norms. The original 25 questions were revised and reduced to 21. The section entitled Influences on Adoption was considered redundant and was removed. Question 12 asking users to note their usage level, frequency of usage, and expertise for 27 CMS features was also removed. The open-ended question asking for explanations for nonuse was also removed. The resulting survey instrument consisted of 85 items in three parts: demographics (16), perceived attributes (48), and organizational support (21).

Questions in the demographic section were designed to collect characteristics in order to determine the subgroups (adopter levels) in the population and to develop a picture of the characteristics of members of each of these segments. The location of the request for personal (demographic) data in the survey is a design feature that seems to affect attrition rates. Attrition rates are significantly lower when personal information is not requested at the beginning of Web-based surveys rather than at the end of the survey. Respondents are not expecting the data request at the end of the survey and react negatively by exiting the survey before completing it (Frick et al., 1999, cited in Andrews, Nonnecke & Preece, 2003). Andrews, et al. indicated that placing the data request at the beginning may be perceived as honesty on the part of the researcher, which helps to build trust. I had originally placed the demographic information at the end of the survey following the advice of Dillman (2000) to place the easier questions at the end. However, based on the literature review and one expert panel reviewer's suggestion, the final design of the survey obtains demographic information and adopter characteristics at the beginning of the survey.

Survey questions included both Likert-type scale and open-ended questions. A 6-point Likert-type scale was used to determine faculty perceptions of the innovation's attributes and of organizational support for the adoption of the CMS. Each response was assigned a point value so that an individual's score for each statement could be mathematically and statistically calculated (Gay, 1996; Leedy, 1997). The respondents' choices and their corresponding point values were: *not applicable/don't know* = 0;

strongly disagree = 1; *disagree* = 2; *undecided/neutral* = 3; *agree* = 4; *strongly agree* = 5. Open-ended questions were limited to optional opportunities to add information at the end of a question set using multiple line text boxes. Skipping these questions did not affect the survey results.

Instrument Reliability

After the survey was revised following feedback from the expert panel, the instrument was field tested with faculty members at a community college not included in the study. An invitation to review the survey was extended to 143 faculty members. Thirty-nine persons attempted the survey. Thirty-eight completed the survey, and 12 provided varying degrees of feedback regarding the survey design. The participants' response time was also documented. Participants generally completed the survey in 15-25 minutes.

The following questions, as suggested by Litwin (1995), were used to gather feedback on the survey design:

1. Are there any typographical errors?
2. Are there any misspelled words?
3. Do the item numbers make sense?
4. Is the type size big enough to be easily read?
5. Is the vocabulary appropriate for the respondents?
6. Is the survey too long?
7. Is the style of the items too monotonous?
8. Are there easy questions in with the difficult questions?
9. Does the survey format flow well?

10. Are the items appropriate for the respondents?

11. Are the items sensitive to possible cultural barriers?

12. Is the survey in the best language for the respondents?

Based on feedback, I made the necessary grammatical corrections to improve the survey instrument, correcting missing or incorrect punctuation. In addition, information defining “perceived attributes” was moved to the same page as the definition of course management system. Two participants provided comments regarding Question 7, in which respondents self-identify their adopter category. One indicated that the question was too complex and did not adequately reflect the respondents’ position. Another noted that the question “assumed” that the instructor was present when the CMS was adopted. I investigated offering the respondents the option of choosing all the statements that applied to them, rather than aggregating the characteristic statements for each adopter category. However, this option triggered reliability issues and added to the length of the survey. Therefore, I decided to delete several of the statements and rewrite others for clarity. See Appendix I for specifics.

Two comments noted that Question 6 did not allow for multiple responses and that one instructor taught a combination of courses, not just one type with the CMS. Therefore, I added “Choose all that apply.”

Cronbach’s alpha test was used to assess the internal reliability of each attribute scale in the survey instrument. Interpreted as a correlation coefficient, its value ranges from 0 to 1. The higher the value the more reliable the scale. George and Mallery (2003) provide the following rules of thumb: “_ > .9 – Excellent, _ > .8 – Good, _ > .7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and_ < .5 – Unacceptable” (p. 231).

Litwin (1995) defines levels of .70 or more as a reasonable goal. Gliem & Gliem (2003) note "When using Likert-type scales it is imperative to calculate and report Cronbach's alpha coefficient for internal consistency reliability for any scales or subscales one may be using" (p. 88).

Reliability coefficients (Cronbach alphas) were computed for the instrument and for the individual scales. An alpha coefficient of .95 for the survey instrument demonstrated good internal reliability for the measure. Relative advantage (.96), compatibility (.89), and complexity (.91) demonstrated good internal reliability. An initial alpha coefficient of .66 was found for trialability. However, with the deletion of trialability statement 6, the alpha increased to .74. The initial alpha for observability was .69. With the deletion of observability statement 4, the alpha increased to .73.

The instrument divided organizational support into three constructs: policies, procedures, and norms. Organizational procedures and norms demonstrated good internal reliability with alpha coefficients of .80 and .81, respectively. Organizational policies only demonstrated an alpha of .62. Deleting any of the items did not positively affect the alpha. However, if all three constructs were recombined into one scale, the alpha coefficient increased to .88. Therefore, I chose to analyze the data as one scale. Table 2 presents the results of the reliability analysis for the final scales.

Table 2

Reliability Analysis of Scales

Construct	No. of Items	Cronbach's Alpha
Relative Advantage	15	.96
Compatibility	10	.89
Complexity	10	.91
Trialability	6 (deleted T6)	.74
Observability	5 (deleted Ob4)	.73
Organizational Support	19	.88

Data Collection

In order to obtain Letters of cooperation from each of the institutions, I contacted the Vice Presidents of Academic Affairs, the IRB Chairs, and Vice Presidents of Research, and the Compliance Officers. Each institution was initially contacted via E-mail, with follow-up phone calls and E-mails. The IRB Chair and Compliance Officer provided Letters of cooperation from Institution A. The Compliance Officer provided the Letter from Institution B. The Deans from the College of Arts and Sciences and Business Administration gave permission to survey their faculty at Institution C. The Provost and Vice President of Academic Affairs at Institution D signed the Letter of Cooperation. The Chair of the IRB Committee at Institution E signed the Letter of Cooperation.

I also requested E-mail addresses for all full-time faculty members in the E-mails to the institutions. As per instructions, E-mail addresses for Institutions B, C and E were gathered from the web-based faculty directories. Institutions A and D do not allow E-mail addresses to be distributed; however, the institutional contacts agreed to send out the invitations through their internal mail system.

The following data collection procedures were followed:

1. For Institutions B, C and E, the E-mail addresses gathered from the Internet were uploaded into SurveyMonkey.
2. An E-mail collector was created in SurveyMonkey which sent a customized invitation to participate in the survey. The collector tracked who responded as well as collected and stored the data.
3. An E-mail invitation that contained a letter of introduction, the intent of the survey, and a hyperlink uniquely tied to the survey and the E-mail address was created and sent to each faculty member (Appendix D).
4. Because Institutions A and D did not allow E-mail addresses to be distributed to outside individuals, they agreed to send out the invitations through their mail system. Therefore, I provided the Invitation to Participate and the follow-up E-mail reminders to the Vice President of Academic Affairs at Institution D and a faculty sponsor at Institution A for dissemination.
5. Respondents were able to click on the link in the E-mail and were directed to the introductory page of the survey.
6. A reminder E-mail was sent out every three-four days for at least two weeks. The SurveyMonkey reminders are included as Appendices E and F.
7. At the end of the data collection period, the data were downloaded to a database created on a secure server.
8. The data were downloaded in two ways:

- The entire raw data file.
- By adopter category.

9. SurveyMonkey allows the data to be downloaded in three formats: Microsoft Excel, PDF, or database format. Raw data were downloaded as a comma delimited file from SurveyMonkey into EXCEL and then into SPSS for analysis.
10. SurveyMonkey computes frequency data and also creates bar graphs and charts that were used to represent data collected.

According to Archer (2008), "The best way to deal with nonresponse error is to increase the response rate through the questionnaire design and deployment processes" (para. 3). He noted that questions organized in tables, complex graphical designs, pull-down menus, ambiguous instructions, and lack of navigational aids all inhibit potential respondents. The survey employed in this study was designed to have a simple, professional layout using straightforward navigation which kept pull-down menus, graphics, and color to a minimum in order to give credibility to the survey and keep download time as short as possible (Andrews, et al., 2003), and meet ADA specifications for survey design. Each page provided a progress bar which indicated the number of pages completed and the percentage of the survey completed. Respondents also had the option of exiting the survey and re-entering at a later time. If a respondent exited the survey, the information from the completed sections was not lost. When the survey was completed, the respondent was immediately notified that his/her survey was successfully completed and thanked for his/her time.

How survey subjects are invited to participate in the survey and how survey completion is encouraged through reminders can affect response rates. "The perceptions of burden (the effort required to complete the survey) can be manipulated and affect non-response and attrition rates" (Andrews, et al., 2003). For example, Crawford et al, (2001 cited in Andrews, et al.) noted that those who were told the survey would take less time, received an automated/embedded password, and received more frequent reminders were more likely to accept the invitation. Therefore, the invitation E-mail included information indicating that the average time to complete the survey was between 15-25 minutes, as demonstrated through the field study. The SurveyMonkey-generated E-mail invitation also included a hyperlink to the web-based survey uniquely tied to each E-mail. This procedure facilitated sending follow-up reminders to nonrespondents.

Another reason for high non-response rates may involve issues of privacy and confidentiality (Couper, 2000). Therefore, I emphasized in both the Invitation to Participate and the Consent Form that all information would be kept confidential and that E-mail addresses would only be used for tracking purposes. See Appendix D for the E-mail invitation and Appendix J for the Consent Form.

Participants had four weeks to complete the survey. Knowing that the majority of responses to electronic invitations occur very shortly after receiving the invitation, reminders were sent every 3-4 days following the initial invitation (Yun & Trumbo, 2000). Each potential respondent received a minimum of one invitation and three follow-up reminders.

Data Analysis

Data from this study was analyzed using the SPSS statistical package. Data analysis procedures were designed around the study's research questions. The analysis included descriptive statistics for adopters, frequency data for the independent variables and logistic regression. Descriptive information for adopter characteristics included frequency and percentages for responses. Statistics were also created for the dependent variable (adopter categories): innovators, early adopters, early majority, late majority, and laggards.

Finally, this study sought to identify a predictive relationship between the adopter levels and faculty perceptions of the perceived attributes of the CMS and organizational policies, procedures, and norms influencing the adoption of the CMS. Logistic regression is a statistical technique allows researchers to predict the relationship between predictors and dichotomous predicted variables. Logistic regression has two main uses. The first use is in predicting group membership. The second use is to show the relationship and strengths among the variables (Menard, 2002).

Table 3

Breakdown of Variables, Item Numbers and Statistical Method

Variable	Item numbers	Data analysis method
Level of expertise in using the CMS	Question 5	Frequency statistics
Current use of cms for teaching	Question 7	Frequency statistics
Primary course delivery method	Question 8	Frequency statistics
Teaching experience	Question 9 a, b, c	Frequency statistics
Tenure status	Question 10	Frequency statistics
Faculty rank	Question 11	Frequency statistics
Discipline	Question 13	Frequency statistics
Race/Ethnicity	Question 14	Frequency statistics
Gender	Question 15	Frequency statistics
Age	Question 6	Frequency statistics
Adopter status	Question 6	Frequency statistics Logistic regression
Relative advantage	Question 17.1-15	Logistic regression
Compatibility	Question 18.1-10	Logistic regression
Complexity	Question 19.1-10	Logistic regression
Trialability	Question 20.1-7	Logistic regression
Observability	Question 21.1-6	Logistic regression
Policies	Question 22.1-5 Question 23 Question 24	Logistic regression
Procedures	Question 25.1-6	Logistic regression
Norms	Question 26.1-8	Logistic regression

Prediction of Adopter Status

Logistic regression was chosen as the statistical method for predicting the connection between the dependent variable (adopter status) and the independent variables (perceived attributes and organizational support). Logistic regression enables data analysis for particular influence and relationship of a set of nonmanipulated independent variables to the dependent variable (Agresti, 1996). It allows the researcher to predict group membership from a set of variables that may be continuous, discrete, or a combination of both. Discriminant analysis can also be used to predict group membership; however, it can only be used with continuous independent variables. Therefore, logistic regression is preferred when the independent variables are a categorical or a mix of categorical and continuous.

Participants' Rights

Participation in the study was purely voluntary. I closely maintained anonymity of participants. Confidentiality was maintained at all times because the downloadable data from SurveyMonkey database did not contain any names. The cover letter sent to the faculty members explained the purpose of the study, the importance of their participation, and the emphasis on maintaining anonymity and confidentiality. Participants were not compensated for participating in the study and nonparticipation was not viewed negatively by their institution. No hard copy versions of the survey were mailed out.

The Consent Form at the beginning of the online survey provided information regarding the participant's rights. Participation in the study was voluntary and anonymous. Because of the participants' anonymity, their signatures were not required on the informed consent form. The form indicated that by clicking the Next button to continue to the survey, participants were providing their electronic consent to allow me to use their survey results in the study. Recipients of the SurveyMonkey E-mails also had the option of sending an opt-out request to SurveyMonkey, and they were not contacted again.

Because survey methodology involves human participants, the Walden University Institutional Review Board (IRB) reviewed and evaluated the field study to determine that I had followed ethical standards established within the university’s scope of authority. I also submitted the IRB application for the actual study and obtained approval. In addition, I submitted IRB applications to Institution A, Institution D, and Institution E and received approval to conduct the study on their campuses. Walden University’s approval number for this study was 03-19-10-0308229 and expired March 18, 2011. Winston-Salem State University's IRB Number was 2986-10-0047 and expired March 23, 2011. Morehouse University IRB Number was 1002002 and was valid from 3/24/2010 until 3/23/2011.

Personal data such as names and E-mail addresses were not used anywhere in the study. Names and E-mail addresses were only used in determining study participants. The participants’ E-mail addresses for Institutions B and C are saved in a Microsoft Word document on a CD, which will remain locked in a filing cabinet for a period of at least 5 years. The participants’ survey responses will be stored on a spreadsheet in the locked filing cabinet and also saved on the SurveyMonkey website. Because users must acquire a personal account with user identification and password to access their saved information, SurveyMonkey provides a secure storage site.

Chapter 4: Results

The overall purpose of this study was to determine faculty members' perceptions of the CMS's attributes and organizational policies, procedures and norms, and how these factors influence their likelihood of adopting the CMS as part of their teaching practices. This chapter describes the results of the CMS Diffusion of Innovations survey, data analysis procedures, and findings related to the research questions related to CMS adoption at HBCUs. Information about response rates and a description of the respondents is also included. The data analysis process and logistic regression findings are organized according to the following research questions:

1. What is the connection between the adopter status of faculty members and their perceptions of the relative advantages of adopting the CMS?
2. What is the connection between the adopter status of faculty members and their perceptions of compatibility issues related to adopting the CMS?
3. What is the connection between the adopter status of faculty members and their perceptions of the complexity/difficulty of adopting the CMS?
4. What is the connection between the adopter status of faculty members and their perceptions of the trialability of the CMS?
5. What is the connection between the adopter status of faculty members and their perceptions of the observability of the CMS?
6. What is the connection between the adopter status of faculty members and their perceptions of organizational policies related to adoption of the CMS?

7. What is the connection between the adopter status of faculty members and their perceptions of organizational procedures related to the adoption of the CMS?
8. What is the connection between the adopter status of faculty members and their perceptions of organizational norms related to adoption of the CMS?

Response Rate

Requests for Letters of cooperation were sent to 13 HBCUs in three Southeastern states. Five institutions agreed to participate and returned the Letters of cooperation. Of the HBCUs participating, three were public, and two were private. Table 4 delineates the response rates for each of the participating institutions. E-mail invitations and reminders to participate in the study were sent to 1,070 full-time faculty at five HBCUs including 436 faculty members who received the invitations via internal E-mail servers at their institutions and 608 who received invitations processed through SurveyMonkey. Because of the low response rate from Institution C, I also forwarded their invitations and reminders via personal E-mail to overcome the possibility that the SurveyMonkey E-mails were being blocked by the institution's security measures. Twenty E-mails bounced and 12 faculty members opted out of responding to the survey leaving a total of 1,038. A total of 148 surveys were attempted for a response rate of 14.2%. After accounting for incomplete surveys, 137 responses were used for the final data analysis.

When categorized by institution, Institution A represented 34% (*n*=46) of the respondents, Institution B represented 42% (*n* =57) of the respondents, Institution C represented 3% (*n* =4) of the respondents, Institution D represented 14% (*n* =19) of the respondents, Institution E represented 8% (*n* =11) of the respondents. Institutions A, B, and C are public HBCUs representing 78% (*n* =107) of the total. Institutions D and E are private HBCUs representing 22% (*n* =30) of the total.

Table 4

Response Rate by Institution (N = 137)

Institution	Frequency	%
A	46	34%
B	57	42%
C	4	3%
D	19	14%
E	11	8%
Survey	137	14.2%

Response Rate Research

Sheehan (2001) analyzed the response rates for E-mail distributed surveys undertaken between 1986 and 2000 and noted the while the number of studies utilizing E-mail has increased, the average response rate has steadily decreased. Research shows that response rates for E-mail surveys have declined as the popularity of E-mail has increased (Sax, Gilmartin, & Bryant, 2003; De Leeuw & Heer, 2002; Moss & Hendry, 2002). Sax, et al. indicated that responses rates for electronic surveys were in a state of flux, asserting that the rates were “probably more dependent on the population sampled that any other factor” (p. 411). College students are among the most heavily surveyed groups and are responding at much lower rates than in previous decades. Yun and Trumbo (2000) also found variations in data regarding response rates for both electronic and multi-mode approaches which included paper and web-based surveys. The American Association for

Public Opinion Research (AAPOR; 2009) stated that response rates for all modes of survey administration have declined.

With lower response rates comes the concern for nonresponse bias. According to Sax, Gilmartin, and Bryant (2003), nonresponse bias refers to the bias that exists when respondents differ from those nonrespondents in terms of demographic or attitudinal variables. Nonresponse can take two forms: total nonresponse, where individuals fail to complete the survey at all, and unit or item nonresponse, where individuals do not complete all the items in the survey (Sax, Gilmartin, & Bryant). According to Curtin, Presser, and Singer (2005), those not responding at all are commonly divided into three groups: noncontacts (those never reached), refusals (those not willing to cooperate), and all others (those who had difficulty or were unable to cooperate—such as those with language barriers or lacked technology). According to Merkle and Edelman (2002), for exit polls, about 75% of nonresponses encompass a refusal, while 25% are misses.

Higher response rates have historically been associated with perceptions of more accurate survey results (AAPOR, 2009; Groves, 2006). Response rates, cooperation rates, and completion rates were often used interchangeably in the literature. The first attempts to standardize the definition of a response rate began in the 1980s by the Council of American Survey Research Organizations (CASRO) and was completed by AAPOR in the late 1990s. The 2008 edition of the *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys* clearly defines response rate and covers household, telephone, mail, and Internet modes of administration. These definitions have gained widespread acceptance (AAPOR).

Dillman (1991) and Krosnick (1999) asserted that a low response rate alone does not necessarily connote bias if respondents and nonrespondents' characteristics are aligned. As early as 1996, Visser, Krosnick, Marquette and Curtin demonstrated that surveys with response rates as low as 20% yielded more accurate measurements than surveys with response rates as high as 60-70%. Recent studies by Keeter, Kennedy, Dimock, Best, and Craighill (2000), Merkle and Edelman (2002) and Holbrook, Krosnick, and Pfenk (2005) have further challenged the view that a lower response rate means lower survey accuracy. Keeter et al. (2006) compared results of a 5-day survey with a 25% response rate with results from a more rigorous survey conducted over a much longer time period which doubled the response rate (50%). In 77 out of 84 comparisons, the two surveys results were statistically indistinguishable. Merkle and Edelman examined the relationship between response rates and survey error in exit polls and found no evidence to support the assumption that high response rates indicate less error or vice versa. Holbrook et al. (2005) assessed whether lower response rates were associated with less unweighted demographic representativeness of a sample. They examined the results of 81 national surveys with response rates ranging from 5% to 54% and found that the surveys with much lower response rates were only minimally less accurate. The AAPOR (2009) noted, "Results that show the least bias have turned out, in some cases, to come from surveys with less than optimal response rates" (para. 4).

These and similar studies demonstrate that a simple relationship between nonresponse rates and nonresponse biases does not exist. "Covariances between survey variables and response propensities are highly variable across items within a survey, survey conditions, and populations" (Groves, 2006, p. 670). In addition, they indicate that low response rates do not automatically produce high nonresponse bias and that the results from such surveys show little difference between those with higher response rates. Based on this research on response rates, I am confident of the results of this data analysis based on a response rate of 14.2%.

Research Instrument

The CMS Diffusion of Innovations Survey, which is available in Appendix B, was designed to measure eight dimensions (independent variables) related to perceived attributes of the CMS and organizational policies, procedures, and norms that potentially influence adoption from the faculty member's perspective. The first five constructs measure the perceived attributes (Rogers, 2003) of the CMS: relative advantages of adoption, compatibility issues, the degree of complexity associated with using the CMS, trialability of the CMS, and the observability of the CMS. Based on data derived from a Cronbach's alpha analysis, policies, procedures, and norms were combined into one construct to measure organizational support.

A combination of existing validated scales was used to develop the survey for this study. A breakdown of the survey questions and their origin is included as Appendix C. Three questionnaires as well as data from the literature review formed the basis for many of the items. The three surveys were McQuiggan's (2006) Perceived Attributes Instrument; Davis's technology acceptance model (TAM); and Moore and Benbasat's (1991) Adoption of Information Technology Innovation Survey.

The participants answered 67 (2 deleted) questions assessing their perceptions of the characteristics of the CMS and organizational support for adoption of the CMS at their institution. Survey questions included both Likert-type scale and open-ended questions. A six-point Likert-type scale (“strongly disagree”, “disagree”, “neutral/undecided”, “agree”, “strongly agree”, not applicable/don’t know) was used to determine faculty perceptions of the innovation’s attributes and of organizational support for the adoption of the CMS. Each response was assigned a point value so that an individual’s score for each statement could be mathematically and statistically calculated (Gay, 1996; Leedy, 1997). The respondents’ choices and their corresponding point values were: *Not applicable/Don’t know* = 0; *Strongly disagree* = 1; *Disagree* = 2; *Undecided/Neutral* = 3; *Agree* = 4; *Strongly Agree* = 5. Open-ended questions were limited to optional opportunities to add information at the end of a coded question set using multiple line text boxes (Andrews et al., 2003).

Descriptive Statistics

Descriptive statistics are used to organize and summarize data in order to easily determine what information they contain and describe what the data shows (Daniel, 2004). Descriptive statistics were used to determine frequencies, counts, and proportions which described the respondents’ demographic features and described the outcome variables.

Characteristics of the Sample

Demographic information presented in Table 5 indicates that 61% of the respondents were female and 39% were males. Respondents between the ages of 50 and 59 years (38%) and over 60 (25%) represented the majority. The majority of respondents (54%) were African American/Black; 39% percent were White; 8% reported Other. The Other category included Asian/Asian American (5%), Hispanic or Latino/a or Chicano/a (2%), Native American/Alaskan, African, and multiracial (2%).

Table 5

Individual Characteristics

Demographics	Frequency	%
Gender		
Male	53	38.7
Female	84	61.3
Age		
20-29 years	1	.7
30-39 years	27	20
40-49 years	22	16.3
50-59 years	51	37.8
60+	34	25.2
Race		
White/Caucasian	51	38.6
African American/Black	71	53.8
Other	10	7.5

Most of the respondents indicated they were teaching faculty (72.7%). Although those with tenure status (39.7%) were the largest group overall, those without tenure (36%) or not tenure track (24.3%) represented a larger number of faculty. The majority of respondents had attained the rank of Associate Professor (36.6%) or Assistant Professor (34.4%). Table 6 contains a breakdown.

Table 6

Career Characteristics

Demographics	Frequency	%
Years in Education		
Less than 1 yr	1	.7%
1-3 yrs	13	9.6%
4-6 yrs	13	9.6%
7-10 yrs	15	11%
10-15 yrs	21	15.4%
15-20 yrs	18	13.2%
20+ yrs	**55**	**40.4%**
Years in Higher Ed		
Less than 1 yr	1	.8%
1-3 yrs	14	10.7%
4-6 yrs	15	11.5%
7-10 yrs	19	14.5%
10-15 yrs	20	15.3%
15-20 yrs	18	13.7%
20+ **yrs**	**44**	**33.6%**
Years at Institution		
Less than 1 yr	6	4.5%
1-3 yrs	**32**	**24.2%**
4-6 yrs	**32**	**24.2%**
7-10 yrs	19	14.4%
10-15 yrs	16	12.1%
15-20 yrs	6	4.5%
20+ yrs	21	15.9%
Tenure Status		
Tenured	**54**	**39.7%**
Non-Tenured	49	36.0%
Not on Tenure Track	33	24.3%
Faculty Rank		
Lecturer	6	4.6%
Instructor	13	9.9%
Asst Professor	45	34.4%
Assoc Professor	**48**	**36.6%**
Professor	19	14.5%

The majority of respondents had been in education (40.4%) and in higher education (33.6%) more than 20 years. However, most of them (48.4%) had been at their present institution for less than six years, which most likely accounts for the fact that 60.6% of the respondents did not know when their institution had first acquired the CMS and that 32.1% indicated the wrong version of the CMS or did not know what CMS their institution used. Table 7 includes the current CMS utilized by the participating institutions.

Table 7

Course Management Systems Used by Institution

Institution	CMS
Institution A	Blackboard 8.0
Institution B	Blackboard 8.0
Institution C	WebCT Vista
Institution D	Blackboard
Institution E	WebCT

Respondents were asked to identify their academic disciplines. Their responses were categorized according to the following: Arts and Humanities (22%), Social and Behavioral Sciences (20%), Allied Health/Nursing (14%), Natural Sciences (11%), Business (11%), Education (9%), Math, Computers and Technology (6%), and Other (7%). The Other category represented disciplines that did not readily fall into the major categories such as Interdisciplinary Studies. Thirteen faculty members did not respond to this question; therefore, Figure 4 reveals analysis of the data provided by 124 respondents.

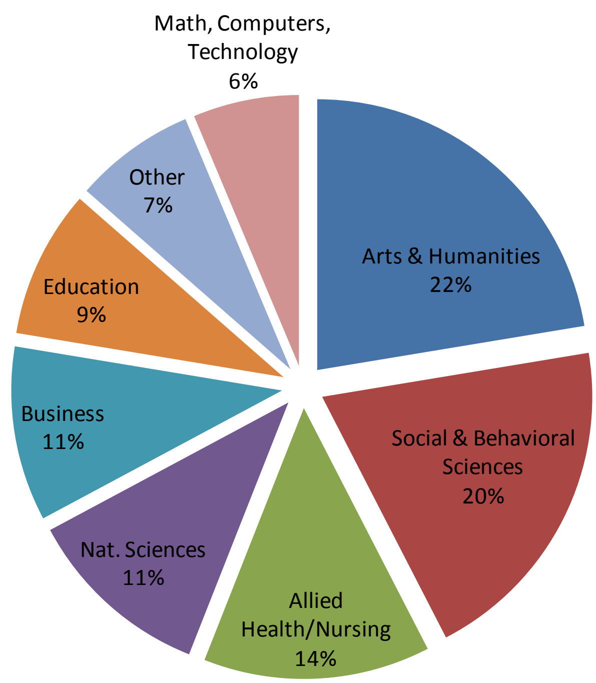

Figure 4. Percentage of respondents by discipline.

CMS Usage

Participants were asked to self-select a ranking for their level of CMS expertise. The majority of participants, 55.9%, responded that they were intermediate computer users competent in a number of CMS tools for instruction. An additional 25.7% categorized themselves as CMS experts proficient in using a wide number of CMS tools, while 18.4% considered themselves as novices performing basic functions and still requiring help on a regular basis (represented in Figure 5). Of those indicating they were not very proficient, 16 or 74.3% of them did not currently use the CMS or only used it as a repository for course materials. The majority of respondents (62.5%) first started using the CMS less than six years ago. Many of those who indicated they were moderately proficient in using the CMS (38.7%) had adopted the CMS within the last three years; while 32% had adopted 4-6 years ago. Those indicating high proficiency (40%) had adopted the CMS 4-10 years ago although those adopting 7-10 years ago ranked at 37.1%. Therefore, the majority of those indicating high proficiency had started using the CMS between 4-10 years ago.

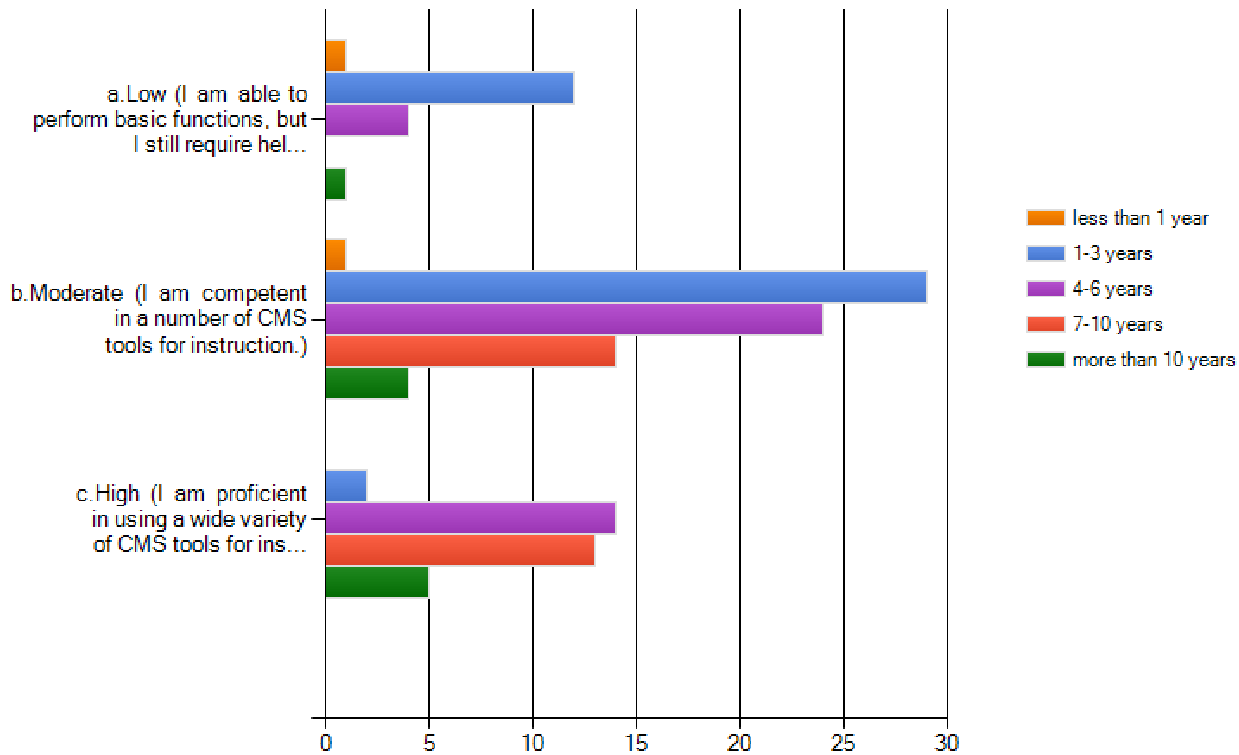

Figure 5. Level of expertise related to time of adoption.

With regard to how they used the CMS, the majority of respondents indicated that they used the CMS to supplement their f2f courses with web-enhanced delivery (64%). Even those that had been using the CMS for more than 10 years primarily used the features to enhance their f2f courses. Technology was used to deliver instruction to all students in the section, but no class sessions were replaced by technology. Another 32.4% simply used the CMS as a repository for course materials and hyperlinks. The limited use of the CMS to supplement f2f courses or to provide a repository for course materials was pervasive despite the users' adoption time or level of proficiency (Figure 6).

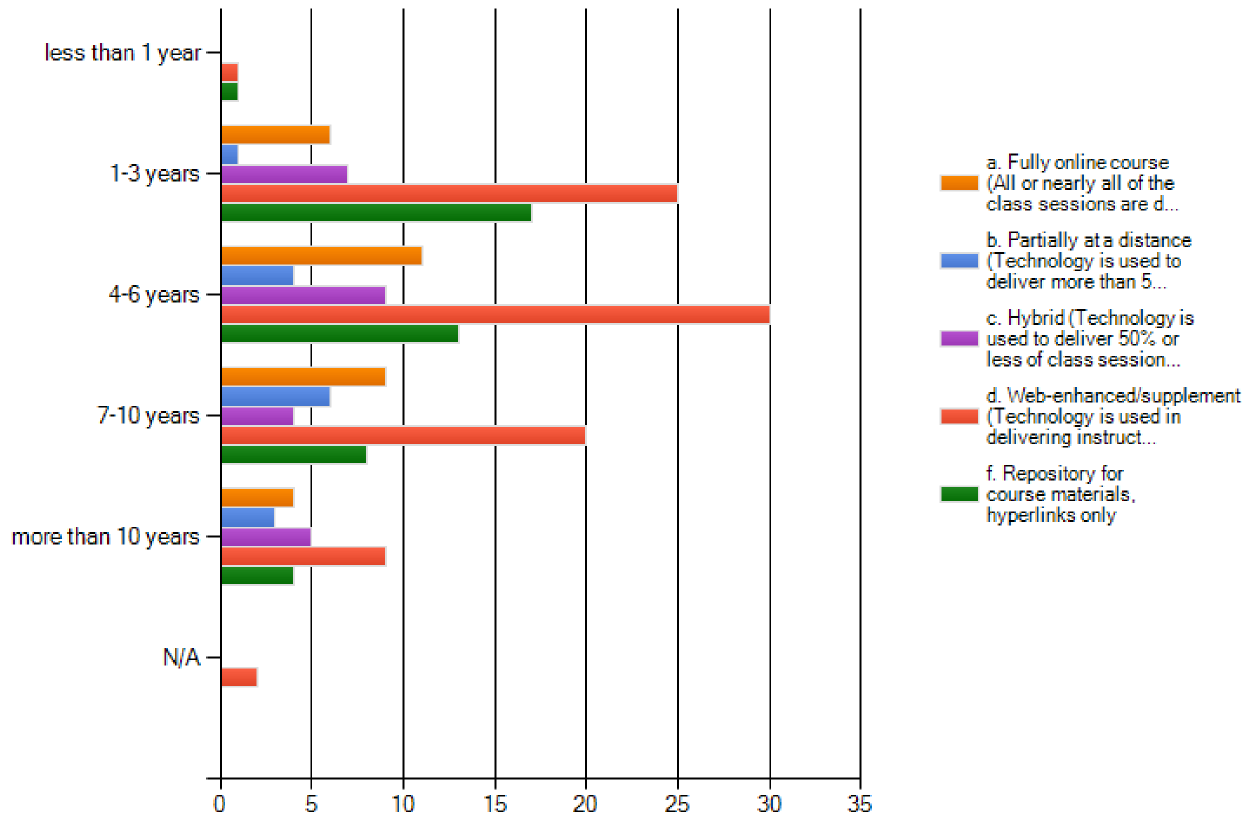

Figure 6. CMS use related to time of adoption.

Summary of Respondent Characteristics

Study participants were from three public and two private HBCUs in two Southeastern states. Complete data were obtained from 137 participants (38.7% male and 61.3% female). Participants were primarily African American (53.3%) or White (38.6%). Respondents ranged in age from 20 to over 60; however, for the most part, respondents were over 50 years old (63%).

Most of the respondents (33.6%) had been in higher education more than 20 years. The majority (55.9%) indicated they considered their level of expertise as moderate, i.e., competent in a number of CMS tools for instruction. This finding corresponded with the report that most of the respondents had been employed at their current institution (52.9%) and had been using a CMS less than six years (62.5%).

The majority of faculty utilized the CMS simply to enhance their f2f courses (64%) or as a repository for course materials (32.4%). Fewer faculty indicated they taught fully online (22.1%) or hybrid (18.4%) courses which would fully integrate the CMS into their teaching practices. Only 3% indicated they taught exclusively online. Respondents were split between teaching a combination of online-delivered and f2f courses (55.1%) and online f2f courses where no technology was used to deliver the course (41.2%).

The largest group of faculty members indicated they were tenured (39.7%); however, those not on tenure track or non-tenured represented 60.3% of the respondents. Respondents were primarily Assistant Professors (34.4%) or Associate Professors (36.6%). Faculty from a variety of disciplines responded to the survey, including the following: Arts and Humanities (22%), Social and Behavioral Sciences (20%), Allied Health/Nursing (14%), Natural Sciences (11%), Business (11%), Education (11%), Math, Computers and Technology (6%), and Other (7%).

Inferential Statistics

Dependent Variable

Inferential statistics analysis used participants' response to Question 7 as a dichotomous dependent variable in a logistic regression analysis. The percentage of respondents for each category was used to calculate the distribution of adopters responding to the survey. The categorization of participants' raw scores is presented in Table 8. The number of participants for each adopter category was Innovators (I) = 23;

Early Adopters (EA) = 77; Early Majority (EM) = 21; Late Majority (LM) = 8; and Laggards (L) = 8. Categorization resulted in 16.8% of participants being categorized as Innovators, 56.2% as Early Adopters, 15.3% in the Early Majority group, and 5.8% in both the Late Majority and Laggard categories.

Table 8

Self-reported Adopter Categories

Adopter Category	Frequency	%
Innovator I am often one of the first persons to try new technologies such as the CMS. I tend to be a risk-taker and active-information seeker. I tend to latch on to new technology as soon as it is available to me. My interest tends to be more with the technology itself than with its application to specific problems. I am willing to invest time and energy to learn on my own and adapt quickly to new technologies.	23	16.8%
Early Adopter I explored the CMS for its potential to bring about improvements in my teaching. I am willing to try new things technologies and am not averse to occasional failure. I share my experiences with the CMS with my colleagues. My colleagues often ask for my advice/help regarding the CMS. I experiment with a new CMS feature to see if it might improve teaching and learning.	77	56.2%
Early Majority I adopted a “wait and see” attitude toward the CMS. I wanted examples of close-to-home successes before adopting the CMS. I wanted to see the value of the CMS before adopting it. I wanted to make sure that adoption would be easy and hassle-free. I wanted to make sure I would have the necessary technical support and advice to learn/use the CMS.	21	15.3%
Late Majority I was skeptical about using the CMS. I accepted the CMS later in the game once it had become established among the majority of the faculty. I accepted the CMS only when it became a necessity. I began using the CMS because of pressure from my peers and/or students. I tend to use CMS features that seem similar to the ways I have always taught.	8	5.8%
Laggard I am usually not interested in adopting new technology. I see no use for adopting the CMS in my teaching practices. My current teaching practices have worked well so far without using the CMS. Just because everyone else is using the CMS, doesn’t mean that I need to.	8	5.8%

Rogers's (2003) asserted that the rate of adoption of an innovation will be distributed normally. He calculated the distribution based on the assumption that "adopter distributions follow a bell-shaped curve over time and approach normality" (p. 275). At any given point, 2.5% could be classified as Innovators, 13.5% as Early Adopters, 34% as Early Majority, 34% as Late Majority, and 16% as Laggards (p. 281). Figure 7 illustrates the comparison between Rogers's theoretically expected distribution across adopter categories and the distribution of participants based on their self-reported designation.

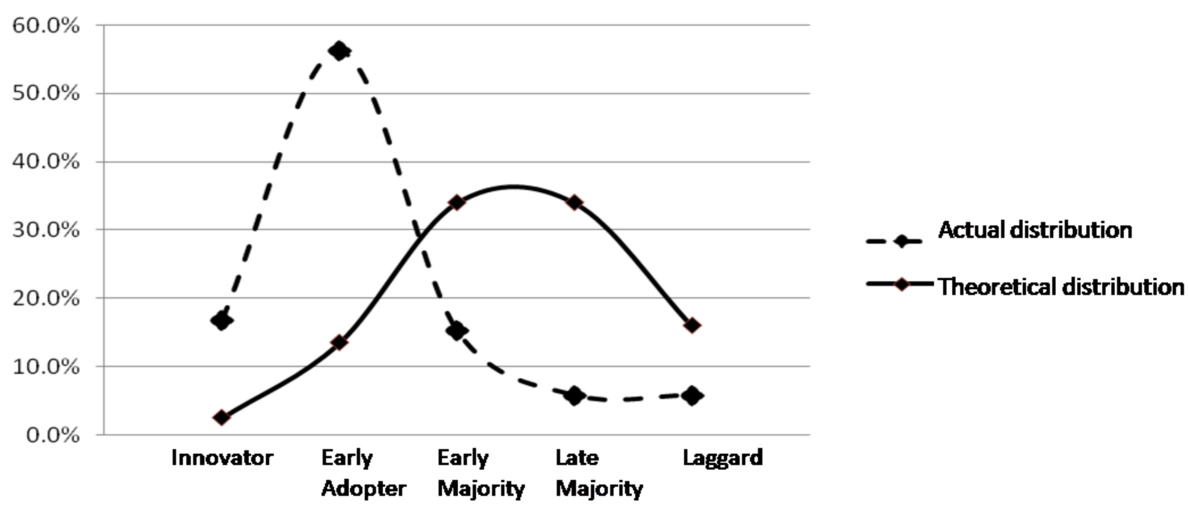

Figure 7. Distribution of adopter categories compared with theoretical distribution.

The results of the comparison indicate that the responses are skewed toward the Innovators and Early Adopters with a lower percentage of participants in the Early Majority, Late Majority, and Laggard categories than should be expected theoretically. The comparison indicates that the population in this study is more likely to adopt innovations earlier than the general population because 88.3% placed themselves in the earliest three categories as compared to the 50% that was theoretically expected.

The distribution is consistent with the finding that 73% of the participants had adopted a CMS within the last six years. Their primary use of the CMS was for as a web-enhanced supplement for their courses (64%) or as a repository for course materials, hyperlinks, etc (32.4%).

Independent Variables

Based on analysis of the internal consistency of scale items in the survey using Cronbach's Alpha, the original eight independent variables were reduced to six. Organizational policies, procedures, and norms were combined into organizational support. Therefore, the six independent variables—relative advantage, compatibility, complexity, trialability, observability, and organizational support—served as predictors of adopter categories. In order to apply logistic regression analysis, the mean of each independent variable was calculated. Each mean is a subscale and was included in the logistic regression analysis as a predictor factor. Table 9 displays the number of items for each perceived characteristic that comprised the mean score for that characteristic and the descriptive statistic.

Table 9

Number of Items and Descriptive Statistics for Perceived Attributes and Organizational Support

		Mean Score for Each Characteristic			
Characteristic	Number of items	Highest Individual Mean	Lowest Individual Mean	Group Mean	Standard Deviation
Relative advantage	15	4.80	1.00	3.62	0.89
Compatibility	10	5.00	1.00	3.48	0.88
Complexity	10	5.00	1.00	3.70	0.86
Trialability	6	4.71	1.00	3.34	0.07
Observability	5	5.00	1.00	3.52	0.71
Organizational Support	19	4.56	1.28	3.11	0.65

Scale values were calculated using 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. Theoretically, the full range of responses for each subscale is a mean between 1.00 and 5.00. For example, a response of “Strongly Agree” on each of the fifteen items in the relative advantage subscale results in a subscale mean of 5.00. Likewise, a response of “Strongly Disagree” on each item in the same subscale results in a subscale mean of 1.00. Three constructs (compatibility, complexity, and observability) all had lowest individual means of 1.00 and highest individual means of 5.00, matching the theoretical range of responses. The range of responses indicates that the full range of agreement and disagreement was present for these subscales. However, for three constructs (relative advantage, trialability, and organizational support), the highest individual mean was less than 5.00, indicating that, overall, participants disagreed with the items in this subscale more than if the full range of responses were present. The organizational support subscale had a lowest individual mean greater than 1.00 and a highest individual mean of less than 5.00. This narrower range indicates that responses tended to congregate in the neutral range.

Logistic Regression Analysis

A series of multiple logistic regression analyses was conducted to identify and compare predictors of adoption across each adopter category. First, logistic regression analysis was run for the mean of the overall subscale and then for all items in each subscale. Logistic regression coefficients signify whether the relationship between a predictor variable and the dependent variable (i.e., adopter status) is positive or negative, and give some indication as to the strength of that relationship. Logistic regression coefficients are similar to linear regression coefficients in that those above zero reflect positive relationships, and those below zero signify negative relationships. The Wald test is a parametric statistical test used in logistic regression to test whether the parameters associated with a group of variables is zero. Although Agresti (1996) argued that the likelihood-ratio test is better, Hauk and Donner (1977) noted that Wald is more convenient because it requires fitting the model under the hypothesis only once instead of twice as required by the likelihood-ratio test. By contrast, odds ratios (*Exp(B)*) are centered on 1. An *Exp(B)*>1 indicates that higher scores on a predictor variable *increase* the odds that the outcome (i.e., adoption) will occur, whereas an *Exp(B)*<1 means the predictor variable *decreases* the odds that the outcome will occur. If the odds ratio = 1.0, the predictor variable has no effect. Because odds ratios are defined in terms of the scale of the independent variables, they can only be compared across adopter groups, not within the groups.

RQ 1: What is the connection between the adopter status of faculty members and their perceptions of the relative advantages of adopting the CMS?

Table 10 presents the results of the logistic regression analysis of the means for each of the adopter categories for relative advantage. Relative advantage was a significant predictor for Early Adopters and Laggards at the .01 level. For Innovators and Early Adopters, the odds ratios (*Exp (B)*) were 1.265 and 1.742 respectively. The ratios indicate the likelihood of the relative advantages of adopting the CMS predicting adoption by Innovators are increased by a factor of 1.265 and adoption by Early Adopters are increased by a factor of 1.742.

Table 10

Relative Advantage Predicted Probability for Adopter Category

Adopters	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
Innovators	.235	.284	.687	1	.407	1.265
Early Adopters	.555	.214	6.754	1	.009**	1.742
Early Majority	-.389	.241	2.596	1	.107	.678
Late Majority	-.583	.370	2.476	1	.116	.558
Laggards	-.932	.344	7.364	1	.007**	.394

** $p < .01$

Table 11 displays the results of the logistic regression analysis for the individual statements grouped under relative advantage for Innovators. Although the mean for relative advantage was not a significant predictor of Innovator status (Wald = .687, p = .407), the perception that the CMS encouraged "student engagement with the course content" (Wald = 4.230, p = .040) was a significant predictor of Innovators' adoption of the CMS at the .05 level. In addition, the odds ratio was the highest for this variable, indicating that this factor increased adoption by a factor of 3.141 for each since unit increase.

Table 11
Relative Advantage Predicted Probability for Innovators

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Enables (would enable) me to significantly improve the overall quality of my teaching.	.665	.603	1.217	1	.270	1.945
2. Makes (would make) it easier to do my job.	-.481	.516	.870	1	.351	.618
3. Enables (would enable) me to accomplish course management tasks (manage course content, assignments, and resources) more efficiently.	.163	.517	.099	1	.752	1.177
4. Is (would be) an efficient use of my time and increases my productivity	-.547	.623	.771	1	.380	.579
5. Allows (would allow) me greater flexibility and control over my work	.523	.501	1.093	1	.296	1.687
6. Allows (would allow) me to reach wider audiences	.472	.338	1.951	1	.162	1.603
7. Allows (would allow) me to develop new technological skills.	-.476	.609	.610	1	.435	.621
8. Enables (would enable) me to use technology more innovatively in my teaching.	.409	.653	.393	1	.531	1.505
9. Helps (would help) me plan and improve student learning.	-.793	.655	1.466	1	.226	.453
10. Allows (would allow) my students to develop greater technological skills.	-.537	.377	2.026	1	.155	.585
11. Allows (would allow) for deeper or more meaningful student learning.	-.064	.397	.026	1	.873	.938
12. Increases (would increase) student access to class information.	-.117	.396	.088	1	.767	.889
13. Encourages (would encourage) student engagement with the course content	1.144	.556	4.230	1	.040**	3.141
14. Increases (would increase) interaction between students and the instructor.	.093	.344	.073	1	.787	1.097
15. The benefits of using the CMS outweigh the hassle factor" (related to time and effort required to learn/use the CMS and the potential for frequent frustrations)	-.046	.461	.010	1	.920	.955

* $p < .05$

Table 12 displays the results of the logistic regression analysis for the individual statements grouped under relative advantage for Early Adopters. Although the mean for relative advantage was a significant predictor of Early Adopter status (Wald = .6.754, p = .009), none of the individual statements was a significant predictor of Early Adopter adoption of the CMS.

Table 12

Relative Advantage Predicted Probability for Early Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Enables (would enable) me to significantly improve the overall quality of my teaching.	.153	.394	.150	1	.699	1.165
2. Makes (would make) it easier to do my job.	.694	.418	2.753	1	.097	2.001
3. Enables (would enable) me to accomplish course management tasks (manage course content, assignments, and resources) more efficiently.	-.380	.339	1.259	1	.262	.684
4. Is (would be) an efficient use of my time and increases my productivity	-.013	.468	.001	1	.979	.988
5. Allows (would allow) me greater flexibility and control over my work	-.053	.390	.019	1	.892	.948
6. Allows (would allow) me to reach wider audiences	-.275	.226	1.483	1	.223	.760
7. Allows (would allow) me to develop new technological skills.	.301	.389	.599	1	.439	1.351
8. Enables (would enable) me to use technology more innovatively in my teaching.	-.729	.458	2.528	1	.112	.483
9. Helps (would help) me plan and improve student learning.	.528	.442	1.428	1	.232	1.696
10. Allows (would allow) my students to develop greater technological skills.	.190	.308	.382	1	.537	1.209
11. Allows (would allow) for deeper or more meaningful student learning.	.113	.291	.151	1	.698	1.119
12. Increases (would increase) student access to class information.	.456	.359	1.614	1	.204	1.577
13. Encourages (would encourage) student engagement with the course content	-.204	.369	.306	1	.580	.815
14. Increases (would increase) interaction between students and the instructor.	.016	.247	.004	1	.950	1.016
15. The benefits of using the CMS outweigh the hassle factor" (related to time and effort required to learn/use the CMS and the potential for frequent frustrations)	-.143	.331	.186	1	.667	.867

Table 13 displays the results of the logistic regression analysis for the individual statements grouped under relative advantage for Early Majority. Neither the mean nor any individual statements were a significant predictor.

Table 13

Relative Advantage Predicted Probability for Early Majority Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Enables (would enable) me to significantly improve the overall quality of my teaching.	-.397	.508	.610	1	.435	.672
2. Makes (would make) it easier to do my job.	-.176	.571	.095	1	.757	.838
3. Enables (would enable) me to accomplish course management tasks (manage course content, assignments, and resources) more efficiently.	-.426	.415	1.056	1	.304	.653
4. Is (would be) an efficient use of my time and increases my productivity	.136	.585	.054	1	.817	1.145
5. Allows (would allow) me greater flexibility and control over my work	-.011	.427	.001	1	.979	.989
6. Allows (would allow) me to reach wider audiences	-.027	.286	.009	1	.925	.973
7. Allows (would allow) me to develop new technological skills.	-.754	.516	2.137	1	.144	.470
8. Enables (would enable) me to use technology more innovatively in my teaching.	.958	.639	2.248	1	.134	2.606
9. Helps (would help) me plan and improve student learning.	.459	.568	.653	1	.419	1.583
10. Allows (would allow) my students to develop greater technological skills.	.329	.416	.627	1	.429	1.389
11. Allows (would allow) for deeper or more meaningful student learning.	-.298	.365	.663	1	.415	.743
12. Increases (would increase) student access to class information.	-.229	.385	.353	1	.552	.795
13. Encourages (would encourage) student engagement with the course content	-.093	.440	.045	1	.832	.911
14. Increases (would increase) interaction between students and the instructor.	-.247	.326	.576	1	.448	.781
15. The benefits of using the CMS outweigh the “hassle factor” (related to time and effort required to learn/use the CMS and the potential for frequent frustrations)	.261	.446	.342	1	.559	1.298

Table 14 displays the results of the logistic regression analysis for the individual statements grouped under relative advantage for Late Majority. Neither the mean nor any of the statements were a significant predictor. However, odds ratios for three factors indicate that these factors significantly increase the odds of adoption by Late Majority adopters. They are listed in descending order below.

1. "Allows (would allow) my students to develop greater technological skills" (*Exp(B)* = 10.508).
2. "Is (would be) an efficient use of my time and increases my productivity" (*Exp(B)* = 9.029).
3. "Enables (would enable) me to significantly improve the overall quality of my teaching" (*Exp(B)* = 4.559).

On the other hand, negative perceptions of the following factors would most significantly decrease the odds of adoption by Late Majority adopters:

1. "Makes (would make) it easier to do my job" (*Exp(B)* = .035)
2. "Encourages (would encourage) student engagement with the course content" (*Exp(B)* = .083)

Table 14

Relative Advantage Predicted Probability for Late Majority Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Enables (would enable) me to significantly improve the overall quality of my teaching.	1.517	1.589	.912	1	.340	4.559
2. Makes (would make) it easier to do my job.	-3.344	2.023	2.734	1	.098	.035
3. Enables (would enable) me to accomplish course management tasks (manage course content, assignments, and resources) more efficiently.	.867	.805	1.162	1	.281	2.381
4. Is (would be) an efficient use of my time and increases my productivity	2.200	1.997	1.214	1	.271	9.029
5. Allows (would allow) me greater flexibility and control over my work	.284	1.114	.065	1	.799	1.329
6. Allows (would allow) me to reach wider audiences	-1.145	.855	1.796	1	.180	.318
7. Allows (would allow) me to develop new technological skills.	-1.135	1.224	.860	1	.354	.321
8. Enables (would enable) me to use technology more innovatively in my teaching.	-.712	1.218	.342	1	.558	.490
9. Helps (would help) me plan and improve student learning.	-.468	1.215	.148	1	.700	.627
10. Allows (would allow) my students to develop greater technological skills.	2.352	1.286	3.344	1	.067	10.508
11. Allows (would allow) for deeper or more meaningful student learning.	-.451	1.336	.114	1	.736	.637
12. Increases (would increase) student access to class information.	1.007	1.003	1.009	1	.315	2.738
13. Encourages (would encourage) student engagement with the course content	-2.493	1.747	2.038	1	.153	.083
14. Increases (would increase) interaction between students and the instructor.	-1.034	.771	1.797	1	.180	.356
15. The benefits of using the CMS outweigh the hassle factor" (related to time and effort required to learn/use the CMS and the potential for frequent frustrations)	.982	1.102	.793	1	.373	2.668

Table 15 displays the results of the logistic regression analysis for the individual statements grouped under relative advantage for Laggards. Although the mean for relative advantage was a significant predictor of Laggard status (Wald = 7.364, p = .007), none of the individual statements was a significant predictor of adoption of the CMS by Laggards. However, one factor significantly increased the odds of adoption by Laggards: "Allows (would allow) me to develop new technological skills" (*Exp(B)* = 4.828).

Table 15

Relative Advantage Predicted Probability for Laggards

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Enables (would enable) me to significantly improve the overall quality of my teaching.	-.418	1.171	.128	1	.721	.658
2. Makes (would make) it easier to do my job.	.405	1.135	.128	1	.721	1.500
3. Enables (would enable) me to accomplish course management tasks (manage course content, assignments, and resources) more efficiently.	.904	1.077	.705	1	.401	2.469
4. Is (would be) an efficient use of my time and increases my productivity	-.020	1.575	.000	1	.990	.981
5. Allows (would allow) me greater flexibility and control over my work	-1.647	1.331	1.531	1	.216	.193
6. Allows (would allow) me to reach wider audiences	.467	.505	.856	1	.355	1.595
7. Allows (would allow) me to develop new technological skills.	1.574	1.049	2.255	1	.133	4.828
8. Enables (would enable) me to use technology more innovatively in my teaching.	-.391	1.238	.100	1	.752	.677
9. Helps (would help) me plan and improve student learning.	-1.019	1.273	.641	1	.423	.361
10. Allows (would allow) my students to develop greater technological skills.	-.941	.926	1.032	1	.310	.390
11. Allows (would allow) for deeper or more meaningful student learning.	.847	1.279	.438	1	.508	2.332
12. Increases (would increase) student access to class information.	-.697	1.098	.402	1	.526	.498
13. Encourages (would encourage) student engagement with the course content	-.417	1.090	.147	1	.702	.659
14. Increases (would increase) interaction between students and the instructor.	.174	.760	.052	1	.819	1.190
15. The benefits of using the CMS outweigh the hassle factor" (related to time and effort required to learn/use the CMS and the potential for frequent frustrations)	.171	.869	.039	1	.844	1.187

RQ 2: What is the connection between the adopter status of faculty members and their perceptions of compatibility issues related to adopting the CMS?

Table 16 presents the results of the logistic regression analysis of the means for each of the adopter categories for compatibility. Compatibility was a significant predictor for Innovators, Early Majority, and Laggards. For Innovators, the odds ratio (*Exp (B)*) was 1.947 and for Early Adopters (1.465), indicating a greater likelihood of compatibility predicting adoption by these two adopter groups. The odds ratios below 1 for Early Majority (.552), Late Majority (.528), and Laggards (.421) indicate that negative perceptions regarding compatibility would more likely reduce the odds of adoption by these adopters.

Table 16

Compatibility Predicted Probability for Adopter Categories

Adopters	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
Innovators	.666	.322	4.279	1	.039*	1.947
Early Adopters	.382	.207	3.409	1	.065	1.465
Early Majority	-.595	.254	5.481	1	.019*	.552
Late Majority	-.639	.386	2.744	1	.098	.528
Laggards	-.865	.379	5.208	1	.022*	.421

* $p < .05$

Table 17 displays the results of the logistic regression analysis for the individual statements grouped under compatibility for Innovators. Although the mean for compatibility was a significant predictor of Innovator status (Wald = 4.279, p = .039), none of the individual statements was a significant predictor of adoption of the CMS by Innovators. However, "Using the CMS fits (would fit) well with my teaching style (*Exp(B)* = 3.025) indicates this factor would significantly increase the likelihood of adoption by Innovators.

Table 17

Compatibility Predicted Probability for Innovators

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Using the CMS fits (would fit) well with my teaching style.	1.107	.724	2.341	1	.126	3.025
2. Using the CMS supports (would support) my philosophy of teaching.	-.677	.566	1.431	1	.232	.508
3. Using the CMS is (would be) compatible with my students' needs.	.261	.589	.196	1	.658	1.299
4. Using the CMS is (would be) compatible with the resources I am currently using in my course(s).	-.156	.635	.060	1	.806	.855
5. I feel (would feel) comfortable using the CMS.	.622	.504	1.522	1	.217	1.863
6. Using the CMS is (would be) compatible with most aspects of my teaching.	-.526	.571	.848	1	.357	.591
7. Using the CMS for academic purposes is (would be) compatible with all religious and cultural aspects of my work.	-.017	.164	.011	1	.918	.983
8. Courses utilizing online technologies such as the CMS are equal or superior in quality to those that do not.	.357	.286	1.566	1	.211	1.430
9. The lack of direct interpersonal contact and feedback from students does (would) not present a problem.	.197	.219	.814	1	.367	1.218
10. The CMS is (would be) compatible with my level of technology expertise and experience.	-.428	.300	2.038	1	.153	.652

Table 18 displays the results of the logistic regression analysis for the individual statements grouped under compatibility for Early Adopters. Although the mean for compatibility was not a significant predictor of Early Adopter status, the statement indicating the CMS would be compatible with their level of technology expertise and experience (Wald = 7.221, p = .007) was a significant predictor of Early Adopter status at the .001 level. With the *Exp(B)* = 2.798, the odds of adoption by Early Adopters increases as the compatibility with their level of technology expertise.

Table 18

Compatibility Predicted Probability for Early Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Using the CMS fits (would fit) well with my teaching style.	-.150	.535	.079	1	.778	.860
2. Using the CMS supports (would support) my philosophy of teaching.	.659	.444	2.204	1	.138	1.934
3. Using the CMS is (would be) compatible with my students' needs.	-.415	.453	.837	1	.360	.661
4. Using the CMS is (would be) compatible with the resources I am currently using in my course(s).	-.560	.493	1.291	1	.256	.571
5. I feel (would feel) comfortable using the CMS.	-.528	.417	1.609	1	.205	.589
6. Using the CMS is (would be) compatible with most aspects of my teaching.	.648	.410	2.501	1	.114	1.913
7. Using the CMS for academic purposes is (would be) compatible with all religious and cultural aspects of my work.	-.191	.148	1.657	1	.198	.826
8. Courses utilizing online technologies such as the CMS are equal or superior in quality to those that do not.	-.326	.232	1.978	1	.160	.722
9. The lack of direct interpersonal contact and feedback from students does (would) not present a problem.	.223	.178	1.577	1	.209	1.250
10. The CMS is (would be) compatible with my level of technology expertise and experience.	1.029	.383	7.221	1	.007*	2.798

** $p < .01$

Table 19 displays the results of the logistic regression analysis for the individual statements grouped under compatibility for Early Majority. Although the mean for compatibility was a significant predictor for Early Majority adopters (Wald = 5.481, p = .019), only the statement that the CMS would be compatible with their level of technology expertise and experience (Wald = 6.321, p = .012) was a significant predictor of Early Majority adopters. However, the odds ratio of .442 indicates that the odds of Early Majority adoption decrease in relation to the compatibility of the CMS with their level of technology expertise.

Table 19

Compatibility Predicted Probability for Early Majority

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Using the CMS fits (would fit) well with my teaching style.	-.892	.619	2.073	1	.150	.410
2. Using the CMS supports (would support) my philosophy of teaching.	.262	.542	.233	1	.629	1.299
3. Using the CMS is (would be) compatible with my students' needs.	.569	.602	.892	1	.345	1.766
4. Using the CMS is (would be) compatible with the resources I am currently using in my course(s).	.672	.649	1.075	1	.300	1.959
5. I feel (would feel) comfortable using the CMS.	.457	.424	1.158	1	.282	1.579
6. Using the CMS is (would be) compatible with most aspects of my teaching.	-.444	.516	.739	1	.390	.642
7. Using the CMS for academic purposes is (would be) compatible with all religious and cultural aspects of my work.	-.119	.167	.506	1	.477	.888
8. Courses utilizing online technologies such as the CMS are equal or superior in quality to those that do not.	.072	.283	.065	1	.799	1.075
9. The lack of direct interpersonal contact and feedback from students does (would) not present a problem.	-.269	.244	1.214	1	.271	.764
10. The CMS is (would be) compatible with my level of technology expertise and experience.	-.817	.325	6.321	1	.012*	.442

* $p < .05$

Table 20 displays the results of the logistic regression analysis for the individual statements grouped under compatibility for Late Majority. Neither the mean nor any of the individual compatibility statements were significant for Late Majority Adopters. However, the odds ratios for two variables indicate they significantly increase the likelihood of Late Majority adoption: "Using the CMS is (would be) compatible with the resources I am currently using in my course(s) (14.404) and "Using the CMS fits (would fit) well with my teaching style" (7.558). However, odds ratios below 1 for the following factors indicate that negative perceptions of the existence of factors would reduce the odds of adoption by Late Majority adopters: "Using the CMS supports (would support) my philosophy of teaching" (.154) and "I feel (would feel) comfortable using the CMS" (.227).

Table 20

Compatibility Predicted Probability for Late Majority

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Using the CMS fits (would fit) well with my teaching style.	2.023	1.362	2.206	1	.137	7.558
2. Using the CMS supports (would support) my philosophy of teaching.	-1.873	1.098	2.908	1	.088	.154
3. Using the CMS is (would be) compatible with my students' needs.	-2.111	1.401	2.270	1	.132	.121
4. Using the CMS is (would be) compatible with the resources I am currently using in my course(s).	2.667	1.697	2.469	1	.116	14.404
5. I feel (would feel) comfortable using the CMS.	-1.481	1.060	1.950	1	.163	.227
6. Using the CMS is (would be) compatible with most aspects of my teaching.	-.462	.964	.230	1	.632	.630
7. Using the CMS for academic purposes is (would be) compatible with all religious and cultural aspects of my work.	.654	.520	1.577	1	.209	1.922
8. Courses utilizing online technologies such as the CMS are equal or superior in quality to those that do not.	.325	.753	.186	1	.666	1.384
9. The lack of direct interpersonal contact and feedback from students does (would) not present a problem.	-.269	.573	.220	1	.639	.764
10. The CMS is (would be) compatible with my level of technology expertise and experience.	-.428	.595	.517	1	.472	.652

Table 21 displays the results of the logistic regression analysis for the individual statements grouped under compatibility for Laggards. Although the mean for compatibility was a significant predictor of Laggards (Wald = 5.208, $p = .022$), none of the individual statements was a significant predictor of adoption of the CMS by Laggards. The odds ratio for "Using the CMS for academic purposes is (would be) compatible with all religious and cultural aspects of my work" (4.755) indicates this variable would increase the odds of adoption by Laggards. However, negative perceptions of whether "Using the CMS fits (would fit) well with my teaching style" (.062) would significantly reduce the odds of adoption by Laggards.

Table 21

Compatibility Predicted Probability for Laggards

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Using the CMS fits (would fit) well with my teaching style.	-2.789	1.618	2.971	1	.085	.062
2. Using the CMS supports (would support) my philosophy of teaching.	-.328	1.039	.100	1	.752	.721
3. Using the CMS is (would be) compatible with my students' needs.	-.767	1.478	.269	1	.604	.465
4. Using the CMS is (would be) compatible with the resources I am currently using in my course(s).	-1.007	1.089	.855	1	.355	.365
5. I feel (would feel) comfortable using the CMS.	.052	1.119	.002	1	.963	1.053
6. Using the CMS is (would be) compatible with most aspects of my teaching.	1.090	1.017	1.147	1	.284	2.973
7. Using the CMS for academic purposes is (would be) compatible with all religious and cultural aspects of my work.	1.559	.883	3.117	1	.077	4.755
8. Courses utilizing online technologies such as the CMS are equal or superior in quality to those that do not.	.854	1.081	.624	1	.430	2.349
9. The lack of direct interpersonal contact and feedback from students does (would) not present a problem.	-.955	1.053	.822	1	.364	.385
10. The CMS is (would be) compatible with my level of technology expertise and experience.	1.021	1.096	.867	1	.352	2.776

RQ 3: What is the connection between the adopter status of faculty members and their perceptions of the complexity/difficulty of adopting the CMS?

Table 22 presents the results of the logistic regression analysis of the means for each of the adopter categories for complexity. The findings for complexity and relative advantage do not support Davis's 1993 study which found usefulness (relative advantage) to be more important in predicting adoption than ease of use (complexity). Complexity was a significant predictor for all five adopter categories, while relative advantage was only a significant predictor for Early Adopters and Laggards. The odds ratios for complexity for Innovators (2.345) and Early Adopters (1.625) are greater than 1, indicating that complexity (or ease of use) *increases* the odds that adoption will occur. On the other hand, the greater the complexity, the less likelihood that Early Majority (.526), Late Majority (.464), and Laggards (.386) will adopt.

Table 22
Complexity Predicted Probability for Adopter Categories

Adopters	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
Innovators	.852	.342	6.199	1	.013*	2.345
Early Adopters	.485	.217	5.026	1	.025*	1.625
Early Majority	-.643	.267	5.812	1	.016*	.526
Late Majority	-.768	.392	3.839	1	.050*	.464
Laggards	-.951	.380	6.250	1	.012*	.386

* $p < .05$

Table 23 displays the results of the logistic regression analysis for the individual statements grouped under complexity for Innovators. For Innovators, complexity of the innovation was a significant predictor. “Learning to use the CMS was (would be) easy” (Wald = 6.487, $p = .011$) was also a significant predictor at the .05 level. The variable also had the highest odds ratio (3.420) for increasing the odds of adoption by Innovators.

Table 23

Complexity Predicted Probability for Innovators

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Learning to use the CMS is (would be) easy for me.	1.230	.483	6.487	1	.011*	3.420
2. I find (would find) it simple to manage my course and student data using the CMS.	.063	.429	.021	1	.884	1.065
3. I can (could) easily integrate the CMS into my courses.	.853	.584	2.129	1	.145	2.346
4. I do not find (would not find) it difficult to add content to the CMS.	.101	.499	.041	1	.840	1.106
5. I find (would find) it easy to modify the CMS course design.	-.291	.417	.485	1	.486	.748
6. I am (would be) able to easily use the Grade Center.	.264	.349	.574	1	.449	1.303
7. I am (would be) able to use the communication tools quickly and easily.	-.294	.507	.337	1	.562	.745
8. I am (would be) able to easily use the test/survey features in the CMS.	.375	.305	1.505	1	.220	1.454
9. I am (would be) able to easily utilize the group collaboration functions in the CMS.	-.143	.352	.164	1	.685	.867
10. It is (would be) easy for me to remember how to perform tasks in the CMS.	-.696	.475	2.152	1	.142	.499

* $p < .05$

Table 24 displays the results of the logistic regression analysis for the individual statements grouped under complexity for Early Adopters. Although the mean for complexity was a significant predictor for Early Adopters (Wald = 5.026, p = .025), none of the individual predictors was significant. In addition, the odds ratios for each of the factors did not vary significantly from 1, indicating that the factors have little effect. Being able to "easily integrate the CMS into my courses" (*EXP(B)* = 1.696) indicated the highest probability of adoption for Early Adopters.

Table 24

Complexity Predicted Probability for Early Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Learning to use the CMS is (would be) easy for me.	-.114	.312	.135	1	.714	.892
2. I find (would find) it simple to manage my course and student data using the CMS.	-.051	.291	.031	1	.860	.950
3. I can (could) easily integrate the CMS into my courses.	.529	.352	2.253	1	.133	1.696
4. I do not find (would not find) it difficult to add content to the CMS.	-.448	.355	1.595	1	.207	.639
5. I find (would find) it easy to modify the CMS course design.	.045	.283	.026	1	.873	1.046
6. I am (would be) able to easily use the Grade Center.	.206	.200	1.064	1	.302	1.229
7. I am (would be) able to use the communication tools quickly and easily.	.160	.339	.222	1	.637	1.173
8. I am (would be) able to easily use the test/survey features in the CMS.	-.226	.214	1.114	1	.291	.798
9. I am (would be) able to easily utilize the group collaboration functions in the CMS.	.207	.239	.748	1	.387	1.230
10. It is (would be) easy for me to remember how to perform tasks in the CMS.	.145	.287	.255	1	.614	1.156

Table 25 displays the results of the logistic regression analysis for the individual statements grouped under complexity for Early Majority. For Early Majority adopters, not only did the mean show significance, but also did three of the individual statements. Like Innovators, the statement indicating that learning to use the CMS was (would be) easy (Wald = 5.170, p = .023) was a significant predictor. Being able to easily integrate the CMS into their courses (Wald = 5.232, p = .022) and being able to easily use the Grade Center (Wald = 5.871, p = .015) were both significant. All three factors also had odds ratios less that 1, indicating that they could negatively impact adoption by Early Majority adopters.

Table 25
Complexity Predicted Probability for Early Majority Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Learning to use the CMS is (would be) easy for me.	-.998	.439	5.170	1	.023*	.369
2. I find (would find) it simple to manage my course and student data using the CMS.	.147	.439	.112	1	.737	1.159
3. I can (could) easily integrate the CMS into my courses.	-1.052	.460	5.232	1	.022*	.349
4. I do not find (would not find) it difficult to add content to the CMS.	.359	.500	.516	1	.473	1.432
5. I find (would find) it easy to modify the CMS course design.	.346	.434	.636	1	.425	1.413
6. I am (would be) able to easily use the Grade Center.	-.654	.270	5.871	1	.015*	.520
7. I am (would be) able to use the communication tools quickly and easily.	.521	.485	1.153	1	.283	1.683
8. I am (would be) able to easily use the test/survey features in the CMS.	.406	.309	1.735	1	.188	1.501
9. I am (would be) able to easily utilize the group collaboration functions in the CMS.	-.256	.343	.561	1	.454	.774
10. It is (would be) easy for me to remember how to perform tasks in the CMS.	.403	.402	1.004	1	.316	1.496

* $p < .05$

Table 26 displays the results of the logistic regression analysis for the individual statements grouped under complexity for Late Majority. Although the mean for complexity was a significant predictor for Late Majority adopters (Wald = 3.839, p = .05), none of the individual predictors was significant. However, three factors significantly decreased the odds of adoption by Late Majority adopters: “I do not find (would not find) it difficult to add content to the CMS” (*Exp(B)* = .599), “I am (would be) able to use the communication tools quickly and easily” (*Exp(B)* = .527), and “I am (would be) able to easily use the test/survey features in the CMS” (*Exp(B)* = .458).

Table 26

Complexity Predicted Probability for Late Majority Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Learning to use the CMS is (would be) easy for me.	.451	.649	.482	1	.487	1.569
2. I find (would find) it simple to manage my course and student data using the CMS.	-.170	.686	.062	1	.804	.843
3. I can (could) easily integrate the CMS into my courses.	.233	.774	.091	1	.763	1.262
4. I do not find (would not find) it difficult to add content to the CMS.	-.512	.747	.471	1	.492	.599
5. I find (would find) it easy to modify the CMS course design.	.321	.640	.252	1	.616	1.379
6. I am (would be) able to easily use the Grade Center.	.122	.430	.080	1	.777	1.130
7. I am (would be) able to use the communication tools quickly and easily.	-.640	.681	.885	1	.347	.527
8. I am (would be) able to easily use the test/survey features in the CMS.	-.780	.431	3.268	1	.071	.458
9. I am (would be) able to easily utilize the group collaboration functions in the CMS.	.413	.485	.726	1	.394	1.512
10. It is (would be) easy for me to remember how to perform tasks in the CMS.	-.218	.638	.117	1	.732	.804

Table 27 displays the results of the logistic regression analysis for the individual statements grouped under complexity for Laggards. Not only did the mean for Laggards show significance, but two individual statements were significant (C3 and C10). Like Early Majority adopters, being able to easily integrate the CMS into their courses (Wald = 4.681, p = .030) was significant. In addition, the ease of remembering how to perform tasks in the CMS was significant (Wald = 5.905, p = .015). These two factors also had the two lowest odds ratios (.132) and (.078) respectively, which indicates the more difficult it is for Late Majority adopters to integrate the CMS into their courses and remember how to perform tasks, the less likely they are to adopt.

Table 27

Complexity Predicted Probability for Laggards

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Learning to use the CMS is (would be) easy for me.	.382	.643	.354	1	.552	1.466
2. I find (would find) it simple to manage my course and student data using the CMS.	.929	.893	1.080	1	.299	2.531
3. I can (could) easily integrate the CMS into my courses.	-2.028	.937	4.681	1	.030*	.132
4. I do not find (would not find) it difficult to add content to the CMS.	1.400	1.310	1.142	1	.285	4.054
5. I find (would find) it easy to modify the CMS course design.	-.231	1.244	.035	1	.853	.794
6. I am (would be) able to easily use the Grade Center.	1.533	1.039	2.178	1	.140	4.632
7. I am (would be) able to use the communication tools quickly and easily.	-1.504	1.150	1.710	1	.191	.222
8. I am (would be) able to easily use the test/survey features in the CMS.	-.266	.557	.228	1	.633	.767
9. I am (would be) able to easily utilize the group collaboration functions in the CMS.	1.243	1.277	.947	1	.331	3.465
10. It is (would be) easy for me to remember how to perform tasks in the CMS.	-2.556	1.052	5.905	1	.015*	.078

* $p < .05$

RQ 4: What is the connection between the adopter status of faculty and their perceptions of the trialability of the CMS?

Table 28 presents the results of the logistic regression analysis of the means for each of the adopter categories for trialability. The only mean that showed significance was for Late Majority Adopters (Wald = 4.381, p = .036) although Laggards (Wald = 3.704, p = .54) were close. The odds ratios for both Late Majority and Laggards were below 1, indicating that odds of adoption decreased as the predictor increased. The odds ratio for Innovators was highest (1.752), indicating that being able to try out the CMS would increase their odds of adopting.

Table 28

Trialability Predicted Probability for Adopter Categories

Adopters	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
Innovators	.561	.372	2.277	1	.131	1.752
Early Adopters	.114	.245	.215	1	.643	1.120
Early Majority	.186	.349	.284	1	.594	1.204
Late Majority	-1.061	.507	4.381	1	.036*	.346
Laggards	-.919	.477	3.704	1	.054	.399

* $p < .05$

Table 29 displays the results of the logistic regression analysis for the individual statements grouped under trialability for Innovators. Neither the mean nor any of the individual statements for trialability were significant predictors for Innovators.

Table 29

Trialability Predicted Probability for Innovators

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. I was (am) permitted to use the CMS on a trial basis long enough to see what it could/can do.	-.104	.166	.395	1	.530	.901
2. A site is available to me to try out various tools and components of the CMS before using them in my courses	.134	.252	.284	1	.594	1.144
3. Before deciding whether to use any of the CMS tools/features, I am (would be) able to experiment with their use.	-.233	.273	.727	1	.394	.792
4. I can try out individual features of the CMS at my own pace.	.530	.419	1.601	1	.206	1.699
5. I am aware of opportunities to try out various uses of the CMS.	.252	.323	.610	1	.435	1.287
6. Being able to try out features of the CMS is important to me.	-.386	.246	2.466	1	.116	.679

Table 30 displays the results of the logistic regression analysis for the individual statements grouped under trialability for Early Adopters. "Being able to try out features of the CMS is important to me" (Wald = 9.961, $p = .002$) was significant at the .01 level. The odds ratio of 2.312 indicates that a positive perception would more than double the likelihood that Early Adopters would adopt the CMS.

Table 30

Trialability Predicted Probability for Early Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
I was (am) permitted to use the CMS on a trial basis long enough to see what it could/can do.	-.103	.139	.542	1	.462	.902
A site is available to me to try out various tools and components of the CMS before using them in my courses	-.178	.208	.734	1	.392	.837
Before deciding whether to use any of the CMS tools/features, I am (would be) able to experiment with their use.	.145	.235	.384	1	.535	1.156
I can try out individual features of the CMS at my own pace.	-.414	.297	1.942	1	.163	.661
I am aware of opportunities to try out various uses of the CMS.	.180	.238	.574	1	.449	1.198
Being able to try out features of the CMS is important to me.	.838	.266	9.961	1	.002**	2.312

** $p < .01$

Table 31 displays the results of the logistic regression analysis for the individual statements grouped under trialability for Early Majority. Although the mean for trialability is not a significant predictor of adoption, being able to "use the CMS on a trial basis long enough to see what it could/can do" (Wald = 7.297, $p = .007$) was a significant predictor for Early Majority adopters at the .01 level. The odds ratio (2.195) also indicates that this factor increases the likelihood of adoption.

Table 31

Trialability Predicted Probability for Early Majority Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
I was (am) permitted to use the CMS on a trial basis long enough to see what it could/can do.	.786	.291	7.297	1	.007**	2.195
A site is available to me to try out various tools and components of the CMS before using them in my courses	-.074	.293	.064	1	.801	.929
Before deciding whether to use any of the CMS tools/features, I am (would be) able to experiment with their use.	-.406	.350	1.340	1	.247	.666
I can try out individual features of the CMS at my own pace.	.118	.398	.088	1	.767	1.125
I am aware of opportunities to try out various uses of the CMS.	-.025	.357	.005	1	.945	.976
Being able to try out features of the CMS is important to me.	-.376	.259	2.105	1	.147	.687

** $p < .01$

Table 32 displays the results of the logistic regression analysis for the individual statements grouped under trialability for Late Majority. Not only was the mean for trialability for Late Majority adopters significant (Wald = 4.381, p = .036), but also being "aware of opportunities to try out various uses of the CMS" (Wald = 4.569, p = .033) was significant at the .05 level. The odds ratio (.368) indicates that not being aware of the opportunities decreases the odds of adoption by Late Majority adopters.

Table 32

Trialability Predicted Probability for Late Majority Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
I was (am) permitted to use the CMS on a trial basis long enough to see what it could/can do.	.011	.349	.001	1	.976	1.011
A site is available to me to try out various tools and components of the CMS before using them in my courses	.337	.545	.381	1	.537	1.400
Before deciding whether to use any of the CMS tools/features, I am (would be) able to experiment with their use.	.030	.625	.002	1	.961	1.031
I can try out individual features of the CMS at my own pace.	.235	.560	.176	1	.674	1.265
I am aware of opportunities to try out various uses of the CMS.	-1.000	.468	4.569	1	.033*	.368
Being able to try out features of the CMS is important to me.	-.453	.442	1.047	1	.306	.636

* $p < .05$

Table 33 displays the results of the logistic regression analysis for the individual statements grouped under trialability for Laggards. Neither the mean nor any individual statements were significant trialability predictors for Laggards. However, the odds ratio for “Before deciding whether to use any of the CMS tools/features, I am (would be) able to experiment with their use” (3.009) indicates that this factor would increase the odds of adoption by Laggards. Not being able “to try out individual features of the CMS at my own pace” (*Exp(B)* = .373) would most reduce the odds of adoption of all the factors.

Table 33

Trialability Predicted Probability for Laggards

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
I was (am) permitted to use the CMS on a trial basis long enough to see what it could/can do.	-.301	.295	1.037	1	.309	.740
A site is available to me to try out various tools and components of the CMS before using them in my courses	.383	.607	.399	1	.527	1.467
Before deciding whether to use any of the CMS tools/features, I am (would be) able to experiment with their use.	1.102	.876	1.583	1	.208	3.009
I can try out individual features of the CMS at my own pace.	-.985	.698	1.994	1	.158	.373
I am aware of opportunities to try out various uses of the CMS.	-.451	.465	.940	1	.332	.637
Being able to try out features of the CMS is important to me.	-.474	.390	1.475	1	.224	.622

RQ 5: What is the connection between the adopter status of faculty and their perceptions of the observability of the CMS?

Table 34 presents the results of the logistic regression analysis of the means for each of the adopter categories for observability. The easier it is for individuals to see the results of an innovation, the more likely they are to adopt it. The means for observability were significant predictors for Early Adopters (Wald = 4.036, p = .045) and Laggards (Wald = 5.179, p = .023) at the .05 level and for Late Majority adopters (Wald = 6.952, p = .008) at the .01 level. Observability would increase the likelihood of adoption by Early Adopters (*Exp(B)* = 1.686), while observability factors could decrease the likelihood of adoption by Late Majority (*Exp(B)* = .279) and Laggards (*Exp(B)* = .358).

Table 34

Observability Predicted Probability for Adopter Categories

Adopters	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
Innovators	.427	.367	1.353	1	.245	1.532
Early Adopters	.523	.260	4.036	1	.045*	1.686
Early Majority	-.178	.326	.299	1	.584	.837
Late Majority	-1.278	.485	6.952	1	.008**	.279
Laggards	-1.028	.452	5.179	1	.023*	.358

** $p < .01$
* $p < .05$

Table 35 displays the results of the logistic regression analysis for the individual statements grouped under observability for Innovators. Neither the mean nor any of the individual statements were significant predictors for Innovators.

Table 35

Observability Predicted Probability for Innovators

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
I have observed how other teachers are using the CMS in their teaching.	.506	.301	2.834	1	.092	1.659
Many of my colleagues use the CMS.	.240	.252	.910	1	.340	1.272
I have seen or heard about students using the CMS for another instructor’s course.	-.420	.311	1.827	1	.177	.657
The results of using the CMS are apparent to me.	-.421	.301	1.960	1	.162	.656
I would be able to explain why using the CMS may or may not be beneficial.	.676	.374	3.267	1	.071	1.967

Table 36 displays the results of the logistic regression analysis for the individual statements grouped under observability for Early Adopters. Not only was the mean for observability a significant predictor for Early Adopters (Wald = 4.036, $p = .045$), but having the results of using the CMS apparent to the Early Adopter was also significant

(Wald = 7.775, p = .005) at the .01 level. In addition, this factor increases adoption by Early Adopters by 1.940 times.

Table 36

Observability Predicted Probability for Early Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
I have observed how other teachers are using the CMS in their teaching.	-.095	.207	.211	1	.646	.909
Many of my colleagues use the CMS.	-.144	.181	.634	1	.426	.866
I have seen or heard about students using the CMS for another instructor's course.	.031	.227	.019	1	.891	1.032
The results of using the CMS are apparent to me.	.663	.238	7.775	1	.005**	1.940
I would be able to explain why using the CMS may or may not be beneficial.	-.047	.227	.043	1	.835	.954

** $p < .01$

Table 37 displays the results of the logistic regression analysis for the individual statements grouped under observability for Early Majority. Neither the mean for observability nor any individual statements was a significant predictor for Early Majority adopters.

Table 37

Observability Predicted Probability for Early Majority Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
I have observed how other teachers are using the CMS in their teaching.	.257	.290	.783	1	.376	1.293
Many of my colleagues use the CMS.	-.141	.222	.405	1	.524	.868
I have seen or heard about students using the CMS for another instructor's course.	.157	.316	.246	1	.620	1.170
The results of using the CMS are apparent to me.	-.053	.303	.030	1	.862	.949
I would be able to explain why using the CMS may or may not be beneficial.	-.365	.274	1.778	1	.182	.694

Table 38 displays the results of the logistic regression analysis for the individual statements grouped under observability for Late Majority. Although the mean for observability was significant for Late Majority adopters (Wald = 6.952, $p = .008$) at the .01 level, none of the individual statements was significant. However, if the results of using the CMS are not apparent to Late Majority adopters (*Exp(B)* = .356), the likelihood of adoption is decreased.

Table 38

Observability Predicted Probability for Late Majority Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
I have observed how other teachers are using the CMS in their teaching.	-.329	.512	.414	1	.520	.719
Many of my colleagues use the CMS.	.368	.471	.609	1	.435	1.445
I have seen or heard about students using the CMS for another instructor's course.	.401	.535	.562	1	.453	1.493
The results of using the CMS are apparent to me.	-1.032	.590	3.054	1	.081	.356
I would be able to explain why using the CMS may or may not be beneficial.	-.458	.403	1.292	1	.256	.632

Table 39 displays the results of the logistic regression analysis for the individual statements grouped under observability for Laggards. Like Early Adopters, having the results of using the CMS apparent to them was also significant (Wald = 6.001, $p = .014$). However, the odds are decreased for Laggards (*Exp(B)* = .304) when this factor is increased.

Table 39

Observability Predicted Probability for Laggards

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
I have observed how other teachers are using the CMS in their teaching.	-.508	.448	1.291	1	.256	.601
Many of my colleagues use the CMS.	.242	.437	.308	1	.579	1.274
I have seen or heard about students using the CMS for another instructor's course.	.007	.481	.000	1	.988	1.007
The results of using the CMS are apparent to me.	-1.192	.487	6.001	1	.014*	.304
I would be able to explain why using the CMS may or may not be beneficial.	.534	.482	1.228	1	.268	1.705

* $p < .05$

RQ 6-8: What is the connection between the adopter status of faculty and their perceptions of organizational policies, procedures, and norms related to adoption of the CMS?

Table 40 presents the results of the logistic regression analysis of the means for each of the adopter categories for organizational support. "Organizational culture [of a social system] can be defined as the implicit norms, values, shared behavioral expectations and assumptions that guide behaviors of members of a work unit" (Aarons, 2005). Rogers's theory assumes that the organizational culture can affect an individual adopter's decision. For the purposes of this study, organizational support included policies, procedures, and norms of the respondent's academic institution. The mean for organizational support was only a significant predictor for Laggards (Wald = 5.384, p = .020). In addition, the odds ratio for Laggards (*Exp(B)* = .249) indicates that as organizational support increases, the odds of adoption decrease.

Table 40

Organizational Support Predicted Probability for Adopter Categories

Adopters	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
Innovators	.493	.384	1.647	1	.199	1.637
Early Adopters	.184	.269	.467	1	.494	1.202
Early Majority	-.025	.368	.005	1	.946	.975
Late Majority	-.521	.622	.701	1	.402	.594
Laggards	-1.391	.599	5.384	1	.020*	.249

* $p < .05$

Table 41 displays the results of the logistic regression analysis for the individual statements grouped under organizational support for Innovators. Neither the mean nor any of the individual characteristics for organizational support were significant for Innovators. “In terms of using the CMS, it is important to me to consider what my students think” had the highest odds ratio (1.552).

Table 41

Organizational Support Predicted Probability for Innovators

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
Using the CMS fits into my institution's vision, mission, and goals.	.621	.471	1.741	1	.187	1.861
My institution provides the technical infrastructure to support using the CMS in my courses.	-.002	.312	.000	1	.995	.998
I am adequately rewarded/compensated for incorporating the CMS in my teaching practices.	-.241	.267	.813	1	.367	.786
Using the CMS enhances my ability to achieve tenure and promotion.	.105	.219	.230	1	.632	1.111
Technological skills/using the CMS are important when making hiring/tenure decisions.	-.108	.245	.194	1	.660	.898
My institution has communicated its strategic plan for the implementation of the CMS in teaching practices.	.150	.253	.350	1	.554	1.161
I feel included in the dialogue about technology and distance education initiatives.	-.094	.336	.078	1	.780	.910
The procedure for establishing course web sites using the CMS encourages faculty use of the system.	-.045	.300	.023	1	.880	.956
I am generally satisfied with the responses or resolution to problem(s) with the CMS.	.205	.301	.464	1	.496	1.227
My institution provides professional development activities to help faculty learn and use the CMS.	-.088	.367	.057	1	.811	.916
Professional development activities related to the CMS have been effective.	-.056	.337	.027	1	.869	.946
The goals and objectives regarding use of the CMS are shared by faculty as well as administration.	.322	.428	.565	1	.452	1.379
My supervisor supports/encourages the use of the CMS.	-.524	.330	2.521	1	.112	.592
My colleagues think that I should use the CMS for my course work.	.087	.260	.113	1	.737	1.091
People in my institution who use the CMS have more prestige than those who do not.	.231	.371	.387	1	.534	1.260
Using the CMS improves my image within my department or the institution.	.010	.355	.001	1	.977	1.010
Innovativeness and experimentation are encouraged at my institution.	-.082	.342	.057	1	.812	.922
In terms of using the CMS, it is important to me to consider what my peers think.	.098	.283	.119	1	.730	1.103
In terms of using the CMS, it is important to me to consider what my students think.	.440	.316	1.939	1	.164	1.552

Table 42 displays the results of the logistic regression analysis for the individual statements grouped under organizational support for Early Adopters. Although the mean for organizational support was not a significant predictor for Early Adopters, two individual statements were significant: “Using the CMS fits into my institution’s vision, mission, and goals” (Wald = 4.958, p = .026) and “In terms of using the CMS, it is important to me to consider what my peers think” (Wald = 4.881, p = .027). Having the CMS fit into the institution’s vision, mission, and goals increased the likelihood of adoption by Early Adopters (*Exp(B)* = 1.977), while the more important the Early Adopters considered what their peers thought, the likelihood of adoption decreased (*Exp(B)* = .583).

Table 42

Organizational Support Predicted Probability for Early Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
Using the CMS fits into my institution's vision, mission, and goals.	.681	.306	4.958	1	.026*	1.977
My institution provides the technical infrastructure to support using the CMS in my courses.	-.443	.247	3.229	1	.072	.642
I am adequately rewarded/ compensated for incorporating the CMS in my teaching practices.	-.029	.204	.021	1	.886	.971
Using the CMS enhances my ability to achieve tenure and promotion.	.051	.165	.095	1	.758	1.052
Technological skills/using the CMS are important when making hiring/tenure decisions.	.235	.195	1.457	1	.227	1.265
My institution has communicated its strategic plan for the implementation of the CMS in teaching practices.	-.052	.202	.067	1	.796	.949
I feel included in the dialogue about technology and distance education initiatives.	.030	.255	.014	1	.907	1.030
The procedure for establishing course web sites using the CMS encourages faculty use of the system.	.109	.224	.235	1	.628	1.115
I am generally satisfied with the responses or resolution to problem(s) with the CMS.	-.284	.230	1.524	1	.217	.753
My institution provides professional development activities to help faculty learn and use the CMS.	-.158	.279	.322	1	.571	.854
Professional development activities related to the CMS have been effective.	.128	.256	.252	1	.616	1.137
The goals and objectives regarding use of the CMS are shared by faculty as well as administration.	-.121	.310	.152	1	.697	.886
My supervisor supports/encourages the use of the CMS.	.287	.257	1.249	1	.264	1.333
My colleagues think that I should use the CMS for my course work.	-.089	.201	.197	1	.657	.915
People in my institution who use the CMS have more prestige than those who do not.	-.151	.278	.297	1	.586	.860
Using the CMS improves my image within my department or the institution.	.036	.274	.017	1	.896	1.036
Innovativeness and experimentation are encouraged at my institution.	.339	.260	1.696	1	.193	1.403
In terms of using the CMS, it is important to me to consider what my peers think.	-.539	.244	4.881	1	.027*	.583
In terms of using the CMS, it is important to me to consider what my students think.	.244	.211	1.336	1	.248	1.277

* $p < .05$

Table 43 displays the results of the logistic regression analysis for the individual statements grouped under organizational support for Early Majority. Although the mean for organizational support was not a significant predictor for Early Majority adopters, three individual statements were significant at the .05 level: “My institution has communicated its strategic plan for the implementation of the CMS in teaching practices,” (Wald = 5.002, $p = .025$, *Exp(B)* = .500), “Innovativeness and experimentation are encouraged at my institution (Wald = 3.897, $p = .048$, *Exp(B)* = .400), and “In terms of using the CMS, it is important to me to consider what my students think” (Wald = 3.897, $p = .048$, *Exp(B)* = .503). “Using the CMS fits into my institution’s vision, mission, and goals” (Wald = 5.002, $p = .025$, *Exp(B)* = .233) was significant at the .001 level. The odds ratios for all four factors are all below 1, indicating that increases in these factors negatively affect adoption.

Table 43

Organizational Support Predicted Probability for Early Majority Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
1. Using the CMS fits into my institution's vision, mission, and goals.	-1.456	.507	8.250	1	.004**	.233
2. My institution provides the technical infrastructure to support using the CMS in my courses.	.757	.437	2.995	1	.084	2.131
3. I am adequately rewarded/ compensated for incorporating the CMS in my teaching practices.	-.115	.354	.106	1	.745	.891
4. Using the CMS enhances my ability to achieve tenure and promotion.	-.010	.309	.001	1	.975	.990
5. Technological skills/using the CMS are important when making hiring/tenure decisions.	.208	.379	.300	1	.584	1.231
6. My institution has communicated its strategic plan for the implementation of the CMS in teaching practices.	-.693	.310	5.002	1	.025*	.500
7. I feel included in the dialogue about technology and distance education initiatives.	.902	.519	3.018	1	.082	2.464
8. The procedure for establishing course web sites using the CMS encourages faculty use of the system.	-.075	.369	.041	1	.839	.928
9. I am generally satisfied with the responses or resolution to problem(s) with the CMS.	.069	.395	.031	1	.861	1.072
10. My institution provides professional development activities to help faculty learn and use the CMS.	1.143	.617	3.432	1	.064	3.135
11. Professional development activities related to the CMS have been effective.	-.294	.421	.488	1	.485	.745
12. The goals and objectives regarding use of the CMS are shared by faculty as well as administration.	.596	.570	1.094	1	.296	1.815
13. My supervisor supports/encourages the use of the CMS.	-.394	.478	.679	1	.410	.675
14. My colleagues think that I should use the CMS for my course work.	-.157	.332	.223	1	.637	.855
15. People in my institution who use the CMS have more prestige than those who do not.	.862	.554	2.423	1	.120	2.368
16. Using the CMS improves my image within my department or the institution.	-.190	.549	.120	1	.729	.827
17. Innovativeness and experimentation are encouraged at my institution.	-.915	.464	3.897	1	.048*	.400
18. In terms of using the CMS, it is important to me to consider what my peers think.	.445	.406	1.200	1	.273	1.560
19. In terms of using the CMS, it is important to me to consider what my students think.	-.686	.362	3.592	1	.058*	.503

** $p < .01$
* $p < .05$

Table 44 displays the results of the logistic regression analysis for the individual statements for organizational support for Late Majority. Neither the mean nor any individual statements were significant predictors for Late Majority adopters. Garson (2010) indicated that a flaw in the Wald test may produce large standard of errors for very large effects. The results for organizational support for Late Majority reflect this flaw. Garson suggests using the odds ratios for comparing variables. However, he also cautions that very high or low odds ratios may arise from sparse data or small sample size in relation to a large number of variables. However, the sample size and data collected for Laggards was the same as for Late Majority, which did produce these anomalies.

The six indicators with odds ratios significantly over 1 are listed below in descending order. The odds of adoption of the CMS by Laggards are increased by each factor, controlling for other variables in the model.

1. I feel included in the dialogue about technology and distance education initiatives (929880.091)
2. The procedure for establishing course web sites using the CMS encourages faculty use of the system (80872.84).
3. My supervisor supports/encourages the use of the CMS (9.301E+15).
4. My institution provides the technical infrastructure to support using the CMS in my courses (8.97).
5. I am generally satisfied with the responses or resolution to problem(s) with the CMS (7.435E+32).
6. In terms of using the CMS, it is important to me to consider what my peers think (4.222E+24).

Table 44

Organizational Support Predicted Probability for Late Majority Adopters

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
Using the CMS fits into my institution's vision, mission, and goals.	-54.995	2332.298	.001	1	.981	.000
My institution provides the technical infrastructure to support using the CMS in my courses.	2.194	2316.053	.000	1	.999	8.97
I am adequately rewarded/ compensated for incorporating the CMS in my teaching practices.	50.859	2650.152	.000	1	.985	.000
Using the CMS enhances my ability to achieve tenure and promotion.	-23.486	1225.328	.000	1	.985	.000
Technological skills/using the CMS are important when making hiring/tenure decisions.	-18.310	2936.167	.000	1	.995	.000
My institution has communicated its strategic plan for the implementation of the CMS in teaching practices.	27.648	4020.902	.000	1	.995	1.017E+12
I feel included in the dialogue about technology and distance education initiatives.	13.743	2894.549	.000	1	.996	929880.091
The procedure for establishing course web sites using the CMS encourages faculty use of the system.	11.301	2110.207	.000	1	.996	80872.84
I am generally satisfied with the responses or resolution to problem(s) with the CMS.	75.689	3561.619	.000	1	.983	7.435E+32
My institution provides professional development activities to help faculty learn and use the CMS.	-23.683	1754.274	.000	1	.989	.000
Professional development activities related to the CMS have been effective.	-1.794	870.382	.000	1	.998	.166
The goals and objectives regarding use of the CMS are shared by faculty as well as administration.	-117.071	4561.794	.001	1	.980	.000
My supervisor supports/encourages the use of the CMS.	36.769	2092.988	.000	1	.986	9.301E+15
My colleagues think that I should use the CMS for my course work.	-2.328	1319.386	.000	1	.999	.098
People in my institution who use the CMS have more prestige than those who do not.	-6.609	3934.293	.000	1	.999	.001
Using the CMS improves my image within my department or the institution.	23.172	4371.920	.000	1	.996	1.158E+10
Innovativeness and experimentation are encouraged at my institution.	-28.799	3867.597	.000	1	.994	.000
In terms of using the CMS, it is important to me to consider what my peers think.	56.702	3884.043	.000	1	.988	4.222E+24
In terms of using the CMS, it is important to me to consider what my students think.	-28.361	2026.255	.000	1	.989	.000

Table 45 displays the results of the logistic regression analysis for the individual statements grouped under organizational support for Laggards. Only the mean for organizational support was a significant predictor for Laggards (Wald = 5.384, p = .020). None of the individual statements was significant.

Table 45
Organizational Support Predicted Probability for Laggards

Predictors	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
Using the CMS fits into my institution's vision, mission, and goals.	-2.161	1.476	2.145	1	.143	.115
My institution provides the technical infrastructure to support using the CMS in my courses.	2.841	1.759	2.608	1	.106	17.137
I am adequately rewarded/compensated for incorporating the CMS in my teaching practices.	-.052	1.349	.002	1	.969	.949
Using the CMS enhances my ability to achieve tenure and promotion.	1.833	1.613	1.291	1	.256	6.250
Technological skills/using the CMS are important when making hiring/tenure decisions.	-1.937	1.703	1.293	1	.256	.144
My institution has communicated its strategic plan for the implementation of the CMS in teaching practices.	.793	1.114	.507	1	.477	2.209
I feel included in the dialogue about technology and distance education initiatives.	.885	1.385	.408	1	.523	2.422
The procedure for establishing course web sites using the CMS encourages faculty use of the system.	-1.886	1.172	2.592	1	.107	.152
I am generally satisfied with the responses or resolution to problem(s) with the CMS.	-2.831	1.753	2.608	1	.106	.059
My institution provides professional development activities to help faculty learn and use the CMS.	.810	1.640	.244	1	.621	2.247
Professional development activities related to the CMS have been effective.	-1.082	1.786	.367	1	.545	.339
The goals and objectives regarding use of the CMS are shared by faculty as well as administration.	-.608	1.617	.141	1	.707	.545
My supervisor supports/encourages the use of the CMS.	-2.316	1.516	2.334	1	.127	.099
My colleagues think that I should use the CMS for my course work.	4.565	2.688	2.884	1	.089	96.039
People in my institution who use the CMS have more prestige than those who do not.	-1.261	1.847	.466	1	.495	.283
Using the CMS improves my image within my department or the institution.	.915	1.809	.256	1	.613	2.496
Innovativeness and experimentation are encouraged at my institution.	1.393	1.471	.897	1	.344	4.028
In terms of using the CMS, it is important to me to consider what my peers think.	3.002	2.073	2.098	1	.148	20.127
In terms of using the CMS, it is important to me to consider what my students think.	-4.582	2.990	2.348	1	.125	.010

Summary

This study examined faculty perceptions across five adopter categories: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards. While the number of participants who provided usable quantitative data was significantly lower than expected, the analysis of the data was useful for understanding faculty characteristics and CMS usage information at the five institutions. Table 46 provides a summary of the scale means and individual factors that were found to be significant predictors for each category.

Relative Advantage and Adopter Status. The first research question examined the faculty perceptions of the CMS in relation to the relative advantage of adoption. Fifteen individual variables comprised the construct. Although the mean for relative advantage was a significant predictor of Early Adopter status (Wald = .6.754, p = .009) and Laggard status (Wald = 7.364, p = .007), none of the individual statements was a significant predictor for either category. The mean for relative advantage was not a significant predictor of Innovator adopter status (Wald = .6.754, p = .009). However, RA 13 that the CMS "encourages (would encourage) student engagement with the course content" was a significant predictor (Wald = 4.230, p = .04) of Innovators' adoption of the CMS.

Compatibility and Adopter Status. The second research question examined the faculty perceptions of the CMS in relation to compatibility issues. Ten individual variables comprised the construct. Compatibility was a significant predictor for Innovators, Early Majority, and Laggards. Although the mean for compatibility was a significant predictor of Innovator status (Wald = 4.279, p = .039) and Laggards (Wald =

5.208, p = .022), none of the individual statements was a significant predictor of adoption of the CMS by Innovators. Although the mean for compatibility was not a significant predictor of Early Adopter status, the statement that the CMS would be compatible with their level of technology expertise and experience (Wald = 7.221, p = .007) was a significant predictor of Early Adopter status. Furthermore, both the mean for compatibility was a significant predictor (Wald = 5.481, p = .019) and the statement that the CMS would be compatible with their level of technology expertise and experience (Wald = 6.321, p = .012) was also a significant predictor of Early Majority adopter status. Neither the mean nor individual statements were significant predictors for the Late Majority.

Complexity and Adopter Status. The third research question examined the faculty perceptions of the CMS in relation to the complexity of the software. Ten individual variables comprised the construct. Complexity, or ease of use, was a significant predictor for all five adopter categories: Innovators (Wald = 6.199, p = .013), Early Adopters (Wald = 5.026, p = .025), Early Majority (Wald = 5.812, p = .016), Late Majority (Wald = 3.839, p = .050), and Laggards (Wald = 6.250, p = .012). For Innovators, the statement indicating that learning to use the CMS was (would be) easy (Wald = 6.487, p = .011) was also a significant predictor. None of the individual predictors was significant for Early Adopters and Late Majority. For Early Majority adopters, however, not only did the mean show significance, but also did three of the individual statements. Like Innovators, the statement indicating that learning to use the CMS was (would be) easy (Wald = 5.170, p = .023) was significant. Being able to easily integrate the CMS into their courses (Wald = 5.232, p = .022) and being able to easily use the Grade Center (Wald = 5.871, p = .015) were also significant. Not only did the mean for Laggards show significance, but two individual statements were also significant. Like Early Majority adopters, being able to easily integrate the CMS into their courses (Wald = 4.681, p = .030) was significant. In addition, the ease of remembering how to perform tasks in the CMS was significant (Wald = 5.905, p = .015).

Trialability and Adopter Status. The third research questions examined the faculty perceptions of the CMS in relation to the trialability of the software. Six individual variables comprised the construct with the deletion of T6. The only mean that showed significance was for Late Majority Adopters (Wald = 4.381, p = .036). Being able to try out features of the CMS was significant for Early Adopters (Wald = 9.961, p = .002). Although the mean for trialability is not a significant predictor of adoption, being able to "use the CMS on a trial basis long enough to see what it could/can do" (Wald = 7.297, p = .007) was a significant predictor for Early Majority adopters. Not only was the mean for trialability for Late Majority adopters significant (Wald = 4.381, p = .036), but being "aware of opportunities to try out various uses of the CMS" (Wald = 4.569, p = .033) was also significant. Neither the mean nor any of the individual statements for trialability were significant predictors for Innovators or Laggards.

Observability and Adopter Status. The fifth research question examined the faculty perceptions of the CMS in relation to the observability of the software. Five individual variables comprised the construct with the deletion of Ob 4. Not only was the mean for observability a significant predictor for Early Adopters (Wald = 4.036, p = .045), but having the results of using the CMS apparent to the Early Adopter was also significant (Wald = 7.775, p = .005). Although the mean for observability was significant for Late Majority adopters (Wald = 6.952, p = .008), none of the individual statements was significant. Observability was a significant predictor for Laggards (Wald = 5.179, p = .023). Like Early Adopters, having the results of using the CMS apparent to them was also significant (Wald = 6.001, p = .014). Neither the mean nor any of the individual statements were significant predictors for Innovators and Early Majority adopters.

Organizational Support and Adopter Status. The sixth, seventh, and eighth research questions were combined into one construct which examined the faculty perceptions of the CMS in relation to the perceived organization support provided for adopters. Nineteen individual variables comprised the construct. Organizational support was a significant predictor only for Laggards (Wald = 5.384, p = .020). Although the mean for organizational support was not a significant predictor for Early Adopters, two individual statements were significant: (OS1) "Using the CMS fits into my institution's vision, mission, and goals" and (OS18) "In terms of using the CMS, it is important to me to consider what my peers think." Organizational support was not a significant predictor for Early Majority adopters. However, three individual statements were significant: (OS6—Wald = 5.002, p = .025) "My institution has communicated its strategic plan for the implementation of the CMS in teaching practices," (OS17—Wald = 3.897, p = .048) "Innovativeness and experimentation are encouraged at my institution," and (OS17—Wald = 3.897, p = .048) "In terms of using the CMS, it is important to me to consider what my students think." One statement was significant (OS1—Wald = 5.002, p = .025) "Using the CMS fits into my institution's vision, mission, and goals." Neither the mean nor any of the individual characteristics for organizational support were significant for Innovators or Late Majority adopters.

Table 46

Predictive Factors by Scale and Individual Factors

	Innovators	Early Adopters	Early Majority	Late Majority	Laggards
Relative Advantage		X**			X**
	Encourages student engagement with the course content*				
Compatibility	X*			X*	X*
		Would be compatible with my level of technology expertise and experience**	Would be compatible with my level of technology expertise and experience*		
Complexity	X*	X*	X*	X*	X*
	Learning to use the CMS was (would be) easy for me*		Learning to use the CMS was (would be) easy for me*		
			I can easily integrate the CMS into my courses*		I can easily integrate the CMS into my courses*
			I can easily use the Grade Center*		It is (would be) easy for me to remember how to perform tasks in the CMS*
Trialability				X*	
		Being able to try out features of the CMS is important to me**	I was (am) permitted to use the CMS on a trial basis long enough to see what it could/can do**	I am aware of opportunities to try out various uses of the CMS*	
Observability		X*		X**	
		The results of using the CMS are apparent to me**			The results of using the CMS are apparent to me*

(*table continues*)

	Innovators	Early Adopters	Early Majority	Late Majority	Laggards
					X*
Organizational Support		Using the CMS fits into my institution's vision, mission, and goals*	Using the CMS fits into my institution's vision, mission, and goals**		
		In terms of using the CMS, it is important to me to consider what my peers think*	My institution has communicated its strategic plan for the implementation of the CMS in teaching practices*		
			Innovativeness and experimentation are encouraged at my institution*		
			In terms of using the CMS, it is important to me to consider what my students think*		

** $p < .01$
* $p < .05$

Chapter 5: Interpretation, Implications, Recommendations, and Conclusions

The purpose of this chapter is to summarize the study and present an interpretation of the study findings. Implications for social change and recommendations for actions and further research are also included. The chapter ends with general conclusions.

HBCUs are defined by the Higher Education Act of 1965 as

> ...any historically Black college or university that was established prior to 1964, whose principal mission was, and is, the education of Black Americans, and that is accredited by a nationally recognized accrediting agency or association determined by the Secretary [of Education] to be a reliable authority as to the quality of training offered or is, according to such an agency or association, making reasonable progress toward accreditation" (qtd. in White House Initiative on Historically Black Colleges and Universities, 2010, Section 3).

In spite of often lacking resources, HBCUs have demonstrated they are better at supporting African American students than PWCUs (DeSousa & Kuh, 1996; Flowers & Pascarella, 1999; Flowers, 2002). However, despite the growth of online learning throughout the United States and the fact that 39 out of 43 HBCUs offer distance learning courses/programs, HBCUs have been reluctant to provide fully online courses and/or programs (Arnone, 2002). Furthermore, little or no research has been conducted that analyzed how faculty members at HBCUs utilize a CMS and how their attitudes toward the CMS and organizational support mechanisms can help or hinder adoption of online teaching at their institution.

This nonexperimental, quantitative study utilized a reliable and validated self-developed survey to solicit responses from full-time faculty members at five HBCUs in two Southeastern states. The purpose of this study was to identify factors that influenced faculty members in their decision to adopt a CMS into their teaching practices for the purpose of predicting membership in one of five adopter categories. The primary focus of the study was to determine faculty members' perceptions of the CMS's attributes and organizational policies, procedures and norms, and how these factors could be used to predict the likelihood of their adopting the CMS. The research used Rogers's (2003) diffusion of innovation theory as the framework for interpreting and presenting the results. In order to isolate key issues involved, the study was designed to determine:

1. Adopter levels for faculty at each institution;
2. Their ratings of the perceived attributes (i.e., relative advantage, compatibility, complexity, trialability, and observability) of the CMS;
3. Their perceptions of institutional characteristics (i.e., policies, procedures, or norms) that could hinder or encourage adoption of the CMS.

Interpretation of Findings

Of the five perceived attributes and three organizational support attributes, only complexity was found to be a significant predictor of adopter status for all five categories. The study found that external controls embodied in the organizational support construct potentially influenced faculty members' perceptions of the effort involved in using and learning to use the CMS. Organizational support issues were also tied to respondents' perceptions of the complexity of the CMS. Compatibility was a significant predictor for Innovators, Late Majority, and Laggards, while compatibility with their level of technology expertise and experience was a significant individual predictor for Early Adopters and Early Majority adopters. Relative advantage and observability were predictors for Early Adopters and Laggards. Observability was also significant for Late Majority adopters. Trialability, specifically being aware of opportunities to try out various uses of the CMS, was a significant predictor for Late Majority adopters. Significant observability factors for both Early Adopters and Early Majority Adopters related to organizational support issues—being able to try out the CMS and being able to try it out long enough to see what it could do.

Innovators

For Innovators, compatibility and complexity were found to be significant predictors of adopter status. All six scales were found to be significantly associated with an increased likelihood of adoption of the CMS, having odds ratios greater than 1.0. This suggests that the odds of adoption of the CMS increases (indicated in parenthesis as an odds ratio with the corresponding percentage) per respondents' positive perceptions of: relative advantages (1.26 times or 13%), compatibility (1.947 times or 20%), complexity (2.345 or 24%), trialability (1.752 times or 18%), observability (1.532 times or 15%), and organizational support (1.637 times or 16%).

Relative Advantage. Contrary to Rogers's (2003) assertion that relative advantage is one of the two most significant attributes in the adopter-decision process, it was not a predictor for Innovators. One faculty member explained, "I personally is [sic] an experienced instructional technologist and have tried many programs in teaching. CMS is not a user-friendly nor functional method."

Diffusion of innovations research indicated that Innovators tend to be experimentalists and “techies” whose focus is on the innovation’s technical characteristics. However, for this study, the primary relative advantage predictor for Innovators was the CMS’s ability to “encourage student engagement with the course content.” This finding indicates that Innovator faculty members at these institutions are more concerned with the benefits for the students rather than the technological innovation itself. Comments by Innovators reflected their interest in the CMS primarily for the benefit to students. “Blackboard is way behind the times, as far as we are concerned. Our students also find the technology very clunky. It is like trying to work on a ten-year-old computer with dial-up access.” Another indicated, “It is frustrating when Blackboard does not work effortlessly for all students (e.g., the sytem [sic] might be down or a student's computer might be slow during a timed test). Another Innovator stated, “I did not fully understand the benefits when I elected to utilize the technology; however, I like to try technologies that will make the transmission of informtion [sic] to students more effective.”

Compatibility. Compatibility was a significant predictor for Innovators. Gastfriend and Finnegan (2005) indicated one of the two most common reasons for not using the CMS was the lack of pedagogical need. Comments by Innovators indicated that the CMS is not compatible with their teaching practices. “CMS is not advanced enough technologically for my classes” and “One drawback that I have personally is integrating team behavior into the CMS. I'll have to study that because I do use teams in essentially every class I teach.”

Complexity. For Innovators, complexity of the innovation was a significant predictor. “Learning to use the CMS was (would be) easy” was also a significant predictor in its own right. The variable also had the highest odds ratio (3.420) for increasing the odds of adoption by Innovators. Innovators seek out information about innovations on their own and are able to understand and apply complex technical knowledge. These characteristics imply that the intrinsic value of perceived ease of use would be greatest with Innovators as opposed to the strategic advantage and pragmatic reasons important to later adopters. The findings bear this out.

Trialability. Neither the mean nor any of the individual statements for trialability were significant predictors for Innovators; however, the odds ratio for Innovators was highest of all the adopter groups (1.752), indicating that being able to try out the CMS would increase their odds of adopting. Frequency data also indicated that 77.5% of Innovators valued “being able to try out features of the CMS is important to me.” One Innovator indicated that at his/her institution, “you can not [sic] ‘try out’ CMS without access (a user name and password.). You have to request access, and you are supposed to attend training.” Since Innovators’ adventurousness requires them to have complex technical knowledge, requiring training before being granted access to CMS may hinder adoption by this group.

Observability. Neither the mean nor any of the individual statements were significant predictors for Innovators. Since Innovators are the first ones to try out and adopt an innovation, the “degree to which the results of an innovation are visible to others” (Rogers, 2003, p. 16), is not immediately evident for Innovators when they begin the innovation-decision process.

Organizational Support. Neither the mean nor any of the individual characteristics for organizational support were significant predictors for Innovators. Rogers (2003) indicated that Innovators may not necessarily be respected by other members of the social system because their risk-taking and visionary characteristics are often outside the norms of the organization. They are often nonconformists. One faculty commented, “The administrator in my department is not tech savvy. She rarely sends anything from her office. She has not [sic] desire to learn the system, so she depends on her secretary. Administrators must be role models for faculty to keep expectation in line and motivate faculty to do more than is required.” **“In terms of using the CMS, it is important to me to consider what my students think” had the highest odds ratio (1.552). One faculty member’s comment reflects this,** “Peers and administrators can do what they wish—I'm here for the students.”

Early Adopters

Predictive factors for Early Adopters were relative advantage, complexity, and observability. All six scales were found to be significantly associated with an increased likelihood of adoption of the CMS, having odds ratios greater than 1.0. This suggests that the odds of adoption of the CMS increases per respondents’ positive perceptions of: relative advantages (1.740 times or 17%), compatibility (1.465 times or 15%), complexity (1.625 times or 17%), trialability (1.120 times or 11%), observability (1.686 times or 17%), and organizational support (1.202 times or 12%).

Relative Advantage. Generally, Early Adopters are technologically savvy, but their focus lies in the relative advantages of the CMS to solve professional and academic problems. Therefore, not only was relative advantage a significant predictor, but observability and specifically having the results of using the CMS apparent to them were also significant predictors. Although the mean for relative advantage was a significant predictor of Early Adopter status, none of the individual statements was a significant predictor of Early Adopter adoption of the CMS.

Comments by Early Adopters supported the findings that Early Adopters felt "generally the benefits outweigh[ed] the hassles." However, they noted that inconsistency of support and the inability to "keep the system operational" were significant drawbacks to using the CMS at their institution. Early Adopters also commented that the limited features and "clunkiness" of the CMS design were deterrents to more effective use of the software. One respondent stated, "Our CMS system really only provides very limited features and does not provide the kinds of features which would be most helpful to my teaching. Many of the features provided which would be helpful have substantial flaws which prevent me from using them…. As a result of these sorts of short-comings, I find that the benefit of our CMS is strictly an increase in student access to information but at the cost of more work on my part. I do not object to that trade-off, but I also do not believe it necessary." Since the majority of survey respondents self-designated as Early Adopters, their comments are relevant, especially since Early Adopters have the highest degree of opinion leadership among the adopter categories.

Compatibility. Although the mean for compatibility was not a significant predictor of Early Adopter status, that the CMS would be compatible with their level of technology expertise and experience was a significant predictor of Early Adopter status. Comments by Early Adopters, however, seem to indicate that compatibility with their teaching philosophy was more significant, which also had an odds ratio of 1.934.

“Instructor's enthusiasm is difficult to mirror online. Some aspects of teaching online fit well with my philosophy - others - NO. The person to person contact in the face to face context can improve student motivation” and “Some students need more 1:1 interaction with faculty; some have not developed independent learning skills & need the traditional classroom structure.” Early Adopters are willing to try new technologies and are not adverse to an occasional failure. Therefore, the CMS would seem to be compatible with the Early Adopter’s level of technology expertise and experience because they are more technologically savvy in the first place.

Complexity. Although the mean for complexity was a significant predictor for Early Adopters, none of the individual predictors was significant. Early Adopter comments regarding complexity tended to focus on individual features such as the grade book or the test functions. They acknowledged, “It takes a lot of upfront time to use the features such as weekly quizzes or set up of group projects,” which relates to the relative advantage of using the software as well as the ease of use. One Early Adopter concluded, “I find Blackboard to work slowly and unreliably, so that it is often quite difficult and time-consuming to accomplish tasks that should be simple, like opening an already constructed lesson in an online course.”

Trialability. Rogers indicated that trialability is more important for earlier adopters than for later adopters as evidenced by the significant ranking for “being able to try out features of the CMS is important to me.” Early adopter comments reflect this perception that despite the lack of institutional policies or procedures allowing or encouraging faculty to try out different features. One respondent noted, “I did not try out any of the features, i [sic] used them in the class and if it worked well, i [sic] kept using it, if not, i [sic] stopped using it but there was no personal trial period just on my own." Another indicated, "We no longer have the option of enrolling ourselves as students in our own Blackboard shells, and I would like to have that possibility, since it would allow me to see what pages look like from the student point of view."

Observability. Not only was the mean for observability a significant predictor for Early Adopters (Wald = 4.036, p = .045), but having the results of using the CMS apparent to the Early Adopter was also significant (Wald = 7.775, p = .005) at the .01 level. In order to maintain their position as opinion leaders and role models in the social system, their judicious and well-informed decision-making is imperative. Early adopters use the data provided by the Innovators' adoption of the innovation to make their own adoption decisions. If they observe that the innovation has been effective for the innovators, then they will be encouraged to adopt. As one Early Adopter indicated, "I have seen how others use the CMS because I frequently assist other faculty members with parts of the system."

Organizational Support. Although the mean for organizational support was not a significant predictor for Early Adopters, two individual statements were significant: "Using the CMS fits into my institution's vision, mission, and goals" and "In terms of using the CMS, it is important to me to consider what my peers think." Having the CMS fit into the institution's vision, mission, and goals increased the likelihood of adoption by Early Adopters (*Exp(B)* = 1.977); however, the more Early Adopters considered what their peers thought when making the innovation adoption decision, the likelihood of their adoption decreased (*Exp(B)* = .583). As opinion leaders, Early Adopters are more bound by the social system than Innovators are. They are more likely to hold leadership positions, and other members of the social system come to them for advice or information about the innovation.

The findings reflect the Early Adopters' position in the social system as opinion leaders and potential change agents in the organization. In order to continue to earn the esteem of colleagues and to maintain their position, they must make judicious innovation decisions which also reflect the organizational culture. One Early Adopter noted that research was considered more important for promotion/tenure; however, online teaching practices, if done right, interfered with research. Another reported, "Use of Blackboard or other online technology has not been promoted as examples of good teaching—in the past it seems to be tolerated or another choice for some teachers."

Early Majority

The only significant predictor for Early Majority adopters was complexity. For Early Majority, one scale was found to be significantly associated with an increased likelihood of adoption of the CMS, having odds ratios greater than 1.0. This suggests that the odds of adoption of the CMS increase per respondents' positive perceptions of trialability (1.204 times or 12%). For Early Majority adopters, five scales were found to be significantly associated with a decreased likelihood of adoption of the CMS, having odds ratios less than 1.0. This suggests that the odds of adoption of the CMS decreases (indicated in parenthesis as an odds ratio) per respondents' negative perceptions of relative advantages (.678 times), compatibility (.552 times), complexity (.526 times), and observability (.837 times). Organizational support (.975) was close enough to 1 to indicate that this factor had little effect on adoption.

Relative Advantage. Individuals in the Early Majority category adopt an innovation after a significantly longer time period than Innovators and Early Adopters. Neither the mean or individual statements for relative advantage of adopting the CMS were significant. One Early Majority respondent commented, indicating that, "testing is almost always a problem for 'crashes' for some students." Another Early Majority adopter commented that, "So far, CMS are far more trouble than they are worth, despite the high potential; both at my current and previous university, Blackboard has been unreliable in action, unsupported for student and faculty use." Another reported that he/she "was told to use [the] CMS. Thus, I took the appropriate classes and have been using the information that I learned." However, he/she admitted to not using the CMS as extensively as others despite having conducted some online classes.

Compatibility. Although the mean for compatibility was not a significant predictor for Early Majority adopters, that the CMS "would be compatible with my level of technology expertise and experience" was a predictive factor. Early Majority adopters are deliberate. The finding indicates that making sure that Early Majority adopters have sufficient expertise and experience with the CMS might promote adoption. One respondent commented, "I have developed online courses and supplements to regular in-class courses as a matter of adapting to new societal realities rather than as a pedagogical value. There are some nice things about online work, but I think it pales in comparison to what happens in real time in real places."

Complexity. For Early Majority adopters, not only did the mean show significance, but also did three of the individual statements. Use of the CMS requires faculty and students to have some level of computer and Internet proficiency. However, as Tabata and Johnsrud (2008) noted, instructors are often required to troubleshoot technical problems they and their students encounter, especially at the beginning of the course. Therefore, the ease of learning the CMS and integrating it into their courses for the pragmatic Early Majority adopter, who tends to avoid risk, were significant.

West, et al. (2007) found that many instructors chose to use the CMS because of the relative advantage of using a particular tool, such as the grade book. Being able to easily use the Grade Center was also a significant predictor for Early Majority adopters. Perhaps this is a reflection of one respondent's comment that his/her institution had mandated that instructors used the Blackboard grade book. Specifically, being able to easily use the Gradebook was a significant predictor. One Early Majority adopter indicated, "I find the grade book somewhat difficult and the testing is almost always a problem for 'crashes' for some students."

Trialability. Although the mean for trialability was not a significant predictor of adoption, being able to "use the CMS on a trial basis long enough to see what it could/can do" was a significant predictor for Early Majority adopters. The odds ratio (2.195) also indicates that this factor increases the likelihood of adoption by Early Majority. This finding supports Tabata and Johnsrud's (2008) study that "being able to gain first-hand information, assistance, and experience in distance education may help to foster positive attitudes that encourage participation (p. 638). These adopters are deliberate in adopting an innovation, and their innovation decision usually takes more time than it takes Innovators and Early Adopters. Therefore, being permitted time to practice and experiment with the CMS is an important characteristic.

Observability. Early Majority adopters' interpersonal networks, which relay information about innovations, are important in their innovation-decision process; however, observability was not a significant predictor either for the mean or for the individual statements.

Organizational Support. Although the mean for organizational support was not a significant predictor for Early Majority adopters, four individual statements were significant at the .05 level: (a) "My institution has communicated its strategic plan for the implementation of the CMS in teaching practices," (b) "Innovativeness and experimentation are encouraged at my institution, (c) "In terms of using the CMS, it is important to me to consider what my students think, and (d) "Using the CMS fits into my institution's vision, mission, and goals." The odds ratios for all four factors are all below 1, indicating that increases in these factors negatively affect adoption. Morgan (2003) reported that student demands or requests for CMS use were not a strong factor in faculty decisions to adopt the CMS. However, this study supports findings by T. Harrington, et al. (2006) and West, et al. (2007) that pressure from students is an important predictor in Late Majority adopters' decisions to adopt.

One Early Majority faculty member commented,

> We are encouraged to use every resource available to us and there are lots---but no one is pressured into doing anything they are not comfortable with---technology use is widespread...but the use of technology is not necessarily related to what the real emphasis here is which is development of exercises that develop critical thinking skills...So while a student may receive information through a variety of technologies (to include just plain old board work), the real emphasis

> here is shifting from lecture to hands on application...so which technology you use to deliver information is more or less irrelevant compared to the critical thinking aspect.

The comment suggests that although Early Majority faculty value institutional support for innovation and experimentation and knowing how the CMS fits into the institution's mission, vision, and goals, usage of the CMS is not reflected in organizational support and policies at this respondent's institution.

Late Majority

For Late Majority adopters, compatibility, complexity, trialability, and observability were found to be significant predictors. All the scales were found to be significantly associated with a decreased likelihood of adoption of the CMS, having odds ratios less than 1.0. This suggests that the odds of adoption of the CMS decreases (indicated in parenthesis as an odds ratio) per respondents' negative perceptions of relative advantages (.558 times), compatibility (.528 times), complexity (.464 times), trialability (.346 times), observability (.279 times), and organizational support (.594 times).

Relative Advantage. Individuals in the Late Majority category will adopt an innovation on average later than most other members of the relevant social group. Members of the Late Majority are typically skeptical about the innovation. The finding that neither the mean nor and individual statements for relative advantage were significant for Late Majority adopters supports these characteristics. One Late Adopter commented, "I was encouraged to teach a web-based course. WebCT was the platform used at my institution. I learned enough WebCT to extend my teaching to this platform. I do not use enrollment management, grading, testing, or communicating by WebCT. I upload files, make announcements, and post my syllabus to WebCT." Another indicated that he/she only uses the CMS because the institution no longer supports turnitin.com for plagiarism prevention. "Otherwise I see no use for it that does not adversely harm my students." Another respondent indicated that the teaching load at his/her institution was "ridiculously heavy. There's no time to think. I believe that all the CMS advocates have to offer is gimmicks. All the excitement about using technology is, I believe, mainly for show."

Compatibility. Neither the mean nor any of the individual compatibility statements were significant for Late Majority Adopters. One respondent explained, "I teach hands-on courses that require active participation of students during demonstrations, labs, lectures, field trips, and projects. With enough effort, an online course could be devised to meet some of the requirements of this style of teaching, but it would not be worth my time, effort and expense to develop such a course."

Complexity. Although the mean for complexity was a significant predictor for Late Majority adopters at the .05 level, none of the individual predictors was significant. The one comment from a Late Majority adopter indicated, "I do not use most of the functionality in WebCT. Thus the n/a selections. My other selections are based on the functions I use." Agarwal, Ahuja, Carter, and Gans (1998) found that "individuals who had not yet adopted the new technology appeared to base their attitudes on more complex belief sets than those who had not adopted the technology." In other words, those who had not adopted the technology had more distinct beliefs about the perceived ease of use of the technology. Tabata and Johnsrud (2008) found that faculty who had never participated in distance education still maintained negative opinions of the medium. The Late Majority respondent comment indicates that he/she has not fully adopted the CMS into his/her teaching practices. Therefore, overall perceived ease of use is more important than any individual criteria.

Trialability. Not only was the mean for trialability for Late Majority adopters significant, but also being "aware of opportunities to try out various uses of the CMS" was significant at the .05 level. Late Majority adopters include the one-third of the social system who waits until most of their peers adopt the innovation. Interpersonal networks are important avenues for fostering positive opinions and persuading Late Majority to adopt. The finding supports that it is not enough to simply provide the opportunities to try out the CMS, but making sure that all faculty members are aware of the opportunities is also important.

Observability. Late Majority adopters approach an innovation with a high degree of skepticism; they adopt only after a majority of the system has adopted. Economic necessity and peer pressure may lead them to adoption. Observability is more easily achieved later in the adoption process; therefore, this perceived attribute was a significant predictor for Late Majority adopters. McQuiggan (2006) also found that observability was important to nonadopters. Although the mean for observability was significant for Late Majority adopters, none of the individual statements was significant.

Organizational Support. Neither the mean nor any individual statements were significant predictors for Late Majority adopters. However, six indicators with odds ratios significantly over 1 indicated that the odds of adoption of the CMS by Laggards were increased by each factor, controlling for other variables in the model. "I feel included in the dialogue about technology and distance education initiatives (929880.091). One faculty member indicated that “the institution has communicated that we should be using it and putting our grades into it. No other plan has been communicated.” Another stated, “I see nothing particularly innovative in using canned technology. I developed innovative technologies when I was a scientific and business programmer. When I became a user of technology, my innovation ceased, and I adapted my behavior to fit the constraints imposed by someone else’s technology.”

Two other organizational support factors relate to procedures and norms: “The procedure for establishing course web sites using the CMS encourages faculty use of the system” (80872.84), “My supervisor supports/encourages the use of the CMS “(9.301E+15).

Two factors reflect the institution’s support of the CMS: “My institution provides the technical infrastructure to support using the CMS in my courses “(8.97) “I am generally satisfied with the responses or resolution to problem(s) with the CMS” (7.435E+32). One faculty member comment reflects the importance of both of these factors in encouraging adoption. “Things break and are often left, broken. I think that's the reason I expend little energy on learning CMS technology.”

Rogers (2003) indicated that interpersonal networks of close peers are important mechanisms for influencing adoption by the Late Majority. This assertion was born out in this study in that the odds ratio for “In terms of using the CMS, it is important to me to consider what my peers think” (4.222E+24) indicated a positive correlation.

Laggards

Predictive attributes for Laggards were relative advantage, compatibility, complexity, and organizational support. All the scales were found to be significantly associated with a decreased likelihood of adoption of the CMS, having odds ratios less than 1.0. This suggests that the odds of adoption of the CMS decreases (indicated in parenthesis as an odds ratio) per respondents' negative perceptions of relative advantages (.394 times), compatibility (.421 times), complexity (.386 times), trialability (.399 times), observability (.358 times), and organizational support (.249 times).

Relative Advantage. Relative advantage was a significant predictor for Laggards. Laggards often withhold from adopting so long that they actually skip several innovation adoption processes. By the time they finally adopt, they have been forced to either by necessity or coercion. One Laggard noted, "I use computers everyday but I do not want to teach my discipline in an online environment. When Blackboard supports holographic instruction, I'll be first to sign up. But until then CMS is a little better than a 'pig in a poke.'"

Although the mean for relative advantage was a significant predictor of Laggard status, none of the individual statements was a significant predictor of adoption of the CMS. Laggards typically tend to be focused on "traditions" and have an aversion to change. Responses by Laggards reflect this characteristic such as this English teacher who feels "that the 'old fashioned' in the classroom approach with feedback and revision and study techniques applied personally woek[sic] better with my types of courses versus a lot of technology and less interaction between teacher and student." Another indicated, "Instruction via computer technology is a panacea not the cure all as it has been touted. I use computers everyday but I do not want to teach my discipline in an online environment."

Compatibility. Although the mean for compatibility was a significant predictor of Laggards, none of the individual statements was a significant predictor of adoption of the CMS by Laggards. Laggards are traditionalists and skeptical of technological changes. None of the respondents commented on the compatibility issues; however, several of the Laggards do not find the CMS compatible with their teaching philosophy or discipline.

Complexity. Laggards are the last to adopt an innovation. They must be certain that the innovation will not fail prior to adoption. Not only did the mean for Laggards show significance, but two individual statements were significant. Like Early Majority adopters, being able to easily integrate the CMS into their courses was significant. As Laggards are more comfortable with the status quo and familiar routines, having consistency in how to perform tasks is important. In addition, the ease of remembering how to perform tasks in the CMS was significant. As Laggards tend to be older and more set in their ways, consistency of task operations would make the software easier to use and predict Laggard adoption. None of the Laggards commented on complexity issues.

Trialability. Neither the mean nor any individual statements were significant trialability predictors for Laggards. Because of their potentially limited resources and lack of awareness/knowledge of innovations, Laggards usually make sure that an innovation is successfully adopted by other members of the social system before they decide to adopt. Because they rely on others' experiences with the innovation to make their decision, the ability to try out the CMS is not important to Laggards.

Observability. Observability was a significant predictor for Laggards. Like Early Adopters, having the results of using the CMS apparent to them was also significant. This finding supports the research that Laggards tend to adopt after verifying that the innovation has been successful adopted by other members of the social system.

Organizational Support. Organizational support for the adoption of the CMS was a significant predictor for Laggards, which runs contrary to accepted characteristics for Laggards which indicate Laggards are essentially isolates in the social system. They tend to interact with others who have similar values, thereby, decreasing their awareness of an innovation's demonstrated benefits. However, they are also traditionalists who maintain the status quo of generally accepted norms. Unfortunately, none of the Laggards provided any comments to clarify their responses.

Implications for Social Change

This study has many implications for society. First, the provision of adequate technology education for individuals in any segment of the society for the purpose of employment plays a significant role in the individual's ability to compete in the global workplace as well as the United States' ability to compete with other countries. As online teaching and learning continue to expand, the use of CMS to facilitate distance education will continue to be important (Camp, DeBlois, & 2007 EDUCAUSE Current Issues Committee, 2007). "Diffusion is a kind of social change defined as the process by which alteration occurs in the structure and function of a social system" (Rogers, p. 5). The diffusion of the use of CMS at HBCUs could possibly prevent the socioeconomic gap from widening by giving students at HBCUs the opportunity to learn the technological skills needed for the 21st century.

The findings can provide other researchers with a knowledge base containing relevant data, information, and answers to questions that will expand the literature regarding both HBCUS and faculty perceptions of CMS. The findings from this study can assist administrators at HBCUs in determining faculty perceptions of online teaching and the CMS in order to reduce, minimize, or overcome perceived barriers to online teaching. Identifying the differences between adopter categories leads to an understanding of the different approaches necessary to bridge the gap between early adopters (Innovators and Early Adopters) and mainstream adopters (Early and Late Majority and Laggards). The findings can be used by faculty development personnel in the development of appropriate interventions geared to meet the needs of the varying categories of adopters.

Recommendations for Action

Moser (2007) noted that innovative faculty members are motivated by an intrinsic desire to create creative and original means for integrating technology in higher education. Early Adopters then generate additional interest as opinion leaders in the social system. However, if appropriate and sufficient support is not provided to the early adopters, particularly in developing technical competence and in designing online courses/materials, their efforts may achieve only mediocre quality. If early adopters experience too many setbacks, their negative reporting may lead to skepticism among the early majority, who will be tentative in their adoption of technology (Rogers, 2003; Moser). As Rogers warned, early adopters and the early majority will abandon the innovation if it does not meet expectations, and the late majority and laggards will not even begin the adoption process. Only the innovators will continue to experiment with technology, based on their intrinsic motivation. Moser suggested that institutions must help faculty develop adequate expectations about time requirements and how much effort and competence are necessary to successfully incorporate educational technology. Support activities should correspond to each phase of the adoption cycle.

The following are offered as suggestions to improve faculty members' adoption of the CMS from the organizational standpoint:

1. Revise current promotion and tenure policies to place a higher value on teaching and the use of innovative technologies to facilitate learning. Like Hiltz, et al. (2006), this study also found that online teaching was viewed as a less rewarding and less scholarly mode of teaching, with fewer career incentives than traditional classroom instruction. One faculty member reported that online educators were not even considered for teaching awards. Findings from this study support Schifter's (2004) study, which found that faculty members were more likely to receive special funding for *developing* a course than for *teaching* a course. Respondents indicated that training was offered and small stipends for attending were often provided; however, release time to attend the sessions was rarely considered. One faculty member noted, "In particular, adjuncts or other part time instructors have difficulty with the limited time to learn new digital technology techniques…."
2. Develop and communicate a long-range technology plan driven by the institutions' overall vision, mission, and goals. According to Bates (2000), assisting faculty to integrate technology is strongly influenced by the institution's overall approach to the use of technology for teaching. "Without leadership [usually in the form of a collective approach] and a strong sense of

support for change in an organization, the barriers of inertia will be too great" (p. 43). Several anecdotal accounts (Epper & Bates, 2001; Brown, 2003: Shepard, et al., 2007 cited in Wiesenmayer, et al., 2008) indicate that administrative failure to provide faculty with satisfactory support has lead to dissatisfaction, resistance to new online initiatives, and an overall sense of apathy toward all forms of technology-mediated learning. HBCUs, specifically, have a legacy of failure with regard to implementing educational technology including CMS. Several respondents indicated there was a "disconnect between what administration says about CMS and what they do." Another noted, "The administrator in my department is not tech savvy…She has not [sic] desire to learn the system, so she depends on her secretary."

3. Provide systematic technical support for the maintenance of the CMS. Frustrations with the operation of the system can impact faculty members' perceptions of the complexity of the system. Faculty comments reflected that generally the benefits of providing students with greater access to course content in managing course-related tasks outweighed the hassles. However, faculty reported that lack of institutional support for the CMS hindered adoption. Although the "hassle factor" was not a significant predictor of adopter status, comments frequently included issues with "multiple technical problems" which made faculty apprehensive about expending the energy to either learn to use or use the CMS. One faculty noted, "When it works the system is helpful, but it's [sic] unpredictability and lack of cohesion among its features can be extremely problematic." They admitted being frustrated with

the system often being down and working extremely slowly. Several reported that institutional response and follow-up were lacking. One faculty member noted, “Things break and are often left, broken.” Another faculty member summed up, “As a result of these sorts of short-comings [with the CMS], I find that the benefit of our CMS is strictly an increase in student access to information but at the cost of more work on my part.”

4. Based on the faculty comments, organizational policies and procedures should be reviewed in order to better facilitate experimentation. Faculty comments reflected that organizational policies and procedures allowing faculty to try out the CMS hindered adoption. One faculty indicated, “I have some ability to play with things, but they do not have a test system available for me to use without worrying that I might disrupt student data. Having one would be a big improvement.” Another indicated the inability to self-enroll in their courses to view them from the students’ perspective had been removed. At one institution, the process to try out a course was so structured, requiring set up of log-in data and participation in a training course, that it hindered access and trialability of the CMS. In addition, the opportunities to try out the CMS features should be communicated to all faculty members, especially Late Majority adopters.
5. Develop programs that document and showcase “best practices” use of the CMS and positive results of using the CMS. Moore and Benbasat (1991) divided observability into “result demonstrability” and “visibility.” Since Blackboard has been in existence since the mid-nineties and is the dominant

CMS in use worldwide, visibility is widespread. However, many faculty respondents, even early adopters, indicated that the results of using the CMS were not always evident.

The following suggestions are offered to improve faculty members' adoption of the CMS from the faculty development perspective:

1. Provide training programs that incorporate support for learning how to operate the technology as well as pedagogical support for the integration of the technology in faculty teaching practices. Al-Ali (2007) reported that faculty was generally positive about the classroom management functions of Blackboard, but neutral or undecided regarding its instructional or psychosocial benefits. Surendra (2001) noted, "Technology based teaching and learning are somewhat incompatible with existing values regarding a f2f system, where the teacher and students are expecting a human element or physical presence" (p. 25). Faculty members' comments supported these findings.

   Several faculty members reported that the CMS did not conform to their style of teaching. Therefore, using the CMS caused frustration with teaching within a rigid format. Others indicated that the CMS was "old technology" and was inadequate for teaching critical thinking or technology-intensive courses. Another faculty member commented, "Technology use in education - just for its use is pointless. Technology as a tool to improve student access or make materials more interesting or engage students is appropriate IF there is a foundation of theory or previous practice…or research." Finally, one faculty member summed up a number of comments: "I still believe in classroom learning as the best method of delivery; I have developed online courses and supplements to regular in-class courses as a matter of adapting to new societal realities rather than as a pedagogical value. There are some nice things about online work, but I think it pales in comparison to what happens in real time in real places."

2. Diversify professional development activities to accommodate the different adopter characteristics. With respect to training, faculty responses were across the board ranging from awful to adequate to glowing recommendations for the specific staff members. Frequency data indicate that the earlier adopters (Innovators, Early Adopters, and Early Majority) were more satisfied with the effectiveness of the professional development activities than the Late Majority and Laggards. One faculty member indicated, "Complexity not an issue— "with training" and another stated, "With some aspects the learning curve is too steep, especially if I have a heavy teaching load. Although, even then if I had someone who could show me, I could do more." These faculty comments reflect the importance of organizational support in defining adopter's perceptions of the complexity of the CMS.

Recommendations for Further Research

The response rate for this study (14.2%) limited generalizability. Therefore, this study should be repeated with more schools and more faculty participating.

The population sample in this study included solely full-time faculty members which utilize the CMS. A future study with a sample of both adjunct and full-time faculty members would allow thorough comparison of faculty to identify which perceptions specifically impact use of the CMS.

This study was weighted toward Innovators and Early Adopters. Future research should strive to obtain responses from a wider range of adopter categories.

This current study was restricted to 4-year HBCUs. The same research could be expanded to include 2-year or graduate-level HBCUs in order to fully compare faculty perceptions.

Future research involving a comparison of faculty perceptions at HBCUs and PWCUs would allow comparisons to determine any significant differences between institutions of similar size and/or geographic location. This study could also potentially include a younger faculty population with greater ethnic diversity.

Future innovation characteristics—adoption research of the CMS should focus on implementation and confirmation and not the simple dichotomous yes/no adoption decision. This research would take into account the level of implementation and adaption as well as smaller adoption decisions triggered by the addition of new features and version or CMS change.

This study included both public and private HBCUs. However, responses from the private institutions were so low that it was not possible to determine any significant differences between the public and private institutions. Since the organizational cultures for private and public HBCUs can vary significantly, future research studies should incorporate a more balanced representation of public and private views.

Further analysis needs to be done on the various policies, procedures, and norms at HBCUs to determine if they help or hinder adoption of the CMS and/or online learning. This study only included faculty perceptions. Additional research should also include administration's perceptions, especially regarding organizational support. Separate questionnaires should be created for the different positions in the institution, which would allow researchers to collect more and different data designed specifically to address each subgroup.

If this study were to be repeated, the means of contacting the HBCU representatives needs to be changed. Perhaps backing from Howard University's Distance Learning Lab or the National Negro College Fund would provide additional incentive for faculty to respond. In addition, the researchers need to be aware of the various IRB procedures and policies for the institutions and incorporate them into the research process.

Additional research ranking the importance of the CMS attributes and organizational support mechanisms in adoption decisions should be conducted.

In addition to the open-ended responses in the survey, a qualitative research follow-up study should be completed to "drill-down" into specific comments and reasons underlying responses.

Conclusion

The findings of this study provide additional evidence that instructors in the different adopter categories have different characteristics and different needs related to adoption and use of the CMS. As Bates (2000) noted, faculty members' buy-in for technology adoption is essential for the successful implementation of any technology initiative. Identifying faculty attitudes toward online learning and the CMS is needed to properly design changes in related programs that will lead to a broader base of users.

Identifying the differences leads to the understanding that different approaches are necessary to facilitate the adoption of the CMS by different adopters. A one-size-fits-all approach to providing knowledge and resources for the integration of the CMS is a recipe for failure. Administrative commitment must also be demonstrated by allocating resources and revising policies and procedures to reduce barriers for faculty members.

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Appendix A: McQuiggan Consent

from	Carol McQuiggan <cam240@psu.edu>
to	Gayla Keesee <gskeesee@gmail.com>
date	Mon, Sep 29, 2008 at 7:40 AM
subject	Re: Survey of University Faculty Innovation Concerns and Perceptions
mailed-by	psu.edu

Hi Gayla,

I've attached my Master's thesis chapter 3, and the attributes instrument I created. Please note that I submitted my chapter 3 to Turnitin, so you'll want to be careful about using any of my text, and be sure to cite correctly. Also, I'm giving you permission to use my attributes instrument as long as credit is given.

I'm excited about your research, and would love to hear the results. Please feel free to be in touch if you have any questions.

Best,
Carol

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Appendix B: CMS Diffusion of Innovations Survey

CMS Diffusion of Innovations Survey

1. Consent Form

You are invited to take part in a study to determine faculty members' perceptions of course management system (CMS) attributes and organizational policies, procedures, and norms and how these factors influence their likelihood of adopting the CMS as part of their teaching practices. You were chosen for this study because you are currently a full-time faculty member at an Historically Black College or University (HBCU). This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

Gayla S. Keesee, who is a doctoral student at Walden University, is conducting this study. She has received approval from your institution to request your participation.

Background Information:

Through my literature review, I determined that there is a gap in the research related to HBCUs and their adoption of online education. Much of the research related to faculty perceptions of online learning and course management system (CMS) has neglected to involve the participation of minority serving institutions, preferring to focus attention on traditionally white institutions. Therefore, I chose HBCUs who currently use a course management system for my target population.

For the purposes of this survey, "A CMS is Internet-based software that manages student enrollment, tracks student performance, and creates and distributes course content. In this way, the CMS enables teachers to extend the classroom beyond its traditional boundaries of time and space" (Ullman & Rabinowitz, 2004). Common course management systems include Blackboard, WebCT, ANGEL, and e-College. Perceived attributes are factors that explain variations in rates of adoption. They include relative advantage, complexity, compatibility, observability, and trialability.

Procedures:

If you agree to be in this study, you are asked to complete the SurveyMonkey questionnaire within the next two weeks.

- Providing any comments or feedback is optional.
- It will take 10-15 minutes to complete the survey.

Voluntary Nature of the Study:

Your participation in this study is voluntary. Everyone will respect your decision whether or not to participate in the study. Since the responses will be anonymous, no one at your institution will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind during the study. 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 HBCU practices. Findings from this study can be used by administration and faculty development professionals to encourage faculty adoption and implementation of course management systems at HBCUs.

Compensation:

There is no compensation provided to complete this survey.

CMS Diffusion of Innovations Survey

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. Also, the researcher will not include your name or anything else that could identify you in any reports of the study. This survey is anonymous. No one will be able to identify you, nor will anyone be able to determine which institution you work for. No one will know whether you participated in this study. If you have not responded, the system will automatically resend the invitation to participate on a scheduled basis. I will not know who you are.

Contacts and Questions:

You may ask any questions you have now. Or if you have questions later, you may contact the researcher via e-mail at gayla.keesee@waldenu.edu or 706-414-6515. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-800-925-3368, extension 1210. Walden University's approval number for this study is 03-19-10-0308229 and it expires March 18, 2011. Winston-Salem State University's IRB # is 2986-10-0047 and expires March 23, 2011. Morehouse University IRB # is 1002002 and is valid from 3/24/2010 until 3/23/2011.

Electronic Signature of Researcher:

Gayla S. Keesee

Researcher

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

Statement of Consent:

I have read the above information, and I feel I understand the study well enough to make a decision about my involvement. By clicking on the Next button, I am agreeing to the terms described above.

NOTE: If you are interrupted while filling out the survey or need to terminate your browser session, you can click on the link again and resume where you left off.

2. Demographics

* 1. Name of Institution

2. Which course management system does your institution use?

- ◯ Blackboard 7 or earlier
- ◯ Blackboard 8
- ◯ Blackboard 9
- ◯ WebCT
- ◯ Moodle
- ◯ ANGEL
- ◯ e-College
- ◯ Don't Know

CMS Diffusion of Innovations Survey

3. When did your institution first acquire a course management system?

- ◯ less than 1 year
- ◯ 1-3 years
- ◯ 4-6 years
- ◯ 7-10 years
- ◯ more than 10 years
- ◯ Don't know

4. When did you first start using a course management system?

- ◯ less than 1 year
- ◯ 1-3 years
- ◯ 4-6 years
- ◯ 7-10 years
- ◯ more than 10 years
- ◯ N/A

5. How would you describe your level of expertise in using the CMS for teaching and learning? Please, select only one level.

- ◯ a. Low (I am able to perform basic functions, but I still require help on a regular basis.)
- ◯ b. Moderate (I am competent in a number of CMS tools for instruction.)
- ◯ c. High (I am proficient in using a wide variety of CMS tools for instruction)

CMS Diffusion of Innovations Survey

* 6. Please choose the description that most reflects your approach to the adoption of new technology, especially related to the adoption of the CMS.

◯ I am often one of the first persons to try new technologies such as the CMS. I tend to be a risk-taker and active-information seeker. I tend to latch on to new technology as soon as it is available to me. My interest tends to be more with the technology itself than with its application to specific problems. I am willing to invest time and energy to learn on my own and adapt quickly to new technologies.

◯ I explored the CMS for its potential to bring about improvements in my teaching. I am willing to try new things technologies and am not averse to occasional failure. I share my experiences with the CMS with my colleagues. My colleagues often ask for my advice/help regarding the CMS. I experiment with a new CMS feature to see if it might improve teaching and learning.

◯ I adopted a "wait and see" attitude toward the CMS. I wanted examples of close-to-home successes before adopting the CMS. I wanted to see the value of the CMS before adopting it. I wanted to make sure that adoption would be easy and hassle-free. I wanted to make sure I would have the necessary technical support and advice to learn/use the CMS.

◯ I was skeptical about using the CMS. I accepted the CMS later in the game once it had become established among the majority of the faculty. I accepted the CMS only when it became a necessity. I began using the CMS because of pressure from my peers and/or students. I tend to use CMS features that seem similar to the ways I have always taught.

◯ I am usually not interested in adopting new technology. I see no use for adopting the CMS in my teaching practices. My current teaching practices have worked well so far without using the CMS. Just because everyone else is using the CMS, doesn't mean that I need to.

Feel free to explain any of your answers

7. Please indicate how you use the CMS at your current institution. Choose all that apply.

☐ a. Fully online course (All or nearly all of the class sessions are delivered via technology.)

☐ b. Partially at a distance (Technology is used to deliver more than 50% of class sessions, but visits to a classroom or similar site are required.)

☐ c. Hybrid (Technology is used to deliver 50% or less of class sessions, but at least one class session is replaced by technology.)

☐ d. Web-enhanced/supplement (Technology is used in delivering instruction to all students in the section, but no class sessions are replaced by technology.)

☐ e. Professional development/training

☐ f. Repository for course materials, hyperlinks only

☐ g. Not currently used

Other (please specify)

CMS Diffusion of Innovations Survey

8. Please select your primary course delivery method.

- ◯ a. A combination of online-delivered and face-to-face courses
- ◯ b. Exclusively distance education or online courses
- ◯ c. Only face-to-face courses (no technology to deliver course)

9. Please provide information about your teaching experience

a. Years in Education	[▼]
b. Years in Higher Education	[▼]
c. Years at Current Institution	[▼]

10. Please indicate your tenure status.

- ◯ a. Tenured
- ◯ b. Non-tenured
- ◯ c. Not on a tenure track faculty line
- ◯ d. Institution does not have/enforce a tenure process

11. Please indicate your faculty rank.

- ◯ Lecturer
- ◯ Instructor
- ◯ Assistant Professor
- ◯ Associate Professor
- ◯ Professor

Other (please specify)

[ ]

CMS Diffusion of Innovations Survey

12. Please select the category that best represents your faculty position during the 2009-2010 academic year.

- ◯ Faculty—Administrative
- ◯ Faculty—Teaching
- ◯ Faculty—Teaching and Administrative
- ◯ Administrator
- ◯ Faculty Development Staff

Other (please specify)

13. Please indicate your program area/discipline.

14. Which of the following best describes your race/ethnicity?

- ◯ a) White or Caucasian
- ◯ b) African American or Black
- ◯ c) American Indian, Native American or Alaskan
- ◯ d) Asian American or Asian
- ◯ e) Hispanic or Latino/a or Chicano/a

Other (please specify)

15. Please indicate your gender.

- ◯ Male
- ◯ Female

16. Please indicate your age group.

- ◯ 20-29
- ◯ 30-39
- ◯ 40-49
- ◯ 50-59
- ◯ 60+

3. Perceived Attribute–Relative Advantage

Relative Advantage is "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, 15).

CMS Diffusion of Innovations Survey

17. Based on my experiences with the CMS, I think using the CMS...

	Strongly Disagree	Disagree	Neutral/Uncertain	Agree	Strongly Agree	N/A
1. Enables (would enable) me to significantly improve the overall quality of my teaching.	◯	◯	◯	◯	◯	◯
2. Makes (would make) it easier to do my job.	◯	◯	◯	◯	◯	◯
3. Enables (would enable) me to accomplish course management tasks (manage course content, assignments, and resources) more efficiently.	◯	◯	◯	◯	◯	◯
4. Is (would be) an efficient use of my time and increases my productivity	◯	◯	◯	◯	◯	◯
5. Allows (would allow) me greater flexibility and control over my work	◯	◯	◯	◯	◯	◯
6. Allows (would allow) me to reach wider audiences	◯	◯	◯	◯	◯	◯
7. Allows (would allow) me to develop new technological skills.	◯	◯	◯	◯	◯	◯
8. Enables (would enable) me to use technology more innovatively in my teaching.	◯	◯	◯	◯	◯	◯
9. Helps (would help) me plan and improve student learning.	◯	◯	◯	◯	◯	◯
10. Allows (would allow) my students to develop greater technological skills.	◯	◯	◯	◯	◯	◯
11. Allows (would allow) for deeper or more meaningful student learning.	◯	◯	◯	◯	◯	◯
12. Increases (would increase) student access to class information.	◯	◯	◯	◯	◯	◯
13. Encourages (would encourage) student engagement with the course content	◯	◯	◯	◯	◯	◯
14. Increases (would increase) interaction between students and the instructor.	◯	◯	◯	◯	◯	◯
15. The benefits of using the CMS outweigh the hassle factor" (related to time and effort required to learn/use the CMS and the potential for frequent frustrations)	◯	◯	◯	◯	◯	◯

CMS Diffusion of Innovations Survey

Feel free to comment or explain any of your answers

4. Perceived Attribute: Compatibility

Compatibility is "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of the potential adopters" (Rogers, 2003, 15).

18. Based on my experiences with the CMS, I think ...

	Strongly Disagree	Disagree	Neutral/Uncertain	Agree	Strongly Agree	N/A
1. Using the CMS fits (would fit) well with my teaching style.						
2. Using the CMS supports (would support) my philosophy of teaching.						
3. Using the CMS is (would be) compatible with my students' needs.						
4. Using the CMS is (would be) compatible with the resources I am currently using in my course(s).						
5. I feel (would feel) comfortable using the CMS.						
6. Using the CMS is (would be) compatible with most aspects of my teaching.						
7. Using the CMS for academic purposes is (would be) compatible with all religious and cultural aspects of my work.						
8. Courses utilizing online technologies such as the CMS are equal or superior in quality to those that do not.						
9. The lack of direct interpersonal contact and feedback from students does (would) not present a problem.						
10. The CMS is (would be) compatible with my level of technology expertise and experience.						

Feel free to comment or explain any of your answers

CMS Diffusion of Innovations Survey

5. Perceived Attribute: Complexity

Complexity is "the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003, 16).

19. Based on my experiences with the CMS, I think...

	Strongly Disagree	Disagree	Neutral/Uncertain	Agree	Strongly Agree	N/A
1. Learning to use the CMS is (would be) easy for me.	○	○	○	○	○	○
2. I find (would find) it simple to manage my course and student data using the CMS.	○	○	○	○	○	○
3. I can (could) easily integrate the CMS into my courses.	○	○	○	○	○	○
4. I do not find (would not find) it difficult to add content to the CMS.	○	○	○	○	○	○
5. I find (would find) it easy to modify the CMS course design.	○	○	○	○	○	○
6. I am (would be) able to easily use the Grade Center.	○	○	○	○	○	○
7. I am (would be) able to use the communication tools quickly and easily.	○	○	○	○	○	○
8. I am (would be) able to easily use the test/survey features in the CMS.	○	○	○	○	○	○
9. I am (would be) able to easily utilize the group collaboration functions in the CMS.	○	○	○	○	○	○
10. It is (would be) easy for me to remember how to perform tasks in the CMS.	○	○	○	○	○	○

Feel free to explain any of your answers

6. Perceived Attribute: Trialability

Trialability is "the degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003, 16).

CMS Diffusion of Innovations Survey

20. Based on what I know right now, I think. . .

	Strongly Disagree	Disagree	Neutral/Uncertain	Agree	Strongly Agree	N/A
1. I was (am) permitted to use the CMS on a trial basis long enough to see what it could/can do.	○	○	○	○	○	○
2. A site is available to me to try out various tools and components of the CMS before using them in my courses	○	○	○	○	○	○
3. Before deciding whether to use any of the CMS tools/features, I am (would be) able to experiment with their use.	○	○	○	○	○	○
4. I can try out individual features of the CMS at my own pace.	○	○	○	○	○	○
5. I am aware of opportunities to try out various uses of the CMS.	○	○	○	○	○	○
6. I have been a student in a course using the CMS.	○	○	○	○	○	○
7. Being able to try out features of the CMS is important to me.	○	○	○	○	○	○

Feel free to explain any of your answers

7. Perceived Attribute: Observability

Observability is "the degree to which the results of an innovation are visible to others" (Rogers, 2003, 16).

21. Based on what I know right now, I think. . .

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	N/A
1. I have observed how other teachers are using the CMS in their teaching.	○	○	○	○	○	○
2. Many of my colleagues use the CMS.	○	○	○	○	○	○
3. I have seen or heard about students using the CMS for another instructor's course.	○	○	○	○	○	○
4. I have been provided with "best practices" examples of CMS use.	○	○	○	○	○	○
5. The results of using the CMS are apparent to me.	○	○	○	○	○	○
6. I would be able to explain why using the CMS may or may not be beneficial.	○	○	○	○	○	○

Feel free to explain any of your answers

CMS Diffusion of Innovations Survey

8. Organizational Support

22. Please indicate your level of agreement with the following statements regarding ORGANIZATIONAL POLICIES that support the adoption of the CMS at your institution.

	Strongly Disagree	Disagree	Neutral/Uncertain	Agree	Strongly Agree	N/A
1. Using the CMS fits into my institution's vision, mission, and goals.	○	○	○	○	○	○
2. My institution provides the technical infrastructure to support using the CMS in my courses.	○	○	○	○	○	○
3. I am adequately rewarded/compensated for incorporating the CMS in my teaching practices.	○	○	○	○	○	○
4. Using the CMS enhances my ability to achieve tenure and promotion.	○	○	○	○	○	○
5. Technological skills/using the CMS are important when making hiring/tenure decisions.	○	○	○	○	○	○

Feel free to explain any of your answers

CMS Diffusion of Innovations Survey

23. What incentives and rewards does your college offer for using the CMS to incorporate online teaching methods in your courses? (Choose all that apply.)

- [ ] Stipend
- [ ] Release time
- [ ] Sabbaticals
- [ ] Mini-grants
- [ ] Continuing education stipends
- [ ] Tied to promotion/tenure
- [ ] Required in contract
- [ ] Tuition reimbursement
- [ ] New technology
- [ ] Private e-mails/letters from administration (i.e. department chair, V.P. of Academic Affairs)
- [ ] Letter from the President
- [ ] Gift certificates
- [ ] Mention in institutional newsletters/website/annual report
- [ ] Awards for teaching excellence
- [ ] Opportunity to showcase teaching practices on campus
- [ ] None
- [ ] Don't Know

Feel free to comment or explain any of your answers

24. Please indicate whether there are any penalties for not using the CMS.

CMS Diffusion of Innovations Survey

25. Please indicate your level of agreement with the following statements regarding ORGANIZATIONAL PROCEDURES that support the adoption of the CMS at your institution.

	Strongly Disagree	Disagree	Neutral/ Uncertain	Agree	Strongly Agree	N/A
1. My institution has communicated its strategic plan for the implementation of the CMS in teaching practices.	◯	◯	◯	◯	◯	◯
2. I feel included in the dialogue about technology and distance education initiatives.	◯	◯	◯	◯	◯	◯
3. The procedure for establishing course web sites using the CMS encourages faculty use of the system.	◯	◯	◯	◯	◯	◯
4. I am generally satisfied with the responses or resolution to problem(s) with the CMS.	◯	◯	◯	◯	◯	◯
5. My institution provides professional development activities to help faculty learn and use the CMS.	◯	◯	◯	◯	◯	◯
6. Professional development activities related to the CMS have been effective.	◯	◯	◯	◯	◯	◯

Feel free to explain any of your answers or add other incentives/barriers.

CMS Diffusion of Innovations Survey

26. Please indicate your level of agreement with the following statements regarding ORGANIZATIONAL NORMS that support the adoption of the CMS at your institution.

	Strongly Disagree	Disagree	Neutral/ Uncertain	Agree	Strongly Agree	N/A
1. The goals and objectives regarding use of the CMS are shared by faculty as well as administration.	○	○	○	○	○	○
2. My supervisor supports/encourages the use of the CMS.	○	○	○	○	○	○
3. My colleagues think that I should use the CMS for my course work.	○	○	○	○	○	○
4. People in my institution who use the CMS have more prestige than those who do not.	○	○	○	○	○	○
5. Using the CMS improves my image within my department or the institution.	○	○	○	○	○	○
6. Innovativeness and experimentation are encouraged at my institution.	○	○	○	○	○	○
7. In terms of using the CMS, it is important to me to consider what my peers think.	○	○	○	○	○	○
8. In terms of using the CMS, it is important to me to consider what my students think.	○	○	○	○	○	○

Feel free to explain any of your answers or add other incentives/barriers.

Appendix C: Breakdown of Questions by Origin

McQuiggan

Davis's TAM

Moore and Benbasat: M/B

Perceived Attribute: Relative Advantage

Enables (would enable) me to significantly improve the overall quality of my teaching. (McQuiggan)
TAM—improve job performance, enhance effectiveness—M/B improve quality of work)
Makes (would make) it easier to do my job. (McQuiggan, TAM, M/B)
Enables (would enable) me to accomplish course management tasks (manage course content, assignments, schedule, materials, and resources) more quickly. (McQuiggan, TAM, M/B)
Is (would be) a more efficient use of my time and increases my productivity (TAM—modified; M/B modified)
Enhances (would enhance) my effectiveness as a teacher. (TAM; M/B)
Allows (would allow) me greater flexibility and control over my work (McQuiggan—modified; M/B—modified)
Allows (would allow) me to reach wider audiences. (lit review)
Allows (would allow) me to develop new technological skills. (lit review)
Enables (would enable) me to use technology more innovatively in my teaching. (lit review)
Helps (would help) me plan and improve student learning. (lit review)
Allows (would allow) my students to develop greater technological skills. (lit review)
Allows (would allow) for deeper or more meaningful student learning. (lit review)
Increases (would increase) student access to class information. (McQuiggan)
Encourages (would encourage) student engagement with the course content. (lit review)
Increases (would increase) interaction between students and the instructor. (McQuiggan—mod)
The benefits of using the CMS outweigh the hassle factor" (related to increased faculty workload, time, and effort required to use the CMS and the potential for frequent

frustrations with the technology). (M/B—modified)
Overall, I find (would find) using the CMS to be advantageous in my job. (M/B)

Perceived Attribute: Compatibility

Using the CMS fits (would fit) well with my teaching style. (McQuiggan—modified; M/B—modified)
Using the CMS supports (would support) my philosophy of teaching. (McQuiggan)
Using the CMS is (would be) compatible with my students' needs. (McQuiggan)
Using the CMS is (would be) compatible with the resources I am currently using in my course(s). (McQuiggan)
I feel (would feel) comfortable using the CMS. (McQuiggan—modified)
Using the CMS is (would be) compatible with most aspects of my teaching. (McQuiggan—modified—M/B)
Using the CMS for academic purposes is (would be) compatible with all religious and cultural aspects of my work. (lit review)
Courses utilizing online technologies such as the CMS are equal or superior in quality to those that do not. (lit review)
The lack of direct interpersonal contact and feedback from students does (would) not present a problem. (lit review)
The CMS is (would be) compatible with my level of technology expertise and experience.

Perceived Attribute: Complexity

Learning to use the CMS is (would be) easy for me. (McQuiggan)
I find (would find) it easy to manage my course and student data with the CMS. (McQuiggan)
Learning how to use the CMS to enhance teaching and learning is (would be) not difficult. (McQuiggan-modified)
It is (would be) easy for me to become skillful at using the CMS. (TAM)
I can (could) easily integrate the CMS into my courses. (McQuiggan)
I find (would find) it easy to do what I want to do with the CMS. (TAM, McQuiggan, M/B)

It is (would be) easy for me to remember how to perform tasks in the CMS. (M/B)
I am (would be able) to use the CMS components and tools I need quickly and easily. (lit review)
My interactions with the CMS tools and navigation are (would be) clear and understandable (M/B)
Overall, the CMS is (would be) easy to use. (McQuiggan, M/B)

Perceived Attribute: Trialability   Based on what I know right now, I think. . .

I was (am) permitted to use the CMS on a trial basis long enough to see what it could/can do. (lit review)
A site is available to me to try out various tools and components of the CMS before using them in my courses (McQuiggan—modified; M/B).
Before deciding whether to use any of the CMS tools/features, I am able to experiment with their use. (McQuiggan—modified; M/B)
I can try out individual features of the CMS at my own pace. (McQuiggan-modified)
I am aware of opportunities to try out various uses of the CMS. (M/B)
I have been a student in a course using the CMS. (lit review)
Being able to try out features of the CMS is important to me. (lit review)

Perceived Attribute: Observability

I have observed how other teachers are using the CMS in their teaching. (McQuiggan—modified; M/B modified)
Many of my colleagues use the CMS. (McQuiggan—modified; M/B modified)
I have seen or heard about students using the CMS for another instructor's course. (McQuiggan)
I have been provided with "best practices" examples of CMS use. (lit review)
The results of using the CMS are apparent to me. (M/B)
I would be able to explain why using the CMS may or may not be beneficial. (M/B—modified)

Organizational Support

The choice to adopt or reject the CMS was... (variation of Voluntariness scale—M/B)

	Mandated by my superiors or job description
	Made by consensus among the members of the system/institution (e.g. faculty vote)
	Voluntary and up to the individual instructor

There are several possibilities for establishing course web sites automatically using the CMS. Which of the following is the standard implementation procedure for your campus?

	Every course on campus has a course website automatically generated by the CMS administrator and the faculty member cannot turn it off.
	Every course on campus has a course website automatically generated by the CMS administrator, but the faculty member can turn if off if they so desire.
	CMS course websites are generated only upon request.
	Other: Please Specify

What incentives and rewards does your college offer for using the CMS and/or incorporating online technologies in your teaching practices? (Choose all that apply.)

	Stipend
	Release time
	Sabbaticals
	Mini-grants
	Continuing education stipends
	Tied to promotion/tenure
	Required in contract
	Tuition reimbursement
	New technology
	Private E-mails/letters from administration (i.e. department chair, V.P. of Academic Affairs)
	Letter from the President
	Gift certificates
	Mention in institutional newsletters/website/annual report
	Awards for teaching excellence
	Opportunity to showcase teaching practices on campus
	None

Organizational Support 2
Liu (2005) noted that administrators need to develop long-term strategic plans that incorporate all stakeholders in order to ensure the readiness for adoption and should work to improve the campus culture so that technology adoption is sustained. Please indicate

your level of agreement with the following statements regarding organizational policies, procedures, and norms that support the adoption of the CMS at your institution.

My institution provides specific resources or activities that encourage faculty to learn and use the CMS.
My institution provides ongoing faculty development activities to help faculty integrate the CMS into their teaching practices.
Adequate support and training in effective online communication/ feedback have been provided.
Funds and material resources the college commits to the maintenance of the CMS are adequate.
My institution's technical infrastructure supports using the CMS in my courses.
It is easy/possible to report problems that arise while working in the CMS.
I am generally satisfied with the responses or resolution to problem(s) with the CMS.
Using the CMS enhances my ability to achieve tenure and promotion.
The college supports faculty attendance at professional development activities.
The college considers technological skills/using the CMS important when making hiring/tenure decisions.
I am adequately rewarded/compensated for developing courses for use in the CMS
I am adequately rewarded/compensated for incorporating the CMS and online technologies in my teaching practices.
People in my institution who use the CMS have more prestige than those who do not. (M/B)
People in my institution who use the CMS have a high profile. (M/B)
Using the CMS fits into my institution's missions and goals.
My institution has developed a strategic plan for the adoption and implementation of online teaching methods and/or the CMS.
My department/ institution has developed specific objectives related to student technology literacy.
Using the CMS improves my image within my department or the institution. (M/B)
Using the CMS is viewed positively by my institution's administrative leaders.
Department chairs and deans effectively model usage of the CMS.

Innovativeness and experimentation are encouraged at my institution.
I feel included in the dialogue about technology and distance education initiatives.

Appendix D: Invitation to Participate Sent Through SurveyMonkey

Dear Education Colleague:

I am a doctoral candidate in Educational Technology in Higher Education at Walden University. My dissertation research is entitled: "Perceived Attributes and Organizational Support Influencing Course Management System Adopter Status in Historically Black Colleges and Universities." I have been granted permission by your institution to contact faculty to invite them to participate in my study. All you have to do is complete the online survey described below; it will only take about 15 minutes.

Here is a link to the survey: http://www.surveymonkey.com/s.aspx
This link is uniquely tied to this survey and your email address. Please do not forward this message.

Through my literature review, I determined that there is a gap in the research related to HBCUs and their adoption of online education. Much of the research related to faculty perceptions of online learning and course management system (CMS) has neglected to involve the participation of minority serving institutions, preferring to focus attention on traditionally white institutions. Therefore, I chose HBCUs who currently use a course management system for my target population. The purpose of the study is to identify characteristics of faculty members, their perceptions of the CMS, and organizational characteristics of the college/university in order to determine their influence on faculty's use of the CMS in their teaching practices. Roger's diffusion of innovations theory provides the framework for analyzing the findings.

Participation is completely voluntary and you may withdraw from participating at any time. In addition, no specific identifying information is gathered by this survey. If you have any questions about this study, please contact me at gayla.keesee@waldenu.edu or at (910) 678-0156. You can also contact my Dissertation Chair, Dr. MaryFriend Shepard, at maryfriend.shepard@waldenu.edu or at (229) 227-0240. If you want to discuss privately your rights regarding this research with a representative of Walden University, please call Dr. Leilani Endicott, the Chair of the Institutional Research Board, at 800-925-3368, ext 1210.

I am very grateful for your time and consideration. If you decide to participate, I am asking that you complete the online survey within the next two weeks. I look forward to your participation so that we may work together to help fill the gap regarding the successes, challenges, and practices among HBCUs. A copy of my dissertation with a summary of the results will be posted online at http://cmsdiffusionresearch.pbworks.com. I will notify the Vice President of Academic Affairs when they are available.

Please note: If you do not wish to receive further emails from me, please click the link below, and you will be automatically removed from the mailing list.
http://www.surveymonkey.com/optout.aspx

Yours truly,
Gayla S. Keesee
(910) 678-0156

Appendix E: First Reminder E-mail Sent Through SurveyMonkey

Subject: Reminder to complete CMS Diffusion Survey

Dear Colleague:

You recently received a request to complete the CMS Diffusion of Innovations Survey. I realize that this is a busy time of year, but the survey will only take 10-15 minutes of your time. So, if you can spare a few minutes, please do. If you are interrupted while filling out the survey or need to terminate your session, you can always click on the link again and resume where you left off.

If you have already completed the survey, many thanks. I greatly appreciate your time and feedback. A copy of my dissertation with a summary of the results will be posted online at http://cmsdiffusionresearch.pbworks.com. I will notify the Vice President of Academic Affairs when they are available.

Here is a link to the survey:
XXXX

This link is uniquely tied to this survey and your email address. Please do not forward this message.

Please note: If you do not wish to receive further emails from us, please click the link below, and you will be automatically removed from our mailing list.
http://www.surveymonkey.com/optout.aspx

Thanks again for your participation! If you have any questions, please do not hesitate to contact me at 678-0156 or keeseeg@faytechcc.edu.

Gayla S. Keesee
Walden University
Ph.D. Candidate

Appendix F: Second Reminder E-mail Sent Through SurveyMonkey

Subject: Please complete CMS Diffusion Survey

Dear Colleague:

I am writing to remind you to complete the brief CMS Diffusion of Innovations Survey. Your participation will help me reach my goal of at least a 40% rate of return. The survey will only take 10-15 minutes of your time. Your participation will also help fill a gap in educational technology literature as well as literature documenting HBCU practices. Please respond soon, since the survey is scheduled to be closed on XXX at XXX.

If you have already completed the survey, your time and feedback are sincerely appreciated. A copy of my dissertation with a summary of the results will be posted online at http://cmsdiffusionresearch.pbworks.com. I will notify the Vice President of Academic Affairs when they are available. I hope that the results can inform professional development initiatives to support the adoption of course management systems and/or online teaching practices.

Here is a link to the survey:
XXXX

This link is uniquely tied to this survey and your email address. Please do not forward this message.

Please note: If you do not wish to receive further emails from us, please click the link below, and you will be automatically removed from our mailing list.
http://www.surveymonkey.com/optout.aspx

Thanks again for your participation! If you have any questions, please do not hesitate to contact me at 678-0156 or keeseeg@faytechcc.edu.

Gayla S. Keesee
Walden University
Ph.D. Candidate

Appendix G: Invitation to Participate in Expert Panel

Dear Education Colleague:

I am a doctoral candidate in the Richard Riley College of Education at Walden University. I am conducting a research study to identify characteristics of faculty members, their perceptions of the course management system (CMS), and organizational characteristics of the college/university in order to determine their influence on faculty's use of the CMS in their teaching practices at Historically Black Colleges and Universities (HBCUs) in Georgia. You are invited to take participate in an Expert Panel review of the *Course Management System Diffusion of Innovations Survey* to determine reliability of the instrument. The data from this instrument will be used in the completion of my dissertation for my Ph.D. in Educational Technology in Higher Education.

If you consent, you will be sent a paper version of the survey as well as the link to the survey in SurveyMonkey. You will also receive an Expert Panel Review Document in which you will evaluate how representative the items in the *Course Management System Diffusion of Innovations* questionnaire are of Rogers's diffusion of innovations theory. That is, to what extent do you think that each question on the survey measures diffusion of innovations theory? You will also be asked to determine the clarity and comprehensiveness of each item.

To be part of the study you must demonstrate knowledge of Roger's Diffusion of Innovations Theory through one of the following means:

- Publications related to Rogers's theories or diffusion of innovations
- Presentations related to Rogers's theories or diffusion of innovations
- Research/teaching activities related to Rogers's theories or diffusion of innovations
- Relevant training related to Rogers's theories or diffusion of innovations

I will ask you to sign and return the attached consent form to indicate your ability to meet the stated criteria willingness to participate in the Expert Panel review via E-mail. Your electronic signature will be considered valid by Walden University's Internal Review Board as noted. Your participation in this study is voluntary. You may discontinue your participation at any time. If you agree, I ask that you provide your recommendations within two weeks of receiving the survey information. Please also indicate whether I have your permission to include your name, title, and institution in my dissertation.

If you have any questions about this study, please contact me at gayla.keesee@waldenu.edu or at (706) 414-6516. You can also contact my Dissertation Chair, Dr. MaryFriend Shepard, at maryfriend.shepard@waldenu.edu or at (229) 227-0240.

Yours truly,
Gayla S. Keesee

Appendix H: Instructions to Expert Panel

Dear Expert Panel Member:

Thank you for agreeing to participate as an expert panel member for my dissertation research on faculty perceptions and attitudes toward the use of course management systems at HBCUs in Georgia. I appreciate your expertise and time in providing content validity for the instrument I have developed to gather data for this study, the *Course Management System Diffusion of Innovations Survey*. I am attempting to identify characteristics of faculty members, their perceptions of the course management system (CMS), and organizational characteristics of the college/university in order to determine their influence on faculty's use of the CMS in their teaching practices.

The following research questions will be addressed in this study:

1. What is the relationship between the *adoption status of faculty* and their perceptions of the *perceived attributes* (1.1 relative advantage, 1.2 compatibility, 1.3 complexity/difficulty, 1.4 trialability, and 1.5 observability) of adopting the CMS?

2. What is the relationship between the *adoption status of faculty* and their perceptions regarding the 2.1 *organizational policies, procedures,* and 2.2 *norms* at their institution influencing adoption of the CMS?

You are requested to evaluate how representative the items in the *Course Management System Diffusion of Innovations* questionnaire are of Rogers's diffusion of innovations theory. That is, to what extent do you think that each question on the survey measures diffusion of innovations theory? Because diffusion of innovations theory comprises several different factors, the survey is divided into sections, which also represent each of the independent variables: perceived attributes and organizational support. Information on adopter characteristics and level of integration was sought to determine adopter category/status.

You are also asked to indicate whether any item may be included as a factor in another section. The clarity of each item is another important aspect for you to evaluate. Specifically, indicate how clear you think each item is. Finally, you are asked to evaluate the overall comprehensiveness of the entire measure by either adding or deleting items.

Definitions:
In his book, *Diffusion of Innovation*, Rogers (2003) defined *diffusion* as "the process by which an innovation is communicated through certain [communication] channels over time among the members of a social system."

Rogers (2003) labeled individuals and organizations as **"innovators," "early adopters,"** the **"early majority,"** the **"late majority,"** and **"laggards"** depending on their ***innovativeness***, or the degree to which they show an affinity for a particular innovation in comparison to other members of the social system. An individual's innovativeness depends both on the individual's **characteristics** and the **social system** in which the individual is a member.

Rogers (2003) identified five **perceived attributes**: (a) complexity, (b) trialability, (c) observability, (d) relative advantage, and (e) compatibility (2003, p. 15-16).

- **Relative advantage** refers to the degree to which an innovation is viewed as better than the option it supplants. Important factors include economic advantages, social prestige, convenience, and satisfaction.
- **Compatibility** refers to the degree in which an innovation is perceived as being consistent with the adopter's existing values, past experiences and practices, and needs.
- **Complexity** refers to the degree to which an innovation is easy or simple to understand or use.
- **Trialability** refers to the degree to which an innovation may be experimented with on a limited basis.
- **Observability** pertains to the degree the results of adoption are visible to others.

INSTRUCTIONS--This measure is designed to evaluate the content validity of the Course Management System Diffusion of Innovations Survey. Please rate each item as follows. Space is provided for you to comment on the item or to suggest revisions.

- Please rate the level of **REPRESENTATIVENESS** on a scale of 1-4, with 1 being the least representative and 4 being the most representative.
- Please indicate the level of **CLARITY** for each item, also on a four-point scale. Please indicate any changes in wording that you believe would make the data collection tool clearer.
- Please evaluate the **COMPREHENSIVENESS** of the entire measure by indicating any items that should be deleted or added.
- Finally, please indicate which **research question correlates** with each of the survey items. If you think the survey question addresses none of the research questions, please indicate with NONE.
- At the end, based upon your review of the survey, please indicate how long you think it will take to complete the survey. The goal is 15 minutes or less.

Representative of DoI Theory: Are the items representative of diffusion of innovations theory as outlined above?

1. Item is NOT REPRESENTATIVE
2. Item needs MAJOR revisions to be representative
3. Item needs MINOR revisions to be representative
4. Item is REPRESENTATIVE

Suggestions:

Clarity: Are the items well-written and at an appropriate reading level for higher education faculty?

1. Item is NOT CLEAR
2. Item needs MAJOR revisions to be clear
3. Item needs MINOR revisions to be clear
4. Item is CLEAR

Suggestions:

Comprehensiveness of item: The instrument is designed to measure faculty perceptions of the perceived attributes of the course management system, of organizational support, and adopter status. Please evaluate to what extent you think the entire instrument is comprehensive. In other words, are the items sufficient to represent the entire domain of diffusion of innovations theory?

1. Item not necessary/redundant
2. Item useful but not essential
3. Item is essential

Suggestions:

Thank you for your time. I hope to receive your responses within the next week. Let me know if you have any questions (gskeesee@gmail.com or 706-414-6515).

Appendix I: Revised Adopter Characteristic Statements

Innovator

~~I was one of the first people to use the CMS.~~
I am often one of the first persons to try new technologies such as the CMS.
I tend to be a risk-taker and active-information seeker.
I tend to latch on to new technology as soon as it is available to me.
My interest tends to be more with the technology itself than with its application to specific problems.
I am willing to invest time and energy to learn on my own and adapt quickly to new technologies.

Early Adopter

I explored the CMS for its potential to bring about improvements in my teaching.
I am willing to try new ~~things~~ technologies and am not averse to occasional failure.
~~I tried the CMS soon after it was available.~~
I share my experiences with the CMS with my colleagues.
My colleagues often ask for my advice/help regarding the CMS.
I ~~will~~ experiment with a new CMS feature~~, working it into my classroom materials and homework assignments~~ to see if it might ~~make a significant~~ improveme~~nt in~~ teaching and learning.

Early Majority

I adopted a "wait and see" attitude toward the CMS.
I wanted examples of close-to-home successes before adopting the CMS.
I wanted to see the value of the CMS before adopting it.
I wanted to make sure that adoption would be easy and hassle-free.
I wanted to make sure I would have the necessary technical support and advice to learn/use the CMS.

Late Majority

I was skeptical about using the CMS.
I accepted the CMS later in the game once it had become established among the majority of the faculty. ~~and/or the institutional norms or policies favored adoption.~~
I accepted the CMS only when it became a necessity.
I began using the CMS because of pressure from my peers and/or students.
I tend to use CMS features that seem similar to the ways I have always taught.

Laggards

I am usually not interested in adopting new technology.
I see no use for adopting the CMS in my teaching practices.
My current teaching practices have worked well so far without using the CMS.
Just because everyone else is using the CMS, doesn't mean that I need to.

Appendix J: Consent Form

Consent Form

You are invited to take part in a study of HBCU faculty perceptions. You were chosen for this study because you are currently a full-time faculty member at an HBCU. This form is part of a process called “informed consent” to allow you to understand this study before deciding whether to take part.

Gayla S. Keesee, who is a doctoral student at Walden University, is conducting this study.

Background Information:
The purpose of this survey is to identify characteristics of faculty members, their perceptions of the course management system (CMS) and organizational policies, procedures, and norms in order to determine their influence on faculty's use of the CMS in their teaching practices

For the purposes of this survey, “A CMS is Internet-based software that manages student enrollment, tracks student performance, and creates and distributes course content. In this way, the CMS enables teachers to extend the classroom beyond its traditional boundaries of time and space” (Ullman & Rabinowitz, 2004). Common course management systems include Blackboard, WebCT, ANGEL, and e-College. Perceived attributes are factors that explain variations in rates of adoption. They include relative advantage, complexity, compatibility, observability, and trialability.

Procedures:
If you agree to be in this study, you will be asked to:

- Complete the SurveyMonkey questionnaire within the next two weeks.
- Providing any comments or feedback is optional.

Voluntary Nature of the Study:
Your participation in this study is voluntary. This means that everyone will respect your decision of whether or not you want to be in the study. No one at your institution will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind during the study. 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 HBCU practices. Findings from this study can be used by administration and faculty development professionals to encourage faculty adoption and implementation of course management systems at HBCUs.

Compensation:
There is no compensation provided to complete this survey.

Confidentiality:
Any information you provide will be kept confidential. The researcher will not use your information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in any reports of the study.

Contacts and Questions:
You may ask any questions you have now. Or if you have questions later, you may contact the researcher via E-mail at gayla.keesee@waldenu.edu or 706-414-6515. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 1-800-925-3368, extension 1210. Walden University's approval number for this study is 03-19-10-0308229 and it expires March 18, 2011. Winston-Salem State University's IRB # is 2986-10-0047 and expires March 23, 2011. Morehouse University IRB # is 1002002 and is valid from 3/24/2010 until 3/23/2011.

Gayla S. Keesee
Researcher

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

Statement of Consent:
I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By clicking on the Next button I am agreeing to the terms described above.

Curriculum Vitae

Gayla S. Keesee

gskeesee@gmail.com

SUMMARY:

Strong background in instructional design, adult learning theory, distance education, and instructional technology. Experience teaching and developing face-to-face, hybrid, and online courses. Experience with a wide variety of web and print authoring tools. Proven ability to work with experienced and novice faculty and students. Research interests include: learning theories, faculty development, online learning, communities of practice, transformative learning, Web 2.0, 3D in education, game-based learning.

PERSONAL ATTRIBUTES:

- Blog: http://edtechlady.blogspot.com/
- Wiki: http://i3dlearning.pbworks.com/
- SlideShare: http://www.slideshare.net/gskeesee
- Primary education background: English, History, Education, and Technology
- Student-centered, constructivist; encourages collaborative learning environment
- Flexible, innovative, energetic self-starter
- Highly competent, outcomes driven with sound organizational skills
- Ability to multi-task and work under deadline pressures

Technical Skills

- Blackboard 8.0, Blackboard 9.0, e-college, Moodle course management systems
- MS Office
- SoftChalk
- Elluminate
- Camtasia
- Adobe Photoshop
- Basic HTML
- Web 2.0 tools including: blogs, PBWorks, Facebook, podcasting, Google docs, SlideShare,

FORMAL AND PROFESSIONAL EDUCATION

Ph.D. Candidate in Educational Technology in Higher Education
Walden University, 2005-present
Dissertation Title: Perceived Attributes and Organizational Support Influencing Course Management System Adopter Status in Historically Black Colleges and Universities

M.Ed. in Secondary Education/English
Augusta State University, May, 1999   Summa Cum Laude

B.A. in English and History (double major)
Augusta College, June, 1981   3.23 GPA

PROFESSIONAL ACCOMPLISHMENTS

1/2009-present Instructional Designer, Fayetteville Technical Community College
Adjunct Instructor, Early Childhood Department

Develop project plans and storyboards for the development of 3-Dimensional interactive learning activities (3D-ILAs) utilizing appropriate instructional methodology
Work closely with subject matter experts and design team in the development of content and activities
Developed a series of templates, tools, and processes to streamline the development process
Utilize emerging technologies including wikis, blogs, Google docs to support training and team collaboration
Coordinated first annual i3D Showcase (2010)
Coordinate with Supervisor in writing and execution of educational grants
Design and deliver professional development activities to a diverse faculty including traditional, hybrid and online models
Develop and facilitate Blackboard Boot Camp, Effective Online Teaching course, and Technology Boot Camp
Collaborate with online standards team for annual review of FTCC's online academic standards
System Administrator for FTCC i3D Collection in NCLOR
Mentor: Kenan Fellow (2009-2011)
Committee Member: Innovations Committee—hosted Innovations Showcase 2010

1/2008-2/2008 Instructional Designer, Queens University of Charlotte

Assisted faculty and administration with hands-on support for learning SharePoint LMS
Assisted 15 faculty from various disciplines with the design and conversion of teaching materials for online delivery
Collaborated and consulted with faculty on the effective use of multimedia, graphic training aids, web-based, and software resources to improve student learning in synchronous and asynchronous learning environments

5/2003-12/2007 Education Specialist, Administrative Faculty, Part-time Instructor
Mack Gipson, Jr. Tutorial and Enrichment Center, Paine College

Duties

- English Instructor
- Professional Tutor--reading, writing, literature, research
- Tutor Trainer/Evaluator--10-12 tutors/semester (CRLA Guidelines)
- Workshop Developer/Presenter
- Technology Coach (faculty and students)
- Faculty Learning Community Facilitator
- Marketing and Design Coordinator for TEC
- Chair, 2006-2007 Scholarships, Honors and Awards Committee—digitized procedures
- Grader: Sophomore Proficiency Exit Exam, Writing Placement Tests, English Exit Exams

1999 - 2001 High School English Teacher: South Aiken High & Silver Bluff High -- Aiken County Public Schools

Courses Taught Integrating Technology

American Literature (11th Grade)

Writing Composition (9th Grade)

1997 - 1999 Summer School English Teacher, Thomson High -- McDuffie County Schools

Courses Taught Integrating Technology

9th Grade (Literature and Composition)

11th Grade (American Literature)

12th Grade (English Literature)

1996 - 1997 Language Arts Teacher at Tubman Middle School -- Richmond County Board of Education

Courses Taught Face-to-Face

8th Grade Language Arts showed greatest improvement on the ITBS

1986-1987, English and Remedial Reading Teacher, Laney High School -- Richmond County Board of Education

Courses Taught Face-to-Face

College Prep and General English (9th Grade)

Remedial Reading (9-12 Grades)

OTHER PROFESSIONAL EXPERIENCE

1991 - 1995 Creative Expressions by Gayla

Computer Graphic Designer

- Planned, designed and laid out—brochures, promotional items, flyers, ads, newsletters, labels, logos
- Used specialized computer software to create layouts and design elements
- Bid, proofed, and evaluated color keys or bluelines for accuracy and quality
- Worked successfully in deadline-driven environment

1987 – 1991 Council for Accreditation of Counseling and Related Educational Programs (CACREP)

Assistant Executive Director

- Planned and monitored CACREP's marketing awareness plan
- Assisted in development and maintenance of budget, contracts and event-planning for CACREP Board of Directors, AACD Convention Booth, and 10th Anniversary Celebration activities and promotions

PROFESSIONAL INVOLVEMENT

Professional and Organizational Development Network in Higher Education (POD Network)

International Society for Technology in Education (ISTE)

International Writing Centers Association

- 2005-2006 IWCA Week Task Force Member

College Reading and Learning Association

- 2005 CRLA Southeast Symposium Coordinating Committee
- 2005 Professional Development Scholarship Recipient

National Tutoring Association

- National Tutoring Week activities (2003-2006)

COMMUNITY INVOLVEMENT

Unitarian Universalist Church of Augusta

Presented with Resolution recognizing outstanding service to church and community (January, 2008)

- **Publicity Committee:** Chair (2 years), newsletter editor (3 years), coordinated communication efforts within the church; liaison with local media representatives
- **Technology Committee:** redesigned church website (2006), created church wiki and Social Justice Ning (2008), researched and made recommendations regarding technology purchases
- **Social Justice Council**: Chair (2008-2009)—involved in projects related to Economic Justice, Environmental Justice, Health & Family Justice, Peacemaking, and Racial & Cultural Diversity (social action, education, witness, advocacy); Co-chair: Fair Trade Task Force (3 years)
- **Fundraising Committee:** Chair (3 years): Common Grounds Coffeehouse Coordinator (2 years); Graphic Designer for CafePress store; variety of activities including an Evening in Pair-O-Dice, Fine Arts Auction, several Goods & Services Auctions
- **Children and Youth Religious Exploration Committee**: Communications Officer (1 year), Youth Worship Coordinator (1 year), Faith in Action Coordinator (1 year), teacher (5 years)
- **Worship Committee**: Chair (2 years), member (2 years), guest speaker, reader, worship service coordinator, usher

CSRA AIDS Resources and Education, Inc. (CARE)

- Board of Directors (2003-2005)

National History Day Competition

- Advised two students working on National History Day projects (Documentary, Performance)
- Both represented the state of Georgia at the National level (twice)

Boy Scouts of America

- Trading Post Manager at Camp Linwood Hayne (2001)
- Merit Badge Counselor (1999-2001)
- Developed interactive PowerPoint presentation (*Citizenship in the Nation*) for Merit Badge University