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Factors that Affect Faculty Use of Course Management Systems in Traditional Courses at Private 4-year Historically Black Colleges and Universities: An Empirical Approach

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Factors that Affect Faculty Use of Course Management Systems in
Traditional Courses at Private 4-year Historically Black Colleges and
Universities: An Empirical Approach

by

Hyacinth L. Henry-Burton

A Dissertation submitted in partial fulfillment of the requirements
for the Doctor of Philosophy
in
Information Systems

College of Engineering and Computing
Nova Southeastern University

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An Abstract of a Dissertation Submitted to Nova Southeastern University
in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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Private 4-year Historically Black Colleges and Universities: An Empirical Approach

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Hyacinth L. Henry-Burton
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The use of information technology to supplement and enhance teaching is prevalent in many higher education institutions (HEIs). HEIs throughout the United States have invested in course management systems (CMS); however, despite heavy investments, faculty use of such systems is limited. Many studies were conducted on the use of CMS in HEIs, but they concentrated on faculty use of such systems at non-Historically Black Colleges and Universities (non-HBCUs). Little has been done on the use of CMS in HBCUs.

The goal of this study was to examine factors that affect faculty use of CMS in traditional courses at HBCUs. Facilitating conditions (infrastructural and technical support, training), computer efficacy, perceived usefulness, perceived ease of use, and attitude toward technology were examined to see how they affect faculty use of CMS in private 4-year HBCUs.

Additionally, this study used the survey methodology to collect information from faculty at eleven private 4-year HBCUs. The survey was designed using the Davis Technology Acceptance Model (TAM) instrument, which has been tested and estimated as valid and reliable for its usefulness in developing a predictive model on the acceptance of technology. Other factors that measure support, training, and self-efficacy were added to the survey. The intent of this study was to develop a predictive model on the factors that affect faculty use of CMS in traditional courses in private 4-year HBCUs. A Likert-type scale survey instrument was administered to faculty at the eleven private 4-year HBCUs via the Web.

This study contributed to existing research on CMS. The findings of this study supported the TAM model; the infrastructural support, technical support, training and self-efficacy all predicted both perceived ease of use and perceived usefulness toward CMS. It also found that both perceived ease of use and perceived usefulness predicted attitude toward CMS, and finally both perceived ease of use and perceived usefulness serve as mediators between infrastructural support, technical support, training, self-efficacy and attitude toward CMS. This study provided base knowledge on factors that affect use of CMS at HBCUs, and will help administrators and faculty at HBCUs use CMS more effectively.

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Table of Contents

Abstract ii

Acknowledgements iii

List of Tables v

List of Figures vi

Chapters

1. Introduction 1

Problem Statement 5

Problem Scope and Nature 7

Dissertation Goal 15

Research Questions 16

Hypotheses 16

Relevance and Significance 18

Goal and Research Problem, Generalization, Original Work 20

Barriers and Issues 21

Assumptions 23

Limitations 24

Delimitations 25

Definitions of Terms 25

Summary 27

2. Literature Review 29

Literature Search Strategy 30

Influence of Information Technology 31

Theoretical Framework 38

Course Management Systems and Traditional Classrooms 44

Historically Black Colleges and Universities 45

Technology Use and Acceptance 49

Course Management Systems and Theories 55

Summary of Prior Research on the Topic 56

The Contributions of this Study to the Body of Knowledge 58

3. Methodology 59

Target Population 59

Research Methods 59

Specific Constructs Validation 64

Formats for Results Presentation 65

Approach 68

Resource Requirements 69

Summary 70

4. Results 71

- Data Collection 71
- Descriptive Statistics 73
- Reliability 77
- Pre-Analysis Data Assessment 79
- Summary of Results 82
- Detailed Analysis 83
- Linear Regression 94
- Mediation 97
- Linear Regression 101
- Mediation 103
- Summary 106

5. Conclusions, Implications, Recommendations and Summary 107

- Introduction 107
- Conclusions 107
- Strengths, Weaknesses and Limitations 115
- Implications 117
- Transferability and Generalizability 128
- Recommendations and Future Research 128
- Recommendations for Practice 130
- Summary 131

Appendices

- A. Variables Comparison 136
- B. t Tests for Mean Differences between HBCUs and Non-HBCUs 137
- C. 4-year Private Undergraduate Instructional HBCUs 138
- D. Survey 140
- E. Recruitment Statement 145
- F. Histograms Displaying Descriptive Statistics of Continuous Variables 146

References 157

List of Tables

Tables

1. Product Comparison of the Most Popular Course Management Systems 34
2. Representation of Each HBCU Applicable Faculty 73
3. Frequencies and Percentages of Demographics 75
4. Descriptive Statistics of Continuous Variables 77
5. Cronbach's Alpha Reliability Statistics for the Composite Score 78
6. Correlation Matrix Among Perceived Usefulness, ease of use, Attitude, Self-Efficacy, Infrastructure Support, Technical Support, and Training 81
7. Spearman Correlation Matrix among Perceived Usefulness, ease of use, Attitude, Self-Efficacy, Infrastructure Support, Technical Support, and Training 82
8. Results for Multiple Linear Regression to Predict ease of use 87
9. Results for Multiple Linear Regression to Predict Perceived Usefulness 90
10. Results for Multiple Linear Regression to Predict Attitude 93
11. Results for Multiple Linear Regression Predicting Attitude 95
12. Regression Results with Perceived Usefulness Mediating the Relationship between Self-Efficacy, Infrastructural Support, Technical Support, Training and Attitude 100
13. Results for Multiple Linear Regression Predicting Attitude 102
14. Regression Results with ease of use Mediating the Relationship between Self-Efficacy, Infrastructural Support, Technical Support, Training and Attitude 105
15. Bachelor's degrees awarded by all HBCUs to Black U.S. citizens and permanent residents from 2010-2012 126

List of Figures

Figures

1. Original TAM, Davis (1989) and additional constructs 44
2. Modified TAM (Davis, 1989) based on study findings 83
3. Normal P-P Plot 85
4. Scatterplot of Standardized Residuals as a function of Standardized Predicted Values 86
5. Normal P-P Plot 89
6. Scatterplot of Standardized Residuals as a function of Standardized Predicted Values 89
7. Normal P-P Plot 92
8. Scatterplot of Standardized Residuals as a function of Standardized Predicted Values 92
9. Normal P-P Scatterplot 96
10. Scatterplot of Standardized Residuals as a function of Standardized Predicted Values 97
11. Normal P-P Scatterplot 102
12. Scatterplot of Standardized Residuals as a function of Standardized Predicted Values 103

Chapter 1

Introduction

The use of technology to supplement and enhance learning is prevalent in educational environments, especially in higher education institutions (HEIs). Technology has permeated the way many people work and do business around the globe. However, technology is only a tool. In order to be effective, instructors and students have to apply technology to further learning. For example, many HEIs have adopted course management systems (CMS) as a way of increasing overall teaching quality (Tsai & Talley, 2014). CMS are user-friendly and help instructors manage their courses more efficiently by providing them with tools and functions such as “storage and distribution of teaching materials, recording and monitoring of syllabi and learning activities, and evaluation of both teaching and learning quality” (Tsai & Talley, 2014, p 423).

Nevertheless, although many HEIs make CMS available to instructors, most instructors have been reluctant to use the systems (Jarrahi, 2010). Kultur and Yildirim (2012) stated that faculty use CMS primarily to upload course syllabi, send emails, and post grades. The researchers further reported that faculty use CMS more for managing learners rather than for creating rich interactive learning experiences, and that the more interactive administrative functions of the systems are not being used.

Researchers have conducted studies to discover and predict faculty use and acceptance of various technologies (Sahin & Thompson, 2007; Surendra, 2001). Surendra (2001) found that access, training, and community support were important factors in faculty adoption and use of technology. In another study conducted by Jacobsen (1998),

the factors most related to faculty use of technology were patterns of personal computer use, computer expertise, self-efficacy, and incentives to integrate technology for teaching and learning. Researchers also found that perceived ease of use (the degree to which a person believes using a system will be free from effort), perceived usefulness (the degree to which a person believes that using a system will enhance his or her job performance) (Zhao & Zhu, 2010), computer efficacy (a person's confidence in his or her ability to perform a behavior) (Bandura, 1997), and facilitating conditions are all factors that affect faculty use of technology (Waheed & Jam, 2010). Lack of technical expertise, inadequate faculty compensation and time, and negative attitudes toward technology are other barriers to faculty technology adoption (Chen, 2009).

Course management systems (CMS) are software packages that provide instructors and students with Web-based tools, services, solutions, and resources to support the teaching and learning process in both online and blended environments. They are web-based communications platforms that give students anytime/anyplace access to learning tools such as course content, program information, discussion boards, teacher assistance, document sharing and learning resources (Motaghian, Hassanzadeh, & Moghadam, 2013). Blended environments combine traditional classes with online access to courseware and documents. The term blended learning is defined as having more than 45% online activity and is used interchangeably with the terms hybrid learning, Web enhanced instruction, and computer-supported collaborative learning (Malm & DeFranco, 2011). These software tools foster communication between instructors and students and allow instructors to post assignments, grades, and various course documents for students to view (Goyal & Purohit, 2010); they are also used by some academic institutions to

support distance learning, while other academic institutions use them to supplement more traditional ways of teaching (Al-Busaidi, 2012).

Instructors tend to use CMS to post assignments, announcements, grades, course documents, and to email students. Teachers also manage groups, administer surveys, view statistics, and create reports. Students use CMS to check assignment due dates, syllabi, grades, announcements, and email teachers. Instructors use a Web browser to access CMS that run on a Web or network server. These software systems also primarily organize and distribute course content, as well as track students' progress. While instructors largely use CMS to manage distance-learning courses, the systems are just as popular in supporting traditional (face-to-face) courses (Daniels, 2009; Malm & DeFranco, 2011). In a study conducted by Malikowski (2011), the author found that 75% of instructors who use CMS only use them to transmit files such as syllabi and class readings. Only approximately 30% of instructors used them for asynchronous features such as discussions, and 25% used them for assessment features such as quizzes or tests. Malikowski also found that only 15% of instructors used CMS-based surveys, and fewer than 5% use other features. Moreover, Jarrahi (2010) found that although CMS are standard components at many HEIs, the barrier to fully utilizing them was reluctance by faculty and not the lack of funds to procure them.

Each college or university governs faculty engagement with CMS in its own unique way. For one university (Oakwood University, Huntsville, AL) all courses listed in the course schedule are in the CMS and placed in the respective faculty's account by the CMS administrator. Faculty are aware of the update and are encouraged to use the software for their classes. Beginning in the fall 2014 semester, limited use (syllabus,

grade book) of the system became mandatory. The university mandated the new policy to ensure that faculty posted students' grades on a consistent basis so students are always aware of their standing in classes (W. Mitchell, personal communication, July 22, 2014).

Faculty promotion and tenure is usually not dependent on the use of CMS at most universities. Each HEI has a track for faculty promotion and tenure based on the type of university, for example, whether it is a teaching or a research university, or both and the importance of the use of technology as set by the promotion and tenure committee. The traditional reward structure at some colleges and universities comprises equal parts of teaching, research, and service (Secret, Leisey, Lanning, Polich, & Schaub, 2011) which may result in a lack of motivation to use CMS since promotion is not tied to their use.

In this chapter, the researcher first defines the problem of lack of using CMS and the lack of study connected with its use for traditional courses by faculty in private 4-year Historically Black Colleges and Universities (HBCUs). The researcher will show that differences exist between HBCUs and non-HBCUs and why a separate study is needed for use of CMS in HBCUs. Next, the researcher will discuss the scope and nature of CMS, HBCUs, and predominantly Black institutions (PBIs) followed by a distinction made in the differences between public and private HBCUs.

Then, the researcher will outline the specific goals of this study, followed by research questions and hypotheses to match the goals. A relevance and significance section follows that will support the problem statement and goals by reiterating the problem and whom it affects. This section will also state any solutions proposed to correct the problem and give reasons why the proposed solutions did not work, as well as give reasons why this study presents original work to address the problem. In the chapter,

the researcher will address the barriers and issues associated with completing this study, and will outline the assumptions, limitations, and delimitations of the study. Finally, a definition of the terms associated with this study and a summary of this chapter concludes Chapter 1.

Problem Statement

Course Management Systems (CMS) are important options for instructors who desire to enhance their traditional face-to-face classrooms and can be helpful to integrate technological and pedagogical features into a Web-based system that deliver both online and traditional content (Akhras, 2012). According to Gautreau (2011), using technology resources such as CMS by infusing them in the educational process may effectively help instructors manage courses by better organizing content to engage students and decrease planning time. The author further stated that although technology has proven beneficial, many instructors do not adopt it as a teaching tool.

While many researchers have written about the use of CMS in HEIs, the research has mainly focused on non-HBCUs (Keese & Shepard, 2011). However, there is a shortage of research regarding faculty use of CMS at HBCUs, and currently an inadequate amount of research regards factors such as perceived ease of use, perceived usefulness (Davis, 1989), facilitating conditions, computer efficacy (Waheed & Jam, 2010), and attitude toward technology (Chen, 2009) at HBCUs.

The need for research on CMS use at HBCUs is demonstrated by the differences between HBCUs and non-HBCUs in terms of culture, funding (Minor, 2008), technology (Smith, 2011), infrastructure, resources, and budgets (Gasman & Bowman, 2011). In the preliminary study, the researcher examined 10 items (Appendix A) for private 4-year

HBCUs and their non-HBCUs counterparts, as defined by geographic proximity and approximate size, to see if differences existed among the institutions on these independent items. The private 4-year HBCUs and their non-HBCUs counterparts were in close geographic proximity (within 200 miles of each other) and students could have chosen one university over the other. Using the Integrated Postsecondary Education Data System (IPEDS) data and statistics site, the non-HBCUs counterparts were chosen based on their close geographic proximity to the HBCUs, their similarity in enrollment, and approximate size. The researcher conducted the preliminary exploratory study to determine whether differences existed between HBCUs and non-HBCUs on relevant items as outlined in Appendix A.

After the researcher conducted a preliminary non-published exploratory study specific to the needs of this project of the IPEDS site (T. MacFarland, personal communication, March 30, 2012), and gathered information on 10 items for each institution, the researcher found that for all items (SAT Math, SAT critical writing, grant aid dollars received, instruction salaries and wages, student services, instruction, plant operation and maintenance, academic support, total revenues and investment returns, and total expenses) non-HBCUs had a higher mean than HBCUs for the 2011–2012 academic year. Furthermore, when the differences in the mean of the 10 items for each institution were evaluated, results (Appendix B) showed that a statistically significant difference existed ($p \leq 0.05$) between HBCUs and non-HBCUs for six of the 10 items. SAT math 75th percentile, SAT critical writing 75th percentile, grant aid dollars received, instruction salaries and wages, total student services, and instruction total all showed statistical significant differences ($p \leq 0.05$). While the other four items did not show statistically

significant differences, it was evident that total revenues and investment returns, and total expenses had a noticeably larger difference in the mean dollars received, favoring the non-HBCUs.

A significant amount of literature covers CMS at HEIs (Al-Busaidi, 2012; Kasraie & Kasraie, 2010; Malm & DeFranco, 2011; Owens & Price, 2010; Waheed & Jam, 2010); however, much of that research was conducted at non-HBCUs (Dunn & Lingerfelt, 2004; Hanson & Robson, 2004; Kilmon & Fagan, 2007; Lonn, 2009; Malikowski, 2011; Morgan, 2003). The previously mentioned exploratory study (Appendices A, B) shows that sufficient differences existed between HBCUs and non-HBCUs to warrant a separate study of CMS use at HBCUs.

The researcher of this study will focus on 4-year private HBCUs. There are 105 HBCUs in the United States, 89 of them are 4-year institutions, and 25 are private institutions that offer mainly undergraduate instruction. The focus of this study will be on this latter set of institutions.

Problem Scope and Nature

Some common features in CMS that allow instructors to transmit information such as syllabi, assignments, reading material, and announcements to students are static. Other tools, such as discussion and chat, are interactive and foster synchronous and asynchronous communication among students. Still, other tools allow students to communicate with the system via a computer to take quizzes or surveys (Malikowski, 2011). CMS features can be grouped in the following categories: course management tools (syllabus, announcements, calendar, drop boxes), course content areas (quizzes and

assessments), and communication tools (discussion boards, chat rooms, virtual classrooms, and whiteboards) (Akhras, 2012).

The features of CMS facilitate the instructor's role to provide learning by helping teachers send or receive assignments, assess learning, and conduct discussions in an asynchronous environment. Similarly, CMS facilitate students' roles by allowing students to share resources, collaborate, upload their assignments, take online exams and quizzes, assess their grades, and remain up-to-date on their courses. The features of CMS also help students by supporting student-to-course content, student-to-student interactions, and student-to-instructor communications (Akhras, 2012).

However, CMS to support the teaching and learning process is not consistently used at a level that comes close to more than marginal use (Malikowski, 2011). Jarrahi (2010) found that 73% of HEIs make CMS available to instructors; however, most instructors are not using the systems in accordance with the intentions sanctioned by the institutions. According to Fulei (2010), technology has not fulfilled its potential in education because it has been underutilized and not been effectively implemented. Fulei also stated that fewer than 20% of teachers use technology several times per week, and up to one half did not use it at all.

The literature is sparse with information relating to mandatory use; however, management support of CMS use may be a key factor in how well faculty accept the technology. Mandatory use of CMS in HEIs may make the technology more acceptable by instructors. According to Al-Busaidi and Al-Shihi (2012), university administration can encourage instructors to use CMS by showing how its use aligns with the university's vision. Additionally, the authors stated that since management is authoritative,

administrative support is related to instructors' acceptance of technology. Furthermore, Al-Busaidi and Al-Shihi found that university administrative support, incentive policies, and training are key factors to instructors' satisfaction with CMS.

In a 2004 study conducted at Duke University in Durham, North Carolina, students cited easy access to course materials and readings as the number one reason for using CMS. Although students show some willingness, resistance remains among faculty to use the technology. Some faculty have admitted that CMS are harder to learn than anticipated, and refer to the technology as time consuming and inflexible (Bradford, Porciello, Balkon, & Backus, 2007). Today, CMS are installed in many HEIs and have become almost indispensable for distance or traditional teaching and learning (Islam, 2014). Still, there are many environmental factors that lead to faculty dissatisfaction with CMS use, some of which are non-accessibility of system, complex system, poor usability, lack of training, and lack of support (Islam).

Historically Black Colleges and Universities

Since the 1863 abolition of slavery in the United States, progressive political movements to educate former enslaved people have been initiated by groups such as the Freedman's Bureau, religious organizations, benevolent societies, abolitionists and northern philanthropists. HBCUs have been founded at various stages in U.S. history, beginning with Wilberforce University in 1856 (Exkano, 2013). According to the Higher Education Act of 1965, in order for an institution of higher learning to be designated an HBCU, it has to be a college or university that was established prior to 1964 with the special emphasis and mission of educating African Americans (Exkano, 2013). In the United States, 89 of the 4-year HBCUs exist mostly in the southern region of the country.

The majority of these HEIs grant baccalaureate degrees; however, a small minority offer graduate and professional degrees. In this study, the researcher will examine CMS use in traditional courses at private 4-year undergraduate HBCUs in the United States (Appendix C).

Education in the United States had a tradition of being available to the wealthy few. It was not until 1862, the year the Morrill Act passed, that the country saw the beginning of higher education being accessible to a wider range of individuals (Weber, 2011). The Morrill Act was “an act donating public lands to the several states and territories which may provide colleges for the benefit of agriculture and mechanic arts” (Weber, 2011, p. 52). For a nation that embraced change and wanted to make education available to the many—although the many initially only included Caucasian males and owners of property—the Morrill Act was a welcomed transformation. In a quest for a more widespread and inclusive knowledge base, the federal government offered 30,000 acres of land for each senator and representative in a state if the state created at least one college where the main objective would be, while still offering other disciplines, the teaching of courses related to agriculture and the mechanic arts (Weber, 2011).

The Morrill Act of 1862, though very beneficial for many who otherwise would not have attended college, did not benefit African Americans in the 17 segregated states. Consequently, the second Morrill Act of 1890 was enacted and called for color blindness so that African Americans could seek and receive an education. The second Morrill Act of 1890 entailed the establishment of colleges with an agriculture and mechanic arts curriculum for African Americans; the establishment of such colleges however, was to remain separate for African Americans and Caucasians. Within a decade of the

enactment, at least one African American college was established in each of the 17 segregated states that concentrated on agricultural, mechanical, and industrial education (Raffel, 2012). The capacity of these institutions has expanded to other disciplines such as engineering, science, liberal arts, and graduate programs (Raffel).

HBCUs have positively contributed to the economic growth and development of the United States (Schexnider, 2008). These institutions are credited with producing many of America's African American middle class and many of America's African American physicians, lawyers, business people, military officers, and those attaining doctoral degrees (Schexnider, 2008).

However, according to Gasman and Bowman (2011), journalists prefer to emphasize non-HBCUs when writing about leadership, governance, faculty, and student issues in the larger body of HEIs and seem to treat HBCUs as if they do not even exist.

Traditionally, HBCUs have not been adequately funded and experience disparities in their physical plants, program offerings, research capacities and technology, while non-HBCUs of comparable size and scope are appropriated larger funding for their programs (Minor, 2008). According to Smith (2011), HBCUs are at a crossroads, not just in terms of diminishing endowments, but also in the area of technology, especially in the online learning environment. Although efforts exist to improve technology infrastructure and to train faculty for online teaching and developing online content at HBCUs, these efforts are thwarted by scarce and inadequate resources (Kinuthia, 2005). Using the IPEDS data and statistics site, only two of the 25 HBCUs in this study had any form of distance education students in 2013. Paine and Stillman Colleges reported 41 and 29

students enrolled in distance education courses respectively (T. MacFarland, personal communication, January 15, 2015).

The cultural and resource differences between non-HBCUs and HBCUs warrant a separate study regarding the use of CMS in HBCU institutions. According to Palmer and Gasman (2008), from the inception of HBCUs, no parity existed between them and non-HBCUs in terms of infrastructure, resources, and budgets, and that inequality still exists.

While HBCUs are HEIs that foster and embrace the cultures of people of African descent, and many African American students appreciate the deep cultural and intellectual history celebrated in HBCUs (Aashir, Roberts, Harrell, & Young, 2005), cultural differences in HBCUs can impede technological advancement. Although these cultural differences have been underscored in the absence of contextual understanding, the differences do exist and greatly affect decision-making by leaders in HBCUs. Minor (2004) asserted that the lack of research on governance in HBCUs has resulted in ignoring the decision-making differences that exist between non-HBCUs and HBCUs. While this study will not focus on governance, it is noteworthy that differences do exist between non-HBCUs and HBCUs, and as such warrant a separate study on the use of CMS by faculty in these institutions.

The difference in culture between HBCUs and non-HBCUs plays a vital role in how technology is accepted and used in both types of institutions. According to Roach (2000), the culture of HBCUs affects the technology lag even more than such issues as poor finances. Of the literature written about CMS at HEIs (Kasraie & Kasraie, 2010; Owens & Price, 2010; Waheed & Jam, 2010), much of that research was conducted at non-HBCUs (Dunn & Lingerfelt, 2004; Hanson & Robson, 2004; Kilmon & Fagan,

2007; Lonn, 2009; Malikowski, 2011; Morgan, 2003). While Woods, Baker, and Hopper (2004) conducted research on CMS at 38 small, medium, and large-sized liberal arts institutions associated with the Council of Independent Colleges (CIC), Michigan Collegiate Telecommunications Association (MICTA), and the Midwest Higher Education Compact (MHEC), only a small portion of these institutions are HBCUs. Moreover, no documentation reveals how many faculty of HBCUs, if any, responded to the survey. Most of the research conducted by Woods et al. was directed at universities that were part of the MICTA and the MHEC, with a total of 6 HBCUs. None of the research was directed specifically at HBCUs.

Additionally, according to Oliver and Moore (2008), one of the largest studies conducted on the use of CMS by faculty in HEIs was done by Woods et al. (2004), which looked at faculty use of CMS across the University of Wisconsin system. It involved Woods et al. interviewing 140 faculty members and surveying 730 faculty. The state of Wisconsin does not have any HBCUs, therefore HBCUs were not included in this study.

Predominantly Black Institutions

While HBCUs began with the mission of educating the descendants of former slaves, a group of HEIs exist that were forced to change their status based upon racial demographic changes in their commuter environments—predominantly Black institutions (PBI) are HEIs that began with a mission to educate white students; however, because of racial changes in their environments, these schools have become predominantly African American. A good example of this change in status that is seldom sought, but eventually embraced, can be seen in the history of Bloomfield College in Bloomfield, New Jersey. Bloomfield was founded in the mid-1800s by the Presbyterian Church as an institution

for German ministers who migrated to the United States (Stuart, 2010). Demographic changes in the college's targeted environment, race riots in nearby cities, and a decision to embrace diversity resulted in a massive flight by Caucasian students and professors to other universities. Bloomfield now boasts an enrollment that consists of 52% African American, 24% Hispanic/Latino, 11% Caucasian, and 3% Asian students—an official PBI (IPEDS, 2014).

Bloomfield's story is similar to that of Upsala College in nearby East Orange, New Jersey, with the exception being that Upsala closed its doors. Upsala, founded in 1893 by Swedish Lutherans, was originally situated in a suburban neighborhood that was predominantly White up to the 1960s. Upsala found itself in the midst of a predominantly African American and Hispanic neighborhood after the loss of jobs and industry in East Orange and neighboring Newark, New Jersey. Instead of predominantly Caucasian students in its enrollment, in 1995 Upsala had 60% of African American, Latino or foreign students, which was similar to its surrounding neighborhoods (Mercer, 1995).

With increased minority enrollment and neighboring economic woes, Caucasian alumni of Upsala turned away from both the city and the college. This resulted in reduced financial support to the college, which became the impetus of its subsequent demise. Although efforts such as increasing enrollment in the 1990s and selling tax-free bonds that were guaranteed by the city and county were enacted to save the institution, eventual rising debt and again decreased enrollment forced the Board of Trustees to declare Upsala insoluble and closed its doors in 1995 (Mercer, 1995).

While most HBCUs were created with the sole purpose of serving the educational and social needs of African American students; PBIs, on the other hand, emerged because

of demographic shifts in their immediate environments and were not created under federal law or with a mission to serve African American students. In order to qualify as a PBI, a college or university must have within its enrollment at least 40% African American students, offer an associate or bachelor's degree, and have at least 1,000 undergraduate students (Dervarics, 2008). A similarity shared by both HBCUs and PBI is that they both face financial difficulties and experience problems associated with understaffed and underfunded campuses (Hubbard & Stage, 2009). Although this study focuses on HBCUs, it is possible that the results associated with this study could be extrapolated to PBIs.

Dissertation Goal

The goal of this study was to assess certain variables and how they affect faculty use of CMS in private 4-year HBCUs. There are 49 U.S. 4-year private HBCUs; however, the researcher of this study will assess faculty use of CMS for traditional courses in 25 4-year private HBCUs that only offer undergraduate instruction (Appendix C). Using technology acceptance factors to conduct an empirical evaluation on the use of CMS in HBCUs, the researcher of this study will validate factors affecting use and provide pertinent information for ameliorating the situation. Findings gleaned from this study will help faculty in HBCUs use CMS effectively in traditional course offerings. According to Daniels (2009), while CMS are mostly used to support distance education, they are just as effective in face-to-face instruction.

The specific goals of this study were:

1. To examine if self-efficacy, support, and training are related to perceived ease of use and perceived usefulness of CMS at HBCUs.

2. To examine if perceived usefulness and perceived ease of use predict attitude toward CMS at HBCUs.
3. To examine if perceived ease of use and perceived usefulness mediate the relationships between self-efficacy, support, and training predicting attitude toward CMS at HBCUs.

Research Questions

The research questions were formulated from the research goals and were as follows:

RQ1a: To what extent do self-efficacy, infrastructure support, technical support and training predict perceived ease of use of CMS at HBCUs?

RQ1b: To what extent do self-efficacy, infrastructure support, technical support and training predict perceived usefulness of CMS at HBCUs?

RQ2: To what extent does perceived usefulness and perceived ease of use predict attitude toward CMS at HBCUs?

RQ3a: To what extent does perceived usefulness mediate the relationships between self-efficacy, support, and training predicting attitude toward CMS at HBCUs?

RQ3b: To what extent does perceived ease of use mediate the relationships between self-efficacy, support, and training predicting attitude toward CMS at HBCUs?

Hypotheses

H₀1(a): No relationship exists between self-efficacy, infrastructure support, technical support, training and Perceived ease of use.

H_{a1(a)}: A relationship exists between self-efficacy, infrastructure support, technical support, training and Perceived ease of use.

H_{01(b)}: No relationship exists between self-efficacy, infrastructure support, technical support, training and Perceived Usefulness.

H_{a1(b)}: A relationship exists between self-efficacy, infrastructure support, technical support, training and Perceived Usefulness.

H₀₂: No relationship exists between perceived usefulness and perceived ease of use and Attitude.

H_{a2}: A relationship exists between perceived usefulness and perceived ease of use and Attitude.

H_{03(a-1)}: Self-Efficacy, Infrastructural Support, Technical Support, and Training are not significant predictors of Attitude.

H_{a3(a-1)}: Self-Efficacy, Infrastructural Support, Technical Support, and Training are significant predictors of Attitude.

H_{03(a-2)}: Perceived Usefulness is not a significant mediator for the relationship between Attitude and Self-Efficacy, Infrastructural Support, Technical Support, Training.

H_{a3(a-2)}: Perceived Usefulness is a significant mediator for the relationship between Attitude and Self-Efficacy, Infrastructural Support, Technical Support, Training.

H_{03(b-1)}: Self-Efficacy, Infrastructural Support, Technical Support, and Training are not significant predictors of Attitude.

H_{a3(b-1)}: Self-Efficacy, Infrastructural Support, Technical Support, and Training

are significant predictors of Attitude.

H₀3(b-2): Perceived ease of use is not a significant mediator for the relationship between Attitude and Self-Efficacy, Infrastructural Support, Technical Support, Training.

H₁3(b-2): Perceived ease of use is a significant mediator for the relationship between Attitude and Self-Efficacy, Infrastructural Support, Technical Support, Training.

Relevance and Significance

The importance for research on CMS at HBCUs is validated by the benefits of such systems to the teaching and learning process (Banerjee, 2011) and the dearth of studies regarding use of CMS in HBCUs (Keese & Shepard, 2011). HBCUs are a significant part of the instructional and learning landscape of the U.S. and the way they differ in sub-culture, technology, resources, infrastructure, and budgets needs to be examined in a separate study. Although efforts have and are being made to bridge the resource gap between HBCUs and non-HBCUs, problems still exist that differentiate the two types of institutions (Hernandez, 2010).

The need for this study is demonstrated by the adoption of CMS in many colleges and universities and the large sums of money expended to install and train faculty to use CMS. As Quarless (2007) noted, CMS have proven to be flexible and integrative, and have become an important part of instruction in colleges and universities everywhere. Furthermore, today more and more instructors see the value of CMS and are using them for more than just posting syllabi. With the emergence of online courses, more instructors use CMS in more collaborative ways. For example, instructors use built-in collaboration

and interaction tools such as Wikis and blogs, synchronous instant chat, and asynchronous email and discussion tools. Faculty can even use offline tools such as Microsoft Word, PowerPoint, and various media such as video, audio, and photo tools and then upload to CMS for students to view (Hamane, 2014).

Research on CMS indicated that the software is useful for both faculty and students (Al-hawari & Mouakket, 2010; Costen, 2009; Crawley & Frey, 2008; Ioannou & Hannafin, 2008; Ready, Johnson, & Astani 2011; van der Merwe, 2011). Instructors can use CMS in both large lecture classes as well as small classes. Although students are required to use technology immediately upon enrollment in courses that use CMS, they seem to adapt well to using the software. Students learn to use the environment quickly because they find it easy to manipulate and enjoy using the technology (Dunn & Lingerfelt, 2004).

While some researchers documented the advantages of faculty using CMS, (Akhras, 2012; Al-hawari & Mouakket, 2010; Banerjee, 2011; Costen, 2009; Crawley & Frey, 2008; Gautreau, 2011; Ioannou & Hannafin, 2008; Ready, Johnson, & Astani 2011; van der Merwe, 2011) considerable resistance to using most of the features of the technology on many university campuses still exists. While 80% of colleges and universities make CMS available to their professors, the software is only used in 20% of instructor courses (Kilmon & Fagan, 2007). Nevertheless, as noted by Payette and Gupta (2009), it was clear that the use of CMS is growing and faculty members are using it to support their instruction, while students are beginning to expect such technology for their classes. The growth in use of CMS by HEIs is also supported by research conducted by Malm & DeFranco (2012) and Islam (2014). A study by Malikowski (2011) found that

75% of instructors who used CMS did so to make syllabi and course readings available to students, although fewer than 5% of instructors used other features.

Goal and Research Problem, Generalization, Original Work

Assessing factors that affect faculty use and effectiveness of CMS for traditional courses in 4-year private HBCUs will specifically address the problem of this study—a scarcity of information available on the use of CMS in HBCUs. Factors such as perceived ease of use, perceived usefulness (Davis, 1989), facilitating conditions, computer efficacy (Waheed & Jam, 2010), and attitude toward technology (Chen, 2009) will be assessed to determine the effect of these variables on use of CMS for traditional courses at HBCUs.

The scarcity of research regarding faculty use of CMS at HBCUs makes this study relevant and timely. This study will contribute to the body of research on CMS by investigating the effect of certain factors on the use of CMS for traditional courses in HBCUs, and offer recommendations for best practices of CMS use at HBCUs.

The potential for generalization of this research in a broader scope than 4-year HBCUs is limited; however, the findings can be generalized to 2-year HBCUs since they have a similar culture to 4-year HBCUs, and they may also be generalized to PBIs since they have at least 40% African American students and also experience financial problems. Using the findings from this study and applying it to all HEIs may not be wise since it has been established that HBCUs and non-HBCUs are different in funding (Minor, 2008), resources (Kinuthia, 2005; Palmer & Gasman, 2008), technology (Smith, 2011), and culture (Aashir, Roberts, Harrell, & Young, 2005; Roach, 2000).

On the other hand, potential for this study to produce original work is great. Little research exists on CMS use in HBCUs. Previous studies (Keesee & Shepard, 2011;

Kinuthia, 2005; Omar, Kalulu, & Alijani, 2011) have not addressed factors such as perceived ease of use, perceived usefulness (Davis, 1989), facilitating conditions, computer efficacy (Waheed & Jam, 2010), attitude toward technology (Chen, 2009), and faculty use of CMS for traditional courses in private 4-year HBCUs.

Barriers and Issues

Much of the research conducted on CMS was conducted at non-HBCUs (Dunn & Lingerfelt, 2004; Hanson & Robson, 2004; Kasraie & Kasraie, 2010; Kilmon & Fagan, 2007; Lonn, 2009; Malikowski, 2011; Morgan, 2003; Owens & Price, 2010; Waheed & Jam, 2010; Woods, Baker, & Hopper, 2004) and those doing research on CMS generally do not appear to be aware of the unique history and culture of HBCUs. This serves as a barrier to solving the problem of this study because little information exist regards the use of technology in HBCUs in general or CMS in particular. Furthermore, information on the particular factors of this study such as perceived ease of use, perceived usefulness (Davis, 1989), facilitating conditions, computer efficacy (Waheed & Jam, 2010), and attitude toward technology (Chen, 2009) at HBCUs are almost non-existent.

In order to conduct this study, a request to survey faculty of all disciplines was sent to 25 4-year private HBCUs, and 11 of the institutions agreed to be surveyed. A computer-based survey was then sent to the 11 4-year private HBCUs; this was a challenging process since response rates for surveys tend to be low. According to Anseel, Lievens, Schollaert and Choragwicka (2010), researchers who rely on survey methodology when conducting their research are often confronted with the threat of receiving a less than substantial response to their surveys. Consequently, this study faced some of the same challenges encountered by others using this method.

Conducting research on faculty use of CMS in HBCUs can be a daunting task. There were 11 private 4-year HBCUs in this study and obtaining IRB approvals and collecting survey responses from them was challenging. HBCUs are facing issues that diminished the likelihood of faculty responses to surveys. Currently, many HBCUs are fighting to remain financially solvent, while anticipating legislation that will force state governments to offer financial support to create parity between them and state non-HBCUs.

According to Palmer and Griffin (2009), although the Federal Supreme Court did not dismantle or merge HBCUs with non-HBCUs in Mississippi, and although the justices ordered that the state support these institutions, to date HBCUs are not benefiting from that decision and still lack comparability with state non-HBCUs in all aspects of their programs and operations. With such predicaments facing HBCUs, response rates to surveys were low because of lack of motivation. Another factor that affected response rates is the finding that minorities are less likely to participate in Internet surveys (Mohr, Meterko, Nagy, & Warren, 2010).

Even though barriers and issues made this study challenging to pursue, the rewards gained from new information regarding CMS use by faculty in private 4-year HBCUs for traditional courses is promising. As stated by Bowman (2010), although HBCUs educate individuals of all racial backgrounds, for over 100 years these institutions have had a special mission to educate African Americans. HBCU institutions tend to have lower endowments than their non-HBCUs counterparts and operate on tight, tuition-driven budgets, which make HBCUs exclusive and exceptional HEIs (Bowman,

2010). These factors made it worthwhile to conduct a study on faculty use of CMS in HBCUs.

CMS have become one of the most commonly implemented computer systems in HEIs in the U.S. (Malikowski, 2011). While much criticism exist regarding CMS adoption, Malikowski stated that these systems will be around in universities for the predictable future. After a 3-year study of CMS use, Malikowski discovered that a stable state exists in CMS use and instructors mostly use the systems for transmitting information to students and less for interactivity among students. Malikowski also noted that despite this stable use, more Web 2.0 features have been added to CMS in recent years with the probability of Web 3.0 and 4.0 to be added in the future. All the research surrounding CMS necessitated a thorough study of their use for traditional courses in private 4-year HBCUs.

Assumptions

The first assumption of this study was that all HBCUs have CMS available at their institutions. It is not known how many of the 25 private 4-year HBCUs actually have CMS in place. This assumption should not negatively affect the study because previous research demonstrated that 75% to 80% or nearly every college and university spent significant financial and human resources on acquiring CMS for faculty and student use (Islam, 2014; Malikowski, 2011; Malm & DeFranco, 2011). With such a high percentage of universities having the software, it can be assumed that at least most HBCUs have them. Second, in this study the researcher assumed that increased faculty use of CMS will improve student outcomes and the teaching and learning process. However, no proof exists that faculty use of CMS improves any type of outcome for

students or teachers. Although some studies revealed that students appreciate faculty use of CMS (Dunn & Lingerfelt, 2004; Payette and Gupta, 2009) no concrete evidence exists that learning or any other student variable has improved because of faculty use.

The third assumption of this study was that results from studying HBCUs separately will differ from results of studies regarding faculty use of CMS at non-HBCUs. Although past studies have shown that differences exist between HBCUs and non-HBCUs in culture, resources, and funding, (Bettez, 2012; Henry & Closson, 2010; Minor 2004; Palmer & Gasman, 2008) and this study has shown that differences exist between the two types of institutions in other variables such as SAT or ACT scores, there is no current evidence that differences exist between HBCUs and non-HBCUs in use of CMS. Lastly, the researcher made the assumption that faculty do not meet adequate use of CMS at HBCUs. Since a dearth of research exists on this topic, no evidence suggests that use of CMS at HBCUs is adequate or not. Therefore, the researcher of this study provided some evidence about this topic.

Limitations

The first limitation of this study is that the researcher only considered 4-year private HBCUs and not graduate or public HBCUs. Consequently, the results of the study may not be applicable to all HBCUs. However, most HBCUs, public and private, experience similar disparities between them and their non-HBCUs counterparts, therefore generalization of the results of the study may be applicable. Second, the constructs used in this study are not exhaustive and other constructs have not been included in this study. The constructs used in this study were based on the TAM, with other constructs added.

Third, the researcher of this study will focus on full-time faculty at participant institutions.

Delimitations

A study of factors that affect faculty use of CMS in HBCUs can be challenging because the U.S. has 105 HBCUs. In order to make this study more manageable, only 4-year private HBCUs were selected. Consequently, the results of the study may not be applicable to all HBCUs. However, it is note-worthy to add that most HBCUs, public and private, experience similar disparities between them and their non-HBCUs counterparts, therefore generalization of the results of the study may be applicable. Second, the constructs used in this study are not exhaustive and other constructs have not been included in this study. The constructs used in this study were based on the TAM, with other constructs added to make the study more useful. Other theories such as diffusion of innovation and the theory of planned behavior could have been used in the study; however, this would have widened the scope of the study and made it less manageable.

Definition of Terms

In order to facilitate an understanding of the terms used in this study, following is a list of definitions:

Attitude toward technology: *Attitude toward technology* is a disposition toward technology and is directly related to behavior and intention to use technology (Zhao & Zhu, 2010).

Blended environment: *A blended environment* combines traditional classes with online access to courseware and documents (Malm & DeFranco, 2011).

Computer self-efficacy: Computer efficacy means the degree to which someone believes he or she possesses the skills necessary to operate a computer system based on his or her previous experiences with other systems. An example of this is when someone uses his or her own judgment to ascertain whether a computing skill can be performed (Chan & Lin, 2009; Motaghian, Hassanzadeh, & Moghadam, 2013).

Course management systems (CMS): Course management systems are web-based communication platforms that give students anytime/anyplace access to learning tools such as course content, program information, discussion boards, teacher assistance, document sharing and learning resources (Motaghian, Hassanzadeh, & Moghadam, 2013).

Facilitating conditions: Facilitating conditions are the support mechanisms a user of a technology believes exist that will influence his or her use of the technology (Hassanein, Head, & Wang, 2010).

Higher Education Institutions (HEIs): Higher education institutions are schools that award bachelor's degrees in no less than 2-year programs. They provide credit toward degrees of no less than 1 year of training towards gainful employment. *HEIs* also offer vocational programs that provide training for gainful employment.

Historically Black Colleges and Universities (HBCUs): Historically Black Colleges and Universities are colleges or universities that were established prior to 1964 with the special emphasis and mission of educating African Americans (Exkano, 2013).

Likert scale survey: The Likert scale survey is comprised of response options that use the terms “agree” or “disagree” as responses to a number of statements, and are often

used in attitude scales for situations where there is no agreed upon criteria for prediction. A *Likert scale survey* also consists of declarative statements to which respondents can state the extent to which they agree or disagree with the statements (Chin, Johnson, & Schwarz, 2008).

Perceived ease of use: Perceived ease of use refers to the degree to which a person believes using a system will be free from effort (Zhao & Zhu, 2010).

Perceived usefulness: Perceived usefulness refers to the degree to which a person believes that using a system will enhance his or her job performance (Zhao & Zhu, 2010).

Predominantly Black Institutions (PBI): Predominantly Black Institutions are HEIs that began with a mission to educate Caucasian students; however, because of racial changes in their environments they have become predominantly African American (Stuart, 2010).

Traditional classrooms: Traditional classrooms refer to places where face-to-face classroom learning occurs (Gadis, 2011).

Summary

Many colleges and universities around the globe have adopted CMS. However, despite widespread adoption, only roughly 20% of instructors in universities that purchased the software are using it for their traditional courses. Although researchers have conducted studies on CMS use in universities overall, not much is known about faculty use of CMS in HBCUs. In this study, the researcher conducted research on the use of CMS among faculty in private 4-year HBCUs for traditional courses.

HBCUs became a part of the landscape of the United States during the days of segregation in order to provide education for African Americans. These institutions still

exist today and have become an important hallmark in American society. Indeed, HBCUs are responsible for educating many of America's middle class African Americans, including many of those with terminal and professional degrees. Research shows that CMS are beneficial to the teaching and learning process in higher education (Banerjee, 2011). It was therefore imperative that a study be conducted on CMS use in private 4-year HBCUs.

Chapter 2

Literature Review

The relationship between IT usage and productivity within organizations is not well documented, and many companies strive to find a connection between the two. Many researchers have studied course management systems (CMS) use in higher education; however, a gap in literature exists on CMS use at historically Black colleges and universities (HBCUs) in general and private HBCUs in particular. Several theories cover technology use and acceptance, but the present study implemented the technology acceptance model (TAM) to examine CMS use at private 4-year HBCUs.

Topics that this chapter addressed include: benefits of information technology (IT), course management system research, course management systems and traditional classrooms, HBCUs and the cultural differences between them and non-HBCUs, technology usage and acceptance, the TAM and its limitations, the constructs of the TAM such as perceived usefulness, perceived ease of use and attitude, and non-TAM constructs such as self-efficacy and facilitating conditions including support and training. Other topics that will help facilitate an understanding of this research are the TAM and culture, IT use in HBCUs, and other technology acceptance theories such as the theory of reasoned action, theory of planned behavior, diffusion of innovation theory, and social cognitive theory. Finally, a review of all the theories combined will culminate in a discussion of the unified theory of acceptance and use of technology.

Literature Search Strategy

The researcher obtained the literature compiled for this review through comprehensive online library search methods. A librarian also assisted in determining the best search methodology, and helped generate ideas regarding keywords to search. Among the journal databases searched, those that generated the most applicable results were SAGE, JSTOR, EBSCO, Wiley, ProQuest and Elsevier. The researcher accessed a multitude of other databases in the search process as well. Prior to generating the returns, the peer-reviewed and scholarly journals features were selected, ensuring that all of the literature generated would fit these designations.

This researcher reviewed current literature containing empirical research in the relevant areas, which appeared in a wide range of publications, such as Journal of Electronic Commerce Research, Journal of the Association for Information Systems, Interdisciplinary Journal of Contemporary Research in Business, Journal of Information Systems Research, MIS Quarterly, Journal of Global Information Technology Management, the International Business & Economics Research Journal, Journal of Multimedia, Computing in Human Behavior, International Journal of Research Marketing, Journal of Theoretical and Applied Information Technology, The Journal of Computer Information Systems, International Journal of Organization Theory and Behavior, Black Issues in Higher Education, The SIGCSE Bulletin, Journal of College Student Development, The Negro Educational Review, Academy of Educational Leadership, and Academy of Educational Leadership Journal. The researcher identified articles through searches conducted through Google Scholar with a preference for peer-reviewed and scholarly journals; and through internet search engines such as Google and

Scirus, with a filter applied for peer-reviewed journals. Additionally, once the researcher identified key authors in this way (e.g., Lavie, Baddeley, Sueller, Colom, and Engle) the corpus of their work was reviewed for other relevant research, and other works cited by those authors were similarly reviewed. Equally, the researcher reviewed identified journals, especially in specifically themed issues, for other relevant work.

Influence of Information Technology

The information systems (IS) literature is saturated with material concerning the relationship between IT and innovation. The acquisition of IT resources is considered a driving force in innovation within companies for both product and process innovation. In fact, as noted by Benitez-Amado, Llorens-Montes, and Perez-Arostegui (2010), IT is pivotal in shaping organizational capabilities that create performance gains “such as new product development (NPD), dynamic capabilities and NPD functional competences and supply chain integration capabilities” for firms (p. 551).

Conversely, many organizations struggle with figuring out whether the acquisition of IT has benefited the organization in any meaningful way. According to Williams and Schubert (2010), achieving expected benefits of IT ranked as the second most critical issue overall to organizations of all sizes, and 43% of organizations reported little, negative, or unknown gains from IT investments.

Course Management System Research

CMS are specifically designed so that instructors and students use features and tools to enhance communication between student and instructor and student to student. They are wildly adopted among higher education institutions and use many tools that support functions such as accessing reading and supplemental materials, working with

peers on tasks and assignments, keeping updated on announcements and notifications, sharing multimedia information, and others (Mustaffa & Mansor, 2015). Additionally, CMS foster collaborative learning and broaden exchange of ideas beyond the classroom in an industry that is worth approximately one billion dollars and is expected to grow to about 7 billion dollars by the year 2018 (Azmi & Singh, 2015). Of 151 HEIs surveyed 99% have CMS (Azmi & Singh).

The literature suggests that CMS have strong potential to enhance retention and satisfaction rates of users by being innovative, convenient, and functional (Al-hawari & Mouakket, 2010). Ready, Johnson, and Astani (2011) stated that the technology used to foster online environments makes learning better and augments learners' growth and development. Some researchers suggested that combining online and traditional modalities using CMS have the potential for improved academic performance (van der Merwe, 2011). However, as noted by Azmi and Singh (2015) faculty use of the systems is low due to the amount of time needed to use them, lack of flexibility and difficulty of use.

Although universities throughout the U.S. are purchasing CMS, the systems are not being used on a regular basis (Kato & Ishikawa, 2012). Kato and Ishikawa concluded that lack of use is a result of instructors not fully comprehending the value of CMS. Furthermore, commercial CMS may be inhibitive to some institutions because of issues such as flexibility, functionality, and availability to students and faculty. Other inhibitions include differences in academic program structures in a university, university internal policies, and different geographical locations of university campuses. In addition, the financial burden associated with license fees for using commercial CMS has proven to be

problematic to many universities, thus steering some in the direction of open-source CMS (Wong et al., 2010).

Despite the benefits associated with CMS use (Al-hawari & Mouakket, 2010; Costen, 2009; Crawley & Frey, 2008; Ioannou & Hannafin, 2008; Ready, Johnson, & Astani, 2011; van der Merwe, 2011), not much is known about the pedagogical benefits of these tools. According to Lust, Collazo, Elen, and Clarebout (2012) advertised benefits to students using CMS assume that each student used the tools of CMS in the same way. The authors found that not all students were capable of using the tools in CMS in a way that enhances their learning, and the differences in how students use CMS may affect their performance. Chen (2011) noted that the rising cost and uncertainty regarding the pedagogical effects of CMS have propelled many institutions of higher learning to explore alternatives to CMS, namely social networking sites.

Azmi and Singh (2015) noted that in some cases the tools in CMS are not highly valued by faculty and students alike. In a study conducted by Dogoriti, Pange, and Anderson (2014), the authors found that among the 48 students surveyed only 2 percent used the Chat tool, 0 percent used the New Forums for distributing information, and only 19 percent were willing to use the platform at all. While 70 percent agreed that the platform had a positive effect in their course, only 6 percent believed that their interaction increased and 6 percent agreed that their participation in the course using the tool resulted in learning that was more active.

There are two types of CMS—proprietary and open-source. Proprietary CMS are closed systems owned by profit-generating entities that do not allow users to alter the computer codes used to determine the structure of the systems and the activities they can

perform. The two most popular proprietary systems are Blackboard (owns Angel and WebCT) and Desire2Learn. Open-source CMS are developed by individuals or a consortium who believe they have a better system for learning and those systems allow users to examine the source codes and make changes to them. The most popular open-source CMS are Instructure Canvas, Moodle, Learning Studio (formerly known as eCollege), and Sakai. Although over 500 CMS exist, the ones mentioned above are the most popular and will be compared in Table 1 (Wright, Lopes, Montgomerie, Reju, & Schmoller, 2014).

Table 1. *Product Comparison of the Most Popular Course Management Systems*

Course Management Systems	Tools/Features	Proprietary or Open Source
Blackboard	Features include customized course look and feel, date management, unified submissions management and grading interface and workflow, course setup assistance, custom branding, group assignments, learning journal, gradable Wikis and blogs, audio/video capture and embed, search for and embed content from Internet services such as YouTube, Flickr, Slideshare. Allows deep linking to course components in rich text editor or course navigation, certifications and badges, early warning features, enterprise surveys, grading rubrics, learning outcomes assessment, peer assessment, student progress and performance tracking, common cartridge	Proprietary

Table 1. *Product Comparison of the Most Popular Course Management Systems*

Course Management Systems	Tools/Features	Proprietary or Open Source
	<p>export, common cartridge import, collaborative workspace for groups, accessibility such as gold certification from the National Federation for the Blind, mobile app, inline annotation of assignment submissions, a unified calendar, a personalized to-do and past due lists, and notifications for both instructors and students.</p>	
Desire2Learn	<p>Features include customized course look and feel, attendance tracking, date management, instructional design wizard, course setup assistance, custom branding, group assignments, audio/video capture and embed, search for and embed content from Internet services such as YouTube, Flickr, and Slideshare. Allows deep linking to course components in rich text editor or course navigation. Has early warning features, grading rubrics, learning outcomes assessment, mobile app for grading, student progress and performance tracking, common cartridge import, SCORM support, and accessibility such as gold certification from the National</p>	Proprietary

Table 1. *Product Comparison of the Most Popular Course Management Systems*

Course Management Systems	Tools/Features	Proprietary or Open Source
	Federation for the Blind, a mobile app, and a unified calendar.	
Canvas	Features include appointment scheduling, attendance tracking, date management, unified submissions management and grading interface and workflow, course setup assistance, custom branding, group assignments, audio/video capture and embed, deep linking to course components in rich text editor or course navigation, certifications and badges, grading rubrics, learning outcomes assessment, mobile app for grading, peer assessment, student progress and performance tracking, common cartridge export, common cartridge import, SCORM support, collaborative workspace for groups, Google Docs and Etherpad integration, built-in Web conferencing, accessibility such as gold certification from the National Federation for the Blind, a mobile app, inline annotation of assignment submissions, a unified calendar, personalized to-do and past due lists and notifications for both instructors and students.	Open-Source

Table 1. *Product Comparison of the Most Popular Course Management Systems*

Course Management Systems	Tools/Features	Proprietary or Open Source
Angel	Features include discussion Forum, file exchange, Internal email, online journal, real-time chat, video services, whiteboard, bookmarks, orientation and help, search feature, calendar, work offline and synchronize feature, Groupwork, self-assessment, authentication, course authorization, online grading tools, student tracking, automated testing and scoring, customized look and feel.	Proprietary
Moodle	Features include discussion forum, file exchange, Internal email, real-time chat, orientation and help, search feature, calendar, Groupwork, self-assessment, authentication, course authorization, online grading tools, student tracking, automated testing and scoring, customized look and feel.	Open-Source
Sakai	Features include discussion forum, file exchange, Internal email, real-time chat, orientation and help, search feature, calendar, Groupwork, self-assessment, authentication, course authorization, online grading tools, automated testing and scoring, customized look and feel.	Open-Source

Theoretical Framework

Faculty use of CMS can be discussed in the broader context of technology acceptance. Fishbein's (1979) theory of reasoned action is borrowed from social psychology research by information systems researchers to help explain technology acceptance in organizations. The theory is grounded in human behavior and has been used to predict a wide range of behaviors. The two constructs as defined by this theory are *attitude toward behavior*, which refers to employees' positive or negative feelings about performing a targeted behavior, and *subjective norm*, or employees' perception that the people who are most important to employees think they should or should not perform the behavior (Venkatesh, Morris, & Davis, 2003).

This is relevant to CMS use at HEIs because instructors' attitudes toward technology, CMS in particular, govern their use and ability to use CMS effectively as a supplement to classroom teaching. Because behavior stems from attitude or how instructors perceive CMS, instructors' level of comfort with this technology determines how and to what extent they use CMS. A study conducted by Lyons and Warlick (2013) revealed that the perception of faculty is that the creation of content and administration required when using CMS is time-consuming. However, the study showed that there was a general positive perception among faculty regarding creating content in CMS, but they believe more assessment is needed to determine if learning outcomes are being met.

The theory of planned behavior also helps to explain motivations about instructors use or lack of use of CMS. This theory is rooted in the theory of reasoned action and states that intention is the basis for whether a person performs a certain behavior (Hazari, Hargrave, & Clenney, 2008). Extending the theory of reasoned action, the theory of

planned behavior introduces another construct called *perceived behavioral control*, which is a person's confidence in his or her ability to perform the behavior (Hazari et al., 2008). This concept is closely related to Bandura's (1997) concept of self-efficacy. The theory of planned behavior includes the constructs of attitude, subjective norm, and perceived behavioral control of users to explain intention to use IT (Hazari et al., 2008).

Bandura's (1986) social cognitive theory is also applicable to why and how individuals apply technology. It consists of a triadic reciprocal model of human behavior. The three constructs are personal behavior, personal cognition, and social environment. Applied to IT and instructors' use of CMS, these three terms from social cognitive theory can be defined in the following way: *Personal behavior* refers to the user's IT behavior or the way the user employs IT; *personal cognition* can be defined as self-efficacy and outcome of expectations; *self-efficacy* refers to the judgment one has regarding whether his or her abilities can achieve a certain level; *outcome expectation* refers to one's judgment regarding the outcome of one's behavior; and *social environment* refers to the IT climate in the organization (Li, Luo, & Zhu, 2010). This study also uses the TAM as a predictive model in determining use of information technology, namely CMS. Researchers have proven TAM useful and valid as a predictor of information system use (Davis, 1989; Tseng, Tu, Lee, & Wang, 2013; Venkatesh et al., 2003).

Technology Acceptance Model (TAM)

The TAM is a widely used model that helps determine why people either accept or reject technology (Davis, 1989). It is well accepted in the IS field that TAM serves as a valid model and predictive tool for user acceptance and is used across various information technologies (Davis, 1989; Venkatesh et al., 2003; Tseng et al., 2013;

Almasri & Mohammad, 2015). Davis (1989) suggested two factors influence a person's decision to use technology—perceived usefulness and perceived ease of use. *Perceived usefulness* is the degree to which a person believes that using a system will enhance his or her job performance, and *perceived ease of use* is the degree to which a person believes using a system will be free from effort (Zhao & Zhu, 2010). Another part of the TAM is user *attitude*; attitude toward using is directly affected by perceived usefulness and perceived ease of use (Zhao & Zhu, 2010). Employees' attitudes toward technology directly relate to their behavior and intention to use technology. The TAM also assumes that there are external variables that affect perceived usefulness and perceived ease of use, which also mediate the effect of those variables on attitude (Almasri & Mohammad, 2015).

Another factor in attitude toward technology is employees' attitudes toward change, especially when the technology is new. As noted by Lee, Rhee, and Dunham (2009), a person's attitude toward change relates to that person's intentions and beliefs toward the extent of change that is needed to use the technology and whether the person believes that the organization has the capacity to deal with that change. The authors further posited that because employees view the use of IT as organizational change, employees' attitudes toward change can affect how they deal with the change of using the new system.

The above is supported by research conducted by Al-Husein and Sadi (2015) whose findings supported their hypothesis that resistance to change has significant impact on customers' attitude towards using mobile banking. Resistance to change, trust, perceived usefulness and perceived ease of use explained 55 percent of the variance in

participants' attitudes toward using mobile technology. The authors concluded that marketing techniques should be used in order to motivate consumers to accept change.

According to Alotaibi (2013), although the TAM shares many characteristics with other IS theories, researchers who utilized TAM placed emphasis on the initial attitudes of individuals when they first encounter a technology (Alotaibi, 2013). Alotaibi further stated that TAM was the most widely used IS acceptance model because of its rich empirical supports. Other research also confirmed that TAM was the most frequently used IS model for predicting technology acceptance and use (Almasri & Mohammad, 2015; Hsiao, Tang, & Lin, 2015; Marangunic & Granic, 2015) and further stated that the principles of the model are based on paradigms from psychology (Abu-Dalbouh, 2013). The theoretical framework on which TAM is based is borrowed from Fishbein's (1979) theory of reasoned action and posits that a user's intention to accept technology is determined by its three constructs—attitude, perceived usefulness, and perceived ease of use.

According to Shipps and Phillips (2013), TAM is rooted in the belief that the effects of perceived ease of use and perceived usefulness influence both the attitude and behavioral intent of individuals to use a particular computer technology. The authors also stated that both perceived ease of use and perceived usefulness are strong predictors of acceptance behavior (Shipps & Phillips, 2013). Ma, Chao, and Cheng (2013) supported the assertion that perceived ease of use and perceived usefulness are influential on behavioral intention to use technology. Previous studies empirically showed a positive correlation between perceived ease of use on perceived usefulness and behavioral intention to use technology (Lee, 2010; Terzis & Economides, 2011).

Technology acceptance in HEIs has proven problematic even in institutions that invest heavily in technology. According to Allen and Seaman (2011), faculty acceptance of online education increased only minimally, by 6% between 2002 and 2007 when faculty considered the worth and validity of online education. Subsequently, in 2009 this figure dropped slightly. The authors further noted that leaders at private, for-profit higher education institutions reported a higher rate of interest in online education by faculty at their institutions than their counterparts at private non-profit institutions (Allen & Seaman, 2011). This is supported by the information found in the IPEDS data with only two private non-profit HBCUs having distance education students (T. MacFarland, personal communication, January 15, 2015).

Furthermore, the perception of online education acceptance rate among higher education institution leaders is stronger among leaders of institutions with fully online programs than leaders from institutions with online courses only or no online presence. Consequently, Allen and Seaman (2011) found that a high level of concern exists among all higher education institution leaders regarding faculty acceptance of online education. A review of the fall 2013 enrollment IPEDS data revealed that even among bigger state HBCUs there were not a lot of students enrolled in distance education courses. For example, Jackson State University in Natchez, MS, Albany State in Albany, GA, Tennessee State in Nashville, TN and Winston-Salem State in Winston-Salem, NC had 328, 490, 697 and 453 students enrolled in distance education respectively (T. MacFarland, personal communication, January 15, 2015).

Limitations of TAM

While Tsai, Zhu, Lan, and Li (2013) acknowledged that TAM is an excellent predictor of the relationships connecting behavioral beliefs (perceived usefulness and perceived ease of use), attitude toward use and usage intention, the authors believed the model is limited in predicting how to influence usage by way of the design and practice of IT. For example, IT designers can obtain feedback from users regarding perceived ease of use and usefulness; however, it is difficult to obtain actionable feedback such as the flexibility, integrity, and fluidity of IT from users when TAM is utilized (Tsai, Zhu, Lan, & Li, 2013).

Some studies found that perceived usefulness, though proven to be effective in predicting technology use for utilitarian systems, does not do as good a job as perceived enjoyment for hedonic systems (Hsu & Lu, 2004; Koufaris, 2002). Wu and Lu (2013) set out to discover the reasons for this discrepancy and posited that the difference lies in that perceived enjoyment is an intrinsic motivator and is more relevant to hedonic systems, while perceived usefulness is an extrinsic motivator and is more relevant to utilitarian systems such as spreadsheets and word processing. Hsiao and Yang (2011) noted that the hedonic nature of TAM is one of the major reasons for its adoption, and Hsiao, Tang, and Lin (2015) added perceived enjoyment as an extension to the TAM and found that the added construct was instrumental in individuals' adoption of technology.

Another factor of TAM that limits its reach is its leanness or parsimonious nature. As noted by Shen (2012), while this nature makes TAM easily adaptable to various situations, this very feature limits its reach. Researchers have pointed out that TAM lacks the ability to assist decision makers in understanding why individuals accept or abandon

IT (Chuttur, 2009). Other researchers have pointed out that in order to measure other variables, researchers had to extend TAM by adding other constructs such as positive image (Moore & Benbasat, 1996), cultural dimensions (Mao & Palvia, 2006; Chau, 1996; Hu et al., 1999; Straub et al., 1997), and computer playfulness (Venkatesh, 2000). More recently some researchers have added constructs such as perceived enjoyment (Hsaio et al., 2015; Hsaio, Tang, & Lin, 2015), openness to experience (Aharony, 2014), and information quality, system quality and service quality (Sebetci & Aksu, 2014).

Similarly, this research will extend the model by adding constructs that are germane to the present study such as facilitating conditions (support and training), and computer self-efficacy. Figure 1 shows the TAM model with the additional constructs for this study.

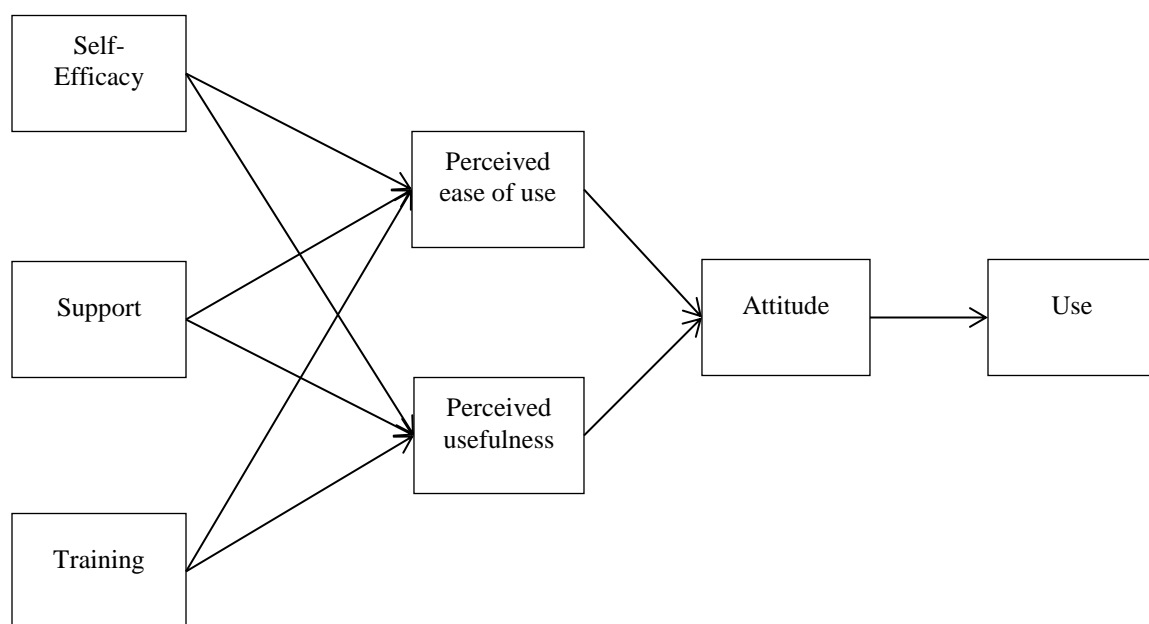


Figure 1. Original TAM (Davis, 1989) and additional constructs

Course Management Systems and Traditional Classrooms

With the emergence of CMS, traditional classrooms have seen a change in recent years that influenced the way students and instructors interact outside the classroom.

Indeed, CMS have made it easier for students to communicate with professors outside the

classroom, as well as enabled students to have better access to lecture notes and classroom presentations in their absence (Crawley & Frey, 2008). Mo (2011) found that the application of instructional technology enhanced student engagement in the learning process and Web-based instructional tools offered students more opportunities to interact with instructors, thus enabling them to be self-motivated in the learning process.

A study conducted by Malikowski (2011) on CMS and faculty use in traditional courses over a 3-year period looked at six specific features of CMS: files provided for students, asynchronous discussion postings, quiz questions available for students, drop box files to a professor, grade book entries, and survey questions. Malikowski found that four features showed differences at the $p < .05$ level: drop box files, discussion postings, grade book entries, and survey questions. During the research period of 2005–2007, the number of survey questions significantly decreased (2005, 2006), the number of grade book entries and survey questions significantly increased (2006, 2007), and the number of discussion postings significantly decreased (2005–2007). Overall, Malikowski found that teachers predominately used CMS for transmitting information to students and less for their interactive features.

Historically Black Colleges and Universities

Historically Black colleges and universities are an important and unique part of the landscape of the United States. They have a rich heritage and grant baccalaureate and graduate degrees to many African Americans. Although HBCUs only encompass 3% of America's 2- and 4-year higher education institutions, they have produced 28% of all bachelor's degrees, 15% of all master's degrees, and 17% of all first professional degrees received by African Americans (Lee, 2010). According to the United Negro College

Fund (UNCF), HBCUs have graduated over 50% of African American professionals, over 50% of all African American teachers, and 70% of African American dentists (Bettez, 2012). Bettez further stated that 50% of African Americans who graduate from HBCUs go on to graduate or professional schools.

One in three African Americans who graduated from HBCUs hold degrees in the natural sciences, and one-third of African Americans with mathematics degrees graduated from HBCUs. Additionally, according to Albritton (2012), between 1995 and 2004, 46% of African American women with degrees in science, technology, engineering, and mathematics graduated from HBCUs. Moreover, 33% of all African Americans with a Ph.D. in science or engineering received their undergraduate degrees from HBCUs.

Despite these accolades, HBCUs face challenges with enrollment, retention rates, and diminishing budgets, and these higher education institutions have never been funded on par with their non-HBCUs counterparts (Bettez, 2012). Enrollment numbers for HBCUs have fallen steadily since the famous 1954 *Brown v. Board of Education* decision to accept Blacks in non-HBCUs institutions of higher education (Bettez, 2012). Before this ruling, 90% of African American college students attended HBCUs. By the 1960s, this number decreased to 70% with non-HBCUs opening their doors to African American students through incentives and pressure to increase minority enrollment from the Higher Education Act of 1965 (Albritton, 2012). This figure continued to decline and reached 20% by the 1980s (Albritton). Today, according to data from the United States Department of Education, 11% of African American college students attend HBCUs (Albritton).

The 1954 *Brown v. Board of Education* decision, combined with the Higher Education Act of 1965, contributed to the decreased enrollment experienced by HBCUs. With a push to increase minority enrollment by the 1965 act, administrators at non-HBCUs offered financial incentives that attracted African American students at an alarming rate. Unable to counter-offer because of a lack of financial resources, African American students' enrollment at HBCUs further declined. The civil rights initiative to admit African Americans to non-HBCUs had the unintentional effect of decreased enrollment at HBCUs because no mandate existed for non-HBCUs to attract Caucasian students (Albritton, 2012).

To complicate matters, the Servicemen's Readjustment Act of 1944, also known as the G.I. bill, served to decrease enrollment of African Americans at HBCUs. Since all higher education institutions were opened to African Americans, servicemen of color who returned from the Vietnam War seized the opportunity to attend college and used funds allocated to them from the G.I. bill to attend non-HBCUs (Albritton, 2012).

Enrollment and retention problems are plaguing HBCUs and are threatening their very existence. Sixty-seven percent of private and public 4-year HBCUs have experienced a drop in undergraduate enrollment in the past 2 years (USDE, 2013). Furthermore, 51% of these institutions have experienced a decrease in enrollment in the last five years (USDE, 2013).

The development for many HBCUs is to seek more diversity in their student body and course offerings (Stuart, 2012). According to Stuart, because HBCUs are facing great financial hurdles, they are looking to non-African American students as an avenue to meet their financial challenges. All three HBCUs in Mississippi—Alcorn State, Jackson

State, and Mississippi Valley State—are intentionally becoming more diverse (Stuart, 2012). Alcorn State in Lorman, Mississippi, is the first of the three universities to reach a court-mandated goal of having at least 10% non-Black enrollment in its student body (Stuart, 2012). Furthermore, Stuart found that many HBCUs such as Jackson State in Jackson, Mississippi, Fayetteville State in Fayetteville, North Carolina, North Carolina Central in Durham, North Carolina, Tennessee State in Nashville, Tennessee, Florida A&M in Tallahassee, Florida, and a host of others are facing administrative hurdles by changing the model and way in which they offer their curriculum (Stuart, 2012). For example, some HBCUs such as North Carolina Central, Tennessee State, and Florida A&M, have slashed course offerings, combined departments, and raised admission standards in hopes of lessening their financial burdens (Stuart, 2012). Others, such as Jackson State, hope to boost enrollment through non-traditional offerings such as online and night or evening programs (Stuart, 2012).

According to Kendricks, Nedunuri, and Arment (2013), between the years 2002 to 2008 inclusive, the 6-year completion rate for Caucasians at 4-year institutions of higher learning was 60.2%. The retention rate for the same period for African Americans was 40.1% (Kendricks et al., 2013). A review of the National Science Foundation (2015) site revealed that of all STEM bachelor degrees awarded to African Americans from 2010 to 2012, 17.6%, 17.2%, and 16.7% respectively for those years were awarded at HBCUs.

Cultural Differences

The concept of difference in culture between HBCUs and non-HBCUs is rooted in the notion of othermothering—a phenomenon whose framework and theoretical underpinnings began during the days of slavery when parents and children were separated

(Roseboro & Ross, 2009). Fictive kin slaves who took the responsibility of parenting children who were not their own would then take the responsibility to care for children separated from their parents. In the same way, faculty in HBCUs take on this othermothering responsibility by continuing the tradition in the pedagogical practice by mothering the minds of students under their tutelage. Indeed, researchers (Mawhinney, 2012; Roseboro & Ross, 2009) have demonstrated that HBCU faculty practice this theoretical framework, especially female instructors. The relationship between teacher and student can sometimes be blurred and may complicate the boundaries of the teacher-student relationship (Mawhinney, 2012; Roseboro & Ross, 2009).

HBCUs and non-HBCUs share other differences in culture. At HBCUs, students usually experience the universities from a campus-wide perspective, meaning students are immersed in the entire community of the campuses on which they attend (Perna et al., 2009). Conversely, at non-HBCUs, experts describe the culture as a place where faculty are indifferent and students are left to survive on their own (Morelle, 1996). In addition, teachers give little advice at non-HBCUs, and students communicate mainly in their respective departments (Morelle, 1996).

Technology Use and Acceptance

Although technology allows people to work better and more efficiently, many organizations struggle to get their employees to adopt IT. As postulated by Ma, Andersson, and Streith (2005), the use of IT has allowed students to become more proactive in learning and helps students achieve their educational goals. In contrast, teachers are not utilizing technology to the same extent as students.

Many organizations have invested considerable time and money to acquire IT systems in order to make their companies more competitive. However, investment in IT alone does not help them achieve their goals, especially when their employees do not use the technology. Some researchers suggested that organizations do not reach their technology goals because of employees' attitudes toward new technology (Baroudi, Olson, & Ives, 1986; Clegg et al., 1997; Shani & Sena, 1994). Particularly, the technology acceptance model (TAM) entailed that individuals' perceived ease of use and perceived usefulness of technology was one determinant of their use of technology and may be responsible for their lack of acceptance (Lee, Rhee, & Dunham, 2009).

Perceived Usefulness, Perceived ease of use, and Attitude

Perceived usefulness of IT refers to a person's perception of whether the technology will provide accurate, timely, relevant, reliable, and valid information to and for the user, while *perceived ease of use* refers to the extent to which a person believes the IT will be easy to manage, manipulate, and regroup (Mohamed Ali & Younes, 2013). Bhattacharjee (2002) noted that once a person makes a decision to interact with a system, that system has already proven useful. Individuals will adopt a system if they believe use of the system will result in good performance (Amoako-Gyampah & Salam, 2004). Al-Haraizah and Choudhury (2012) found that culture has a positive influence on both perceived usefulness and perceived ease of use; however, that influence is not significant. On a 7-point Likert scale, the level of influence of culture showed a mean on both constructs at 4.65, which was greater than the neutrality point of 4, but less than the agreement point of 5 (Al-Haraizah & Choudhury, 2012). Similarly, trust had a positive

non-significant influence on perceived usefulness and perceived ease of use. On the same Likert scale, the researchers calculate trust at 4.675 (Al-Haraizah & Choudhury, 2012).

Perceived ease of use refers to an individual's belief that using a particular system will be free of physical or mental effort (Davis, 1993). According to the TAM, both perceived usefulness and perceived ease of use influence attitude and, in turn, have a major effect on actual use of a system (Davis, 1989). According to Taylor and Todd (1995), both perceived usefulness and perceived ease of use are pivotal determinants of behavioral intention to use a system and are therefore instrumental in subsequent use of the system. Tseng et al. (2013) found that perceived quality is a better predictor of users' intentions to use and actual use of a system than is perceived ease of use. *Perceived quality* refers to the quality of the system; trust in the medium and information, support and convenience of the system (Tseng et al., 2013).

Researchers define *attitude* toward a behavior as "an individual's positive or negative feelings about performing the target behavior" (Taherdoost et al., 2012, p. 1794). According to the theory of planned behavior, a person's intention to perform a behavior is based on the person's attitude toward the behavior, and subjective norms. Attitude toward behavior includes behavioral belief, evaluations of behavioral outcome, subjective norm, normative beliefs, and the motivation to comply (Taherdoost & Masrom, 2009).

Facilitating Conditions—Support and Training

For most studies, the effect of facilitating conditions on use is usually difficult to measure. Most researchers look at the relationship between facilitating conditions and behavioral intention to use (Venkatesh et al., 2003). Some studies revealed facilitating

conditions effectiveness on predicting intention (Foon & Fah, 2011; Venkatesh, Zhang, & Sykes, 2011). Taiwo and Downe (2013) found that the effect of facilitating conditions on behavioral intention did not pass the fail-safe test; the researchers thus concluded that the relationship between the two is questionable. Conversely, Alrawashdeh and Al-Mahadeen (2013) found that facilitating conditions have a direct effect on individuals' intention to use systems. In fact, the statistical results of the aforementioned study showed that a strong relationship exists between facilitating conditions and intention to use. Other studies (Ajzen, 1991; Thompson, Higgins, & Howell, 1991) concurred with this study on the strong relationship between facilitating conditions and intention to use.

Researchers have suggested that individuals are more likely to adapt system use in the presence of facilitating conditions (Sun, 2012). Workers who get support in the form of such actions as tangible assistance and encouragement were more likely to persist in their work efforts and demonstrate creativity under pressure than were those who received lower levels of support (Baer & Oldham, 2006). Zhou (2003) found that support from supervisors fostered creative co-workers, thus moderately stimulating creativity. Adaptive system use (ASU) is time-consuming and requires a lot of energy and cognitive processing (Sun, 2012). Facilitating conditions provide the necessary resources and support that help to make ASU more achievable and controllable (Sun, 2012). As such, facilitating conditions help individuals overcome the uncertainties associated with ASU and enhance their perceived probability of succeeding in using systems (Venkatesh, Brown, Maruping, & Bala, 2008).

The implementation of new organizational systems can frustrate and worry employees (Morris & Venkatesh, 2010). Employees do not react well to new systems for

many reasons such as: complexity of the new system, desire to remain with the status quo, and frustration from early trials with the new system (Boudreau & Robey, 2005). Frustration with a new system can be related to changes in a person's job caused by the new system (Morris & Venkatesh, 2010). When sufficient facilitating conditions such as timely assistance and training are present, employers encourage employees to explore and experiment with new ideas, thus becoming more persistent and innovative (Baer & Oldham, 2006).

Technology Acceptance Model and Culture

Previous researchers have used the TAM to assess whether the culture of an organization affected the use or intention to use information systems. In a study conducted by Hardee (2012), researchers used cultural factors such as how readily universities accept change, how willing employees were to try new processes and procedures to improve performance, and how employees adapted to change to assess behavior and actual use of a system. The study found that a weak positive correlation ($r = .154$; $p \leq .01$) occurred between culture and actual use of an information system.

Self-Efficacy

Self-efficacy refers to one's belief that he or she has the necessary abilities to pursue a course of action that will result in a desired performance (Bandura, 1997). Bandura's model is more concerned with an individual's belief about what one can accomplish rather than possessing the necessary skills to accomplish the task. Bandura asserted that the stronger one's perceived self-efficacy in meeting a goal, the more effort that person will exert (Teo & Van Schaik, 2012). Venkatesh et al. (2003) found that self-efficacy was not instrumental in influencing actual behavior. Further study revealed that

self-efficacy was an “indirect determinant captured by effort expectancy and fully mediated by effort expectancy” (Yu, 2012, p. 109). Other studies have supported the notion that self-efficacy was not a direct determinant of behavior (Brown, Zaheeda, Douglas, & Stroebel, 2003; Puschel, Mazzon, & Hernandez, 2010; Venkatesh & Zhang, 2010), while some support self-efficacy as a determinant of behavior (Dasgupta, Paul, & Fuloria, 2011; Luarn & Lin, 2005; Sripalawat, Thongmak, & Ngramyarn, 2011).

Information Technology Use in HBCUs

A study conducted in two HBCUs over a 3-year span showed that students in HBCUs have low self-efficacy when asked about their own knowledge and skill level pertaining to the use of word processing, spreadsheets, database, and presentation software (Guy & Lownes-Jackson, 2010). Guy and Lownes-Jackson found that only 11% of students in the study admitted to having above average skills in database, 22.2% for spreadsheets, 50% for presentations, and 67.1% for word processing applications. Students reported higher confidence with word processing and presentation applications because they used those applications more frequently (Guy & Lownes-Jackson, 2010).

The landscape of information technology has significantly improved for HBCUs. A survey conducted by the National Association for Equal Opportunity (NAFEO, 2004) revealed that although minority-serving institutions lag behind other institutions in student computer ownership and online services, most institutions have a solid IT infrastructure and IT is used to enhance a number of services offered in higher education. The study revealed that most HBCUs have an enterprise resource planning system with a number of applications that integrate information systems, and financial and student services operations. In addition, a review of all minority-serving institutions showed that

79% had a financial management system, 76% had a student information system, and 60% had a human resource management system (Hardee, 2012). Additionally, financial support from the Higher Education Act's Titles III and V programs support institutions that provide education for minorities, low income, and first generation college students so they can continue to offer administrative and operational capacity to achieve their mission (Hardee).

Course Management Systems and Theories

Course management systems such as Desire2Learn, Blackboard, Angel, and Moodle have become a mainstay of numerous universities and are becoming increasingly popular. Many universities commonly adopt CMS and instructors and students alike use the systems. Indeed, CMS will be around in universities for the foreseeable future (Malikowski, 2011).

Research conducted by Malm and DeFranco (2012) found that colleges and universities spent approximately one billion dollars per year on CMS. The authors further cited that nearly every college has these systems along with the necessary support to make them operate. Many universities use them for distance learning, blended learning or simply to enhance and provide access to traditional classroom resources (2012).

The researcher in the present study will use the TAM and additional constructs to formulate questions for the Likert scale survey that will be administered to faculty at 4-year private HBCUs. Constructs such as perceived ease of use, perceived usefulness (Davis, 1989), facilitating conditions, computer efficacy (Waheed & Jam, 2010), and attitude toward technology (Chen, 2009) will help identify the use of CMS in HBCUs.

Summary of Prior Research on the Topic

Designers specifically create course management systems so that instructors and students use features and tools to enhance communication between student and instructor and student to student. Eighty percent of colleges and universities have CMS in place. Additionally, CMS foster collaborative learning and broaden exchange of ideas beyond the classroom (Costen, 2009). CMS assimilate both technology and pedagogical features into one tool and instead of having students passively download content material, CMS allow students to actively communicate and interact with instructors and peers alike (Beer, Clark, & Jones, 2010).

The literature suggests that CMS have a strong potential to enhance retention and satisfaction rates of users by being innovative, convenient, and functional (Al-hawari & Mouakket, 2010). Ready, Johnson, and Astani (2011) stated that the technology used to foster online environments makes learning better and augments learners' growth and development. Some researchers suggested that combining online and traditional modalities using CMS have the potential for improved academic performance (van der Merwe, 2011).

With the emergence of CMS, traditional classrooms have seen a change in recent years that has influenced the way students and instructors interact outside the classroom (Crawley & Frey, 2008). Indeed, CMS have made it easier for students to communicate with professors outside the classroom, as well as enable students to have better access to lecture notes and classroom presentations in their absence (Crawley & Frey, 2008). Mo (2011) found that the application of instructional technology enhanced student engagement in the learning process and Web-based instructional tools offered students

more opportunities to interact with instructors, thus enabling them to be self-motivated in the learning process.

The difference in culture between HBCUs and non-HBCUs plays a vital role in how technology is accepted and used in both types of institutions. According to Roach (2000), the culture of HBCUs affects the technology lag even more than such issues as poor finances.

While Woods et al. (2004) conducted research on CMS at 38 small, medium, and large-sized liberal arts institutions associated with the Council of Independent Colleges, Michigan Collegiate Telecommunications Association, and the Midwest Higher Education Compact, only a small portion of these institutions were HBCUs. Moreover, no documentation revealed how many faculty of HBCUs, if any, responded to the survey. Most of the research conducted by Woods et al. was directed at universities that are part of the Michigan Collegiate Telecommunications Association and the Midwest Higher Education Compact with six HBCUs. None of the research specifically addressed HBCUs.

Much of the research conducted on CMS focused on non-HBCUs (Boer, 2001; Dunn & Lingerfelt, 2004; Hanson & Robson, 2004; Kasraie & Kasraie, 2010; Kilmon & Fagan, 2007; Lonn, 2009; Malikowski, 2011; Morgan, 2003; Owens & Price, 2010; Waheed & Jam, 2010; Woods et al., 2004), and those doing research on CMS generally do not appear to be aware of the unique history and culture of HBCUs. This serves as a barrier to solving the problem because little information is known regarding the use of technology in HBCUs in general or CMS in particular. Furthermore, information on the particular factors of this study such as perceived ease of use, perceived usefulness (Davis,

1989), facilitating conditions, computer efficacy (Waheed & Jam, 2010), and attitude toward technology (Chen, 2009) at HBCUs were almost non-existent.

The Contributions of this Study to the Body of Knowledge

Through this dissertation, the researcher sought to fill a need and help to close a gap in this area that has not previously been addressed—use of CMS for traditional courses by faculty in private 4-year HBCUs. Previous research addressed within this study revealed that significant differences exist between HBCUs and non-HBCUs that warrant a need for the present study. The present study will build on prior research using the TAM framework and offer a unique perspective on how researchers can use those and additional constructs to assess how faculty in HBCUs use CMS. The present study will yield results from private 4-year HBCUs on faculty use of CMS and make recommendations regarding how faculty in these types of institutions can use CMS effectively to enhance the teaching and learning process.

Chapter 3

Methodology

In this chapter, the methodology for this study is presented. This chapter includes a discussion of the target population, survey instrument, specific constructs used in the framework, and approach. The survey instrument was adapted from Davis' (1989) TAM which was already estimated valid and reliable as an instrument to measure acceptance and use of information systems. Other constructs were added to the original TAM framework and a discussion of those constructs and their validity is discussed in this chapter. The chapter concludes with an approach section that delineates how data were collected from faculty at the participating HBCUs.

Target Population

The population of this study includes full-time faculty in higher education, notably those serving and considered full-time 10 or 12-month employees at participating private 4-year HBCUs. The study used a convenience sample of all full-time faculty members from participating private institutions outlined in Table 1. Faculty are defined as those serving in an instructional role on a full-time basis and are on 10 or 12-month contracts.

Research Methods

This research was a survey-based study. It was heavily reliant on responses to survey questions from faculty in private 4-year HBCUs to gather data that were analyzed in order to determine their use of CMS. The research used the Davis (1989) TAM framework and questions used in his research to determine the effect of factors such as

perceived ease of use, perceived usefulness and attitude on their use of CMSs. Additional questions for constructs such as self-efficacy, support and training were added to the survey to see how these impacted the existing constructs in TAM.

The survey instrument in this study was designed to answer the research questions discussed in chapter one. The survey questions adapted from Davis (1989) were already validated and estimated reliable for studies involving acceptance and use of information technology. The questions for self-efficacy were adapted from Flosi (2008). The questions for support were adapted from Bhattacharjee and Hikmet (2008), and the questions for training were adapted from Hassanein, Head, and Wang (2010) and do not require construct validation. However, the constructs (support and training) were measured for multicollinearity by Hassanein et al. to make sure two different facilitating condition constructs (support and training) are not too highly correlated, thus measuring the same thing. Both constructs met the threshold of the variance inflation factor (VIF) of less than 3.3 thus showing that multicollinearity did not exist.

Survey Instrument

A Web-based survey (Appendix D) was designed using the Davis (1989) TAM instrument, which was tested and validated for its usefulness in developing a predictive model on the acceptance and use of technology. The intent of this study was to develop a model on the factors that affect faculty use of CMSs in traditional courses in private 4-year HBCUs. A survey was designed to empirically assess faculty use of CMS for traditional courses based on perceived ease of use, perceived usefulness, facilitating conditions, computer efficacy, and attitude toward technology use.

Permission to use the TAM model and original TAM survey questions was obtained via email from Fred Davis, the author of the TAM model:

You may not need permission as long as you cite the paper(s) from where you got the model and measures. For a dissertation, it seems wise to get permission anyway just to be safe. In any case, you have my permission to use TAM for your doctoral research. (F. Davis, personal communication, February 4, 2013)

Furthermore, Davis confirmed in email that the mechanics of survey distribution and estimates of reliability and validity for when the survey is put into electronic format versus paper-and-pencil format are no different. He stated, "TAM works well for surveys distributed electronically (F. Davis, personal communication, February 4, 2013).

Institutional review board (IRB) approval was sought from 25 HBCUs. An initial email was sent to each institution followed by reminders periodically. This process began at the beginning of the spring 2014 semester after IRB approval was obtained from Oakwood University where the researcher serves as an Assistant Professor. The approval letter, consent form, and IRB application from Oakwood University were sent along with the email to 25 private 4-year HBCUs to see if they would grant approval based on the approval from Oakwood University. Twelve institutions responded and additional applications were completed at the institutions and sent via email. Spelman College was the only institution with a Web-based application.

The researcher was able to obtain twelve IRB approvals. One of the twelve approving institutions was unable to complete the process. The two institutions with the most faculty in the study (Morehouse College and Spelman College) granted approvals. Although all approvals were not granted, the researcher conducted the study with

participants from eleven institutions. Results can be generalized to the private HBCUs group since they are all very similar in size, geographic location, and enrollment.

Institutional review board (IRB) approval was sought from Nova Southeastern University (NSU) after IRB approvals were obtained from participating HBCUs. The survey instrument was delivered to faculty in the 11 private 4-year undergraduate HBCUs via the Web using Survey Monkey. The survey instrument was accompanied by a recruitment statement (Appendix E) to explain reasons for soliciting responses from participants with details about the importance and contributions of this study to the research literature. The survey was not accompanied by a consent form as advised by NSU since the survey responses were anonymous and there was no way to identify individual participants.

The survey instrument had three parts. The first part had general non-identifying information participants must provide about themselves and their work environment. The second part of the survey stimulated responses based on the TAM constructs of perceived ease of use, perceived usefulness and attitude, and the third part of the survey focused on the additional constructs for this study, namely, self-efficacy, support and training.

The survey was designed to measure the use of CMS, utilizing scales that were already estimated as valid. According to Lule, Omwansa, and Waema (2012), adopting construct items that were used in prior research is useful since they ensure prior validity. The survey contained items such as academic disciplines taught, demographic and general information about faculty, items for perceived ease of use, perceived usefulness, and attitude from Davis (1989), and items on facilitating conditions, namely, training and support which were adapted from survey instruments used in prior research.

Online survey distribution is now the leading research method because it is the fastest and most inexpensive way for disseminating surveys to participants (Clow & James, 2014). Furthermore, online surveys can be conducted in various ways such as placing them on a Website, emailing them directly, or placing a link to the survey in an email to participants (Clow & James, 2014). This study used the latter method to give faculty access to the survey.

A Likert-type scale survey was administered to faculty. Likert scale surveys have been used in information systems research for over 20 years and are most often used on surveys involving TAM. They are comprised of response options that use the terms “agree” or “disagree” as responses to a number of statements, and are often used in attitude scales for situations where there is no agreed upon criteria for prediction. When administering survey questionnaires, a Likert scale is often used because it consists of declarative statements to which respondents can state the extent to which they agree or disagree with the statements (Chin, Johnson, & Schwarz, 2008). A Likert scale questionnaire was an ideal survey instrument to use for this study.

A Likert-type scale also allows researchers to view the data from an ordinal or interval perspective. According to Stoutenborough (2008), interval type measures have an equal value between the measures. For example, there will be no variations between the scale measurements. The difference between a 3 response and a 4 response is the same as the difference between a 233 response and a 234 response – which is 1. This allows interval-type data to be easily measured and compared (Clow & James, 2014; Stoutenborough, 2008).

On the other hand, ordinal type scales, such as the one used in this study, are more common in this type of research because not many attributes can take on an interval form (Stoutenborough, 2008). Furthermore, the difference between response options are not assumed to be equal, as in the scale “strongly agree, agree, neither agree nor disagree” etc. The manner in which these response categories are labeled makes the data of an ordinal nature (Clow & James, 2014). Therefore, when data of an ordinal type are collected, data analyses focus on frequencies, percentages, mode and median (Clow & James, 2014).

Specific Constructs Validation

Questions to measure perceived ease of use and perceived usefulness were adapted from Davis (1989) TAM instrument. This instrument was already estimated as valid in studies by Davis (1989), Lule et al. (2012), Kalema, Olugbara, and Kekwaletswe (2011), and the instruments all met or exceeded Cronbach’s Alpha internal reliability of 0.7 for items related to perceived ease of use and perceived usefulness.

Questions to measure attitude were derived from the Davis (1989) TAM instrument. This instrument was already estimated valid for use in studies conducted by Davis (1989), Jeung-tai and Chihui (2009), Song (2010), and each instrument met or exceeded Cronbach’s Alpha internal reliability of 0.7 for items related to attitude.

Computer self-efficacy (CSE) is the degree to which someone believes he/she possesses the skills necessary to operate a computer. CSE is when someone uses his/her own judgment to ascertain whether a computing skill can be performed, thus, this construct can be used to determine if an instructor has the confidence to use a CMS (Chan & Lin, 2009). Questions to measure CSE were adapted from (Flosi, 2008) and

were reviewed by an expert panel.

Facilitating conditions is a construct that was added to this study in order to assess whether external conditions influence user attitude toward using CMSs. According to Hassanein, Head, and Wang (2010), facilitating conditions are the support mechanisms the user of a technology believes exist that will influence his/her use of the technology. In the case of CMS use, external facilitating conditions may be training and support when difficulties are experienced.

For formative measures such as facilitating conditions, there is no requirement that they be highly correlated (Hassanein, Head, & Wang, 2010). Construct validation required by methods such as Cronbach's alpha is not necessary for formative constructs like facilitating conditions; however, such constructs must be measured for multicollinearity to make sure two different facilitating condition constructs are not too highly correlated, thus measuring the same thing. To establish that multicollinearity is not present, the VIF statistic should be used to measure the constructs and a VIF of less than 3.3 should be present. Hassanein, Head, and Wang (2010) measured the facilitating conditions constructs of training and support and they were estimated as valid and reliable below the 3.3 as suggested (2010).

Formats for Results Presentation

Data were entered into SPSS version 20.0 for Windows. Descriptive statistics were conducted to describe the sample demographics and the research variables used in the analysis. Frequencies and percentages were calculated for nominal data, such as gender and age. Means and standard deviations were calculated for continuous data, such as support, training, and self-efficacy. Cronbach's alpha reliability was also conducted on

each one of the subscales (support, training, self-efficacy, perceived usefulness, perceived ease of use and attitude).

To assess research question 1, two multiple linear regressions were conducted to assess if self-efficacy, support, and training predict perceived ease of use and perceived usefulness. A multiple linear regression was the appropriate analysis to conduct to assess the relationship between multiple interval independent variables and an interval level dependent variable (Pallant, 2007). In this case, the interval level independent variables are self-efficacy, support, and training. The interval level dependent variables are perceived ease of use and perceived usefulness. One multiple linear regression was conducted for each dependent variable. The assumptions of the multiple linear regression (normality, homoscedasticity, and absence of multicollinearity) were assessed prior to analysis.

To assess research question 2, a multiple linear regression was conducted to assess if perceived usefulness and perceived ease of use predict attitude. A multiple linear regression was the appropriate analysis to conduct to assess the relationship between multiple interval independent variables and an interval level dependent variable (Pallant, 2007). In this case, the interval level independent variables are perceived usefulness and perceived ease of use. The interval level dependent variable was attitude. The assumptions of the multiple linear regression (normality, homoscedasticity, and absence of multicollinearity) were assessed prior to analysis.

To assess research question 3, six mediation analyses were conducted to assess if perceived ease of use and perceived usefulness mediate the relationships between self-efficacy, support and training predicting attitude. The two mediators are perceived ease of

use and perceived usefulness. The three independent variables are self-efficacy, support, and training. The dependent variable was attitude. One mediation analysis will be conducted for each independent variable and mediator combination. The Baron and Kenny (1986) method for testing mediation was used.

To assess for mediation, three regressions were conducted. The first regression assessed if the independent variable predicted the dependent variable. If the regression is significant, the second regression will be conducted. The second regression assessed if the independent variable predicted the mediator variable. If the second regression is significant, the third regression will be conducted. In the third regression, the independent variable and the mediator variable predicted the dependent variable. If one of the first two regressions is not significant, the mediation analysis stops and mediation is not supported. Full mediation is supported if in the third regression, the independent variable is no longer a significant predictor of the dependent variable in the presence of the mediator variable. Partial mediation is supported if in the third regression, the unstandardized beta coefficient (B) for the independent variable becomes closer to zero.

Right-to-use computer and Internet resources for survey writing and distribution will be granted through computers to which the researcher had access as Chair of the Business and Information Systems department at Oakwood University, Huntsville, Alabama. Permission to use the TAM survey questions which were already shown valid and reliable was granted, and questions based on facilitating conditions and self-efficacy were chosen based on their estimated reliability and validity in previous research. As an assistant professor of information systems, the researcher had access to student workers and one was already identified to upload the survey questions in Survey Monkey and

distribute to select HBCUs. Data analysis was performed and an expert in research design assisted with the composition of the results chapter.

Approach

This study used the survey research method to collect information from faculty. Specifically, a Web-based survey instrument was used to administer the survey to facilitate attempts to reach a broadly representative sample of potential respondents. According to Mohr, Meterko, Nagy, and Warren (2010), using the Internet as the mode of survey distribution to respondents is “less expensive, more efficient, easier to use, allows more customization, and is generally less error-prone than paper-and-pencil methods of data collection” (p. 1).

To begin the approach, in the fall 2013 semester, an IRB application was completed for Oakwood University, the institution at which the researcher had employment. In December 2013, an expedited approval was granted from Oakwood University to continue the research.

The researcher completed individual applications and received approvals from colleges on the list. Those that did not respond were sent an email reminder, which sparked more application completions. After continuously repeating the reminder process for the entire spring 2014 semester, the researcher was able to obtain eleven IRB approvals to conduct the research at those institutions. At the beginning of the fall 2014 semester, the researcher submitted an IRB application to NSU and was granted approval. All eleven approvals were submitted with the NSU application.

In order to obtain the best possible response from the survey participants in this study, the researcher used the following approaches which were suggested by Anseel et al. (2010):

1. **Advance notice** – advance notification was sent to participants via email that a survey was forthcoming.
2. **Follow-up** – all participants who did not complete the survey were sent a reminder after two weeks. This process continued until the researcher completed the collection process.
3. **Topic salience** – the researcher made sure the survey instrument had item topics that are relevant to faculty performing their duties.
4. **Personalization** – a recruitment statement accompanied the survey instrument to add exclusivity by addressing participants and including a personal signature at the end of the letter.
5. **Anonymity** – the researcher informed participants of anonymity to foster safety and non-compromised identity.
6. **Internet** – the Internet was used to administer the survey for cost savings, and having results in an electronic format.

Resource Requirements

The following resources were required to complete the study:

1. Dissertation committee
2. IRB Board NSU
3. IRB Board for participants' universities
4. Faculty completing survey instruments at universities

5. Statistician for data analysis, reliability and validity
6. Internet and computers for distributing surveys
7. Survey Monkey for sending surveys via Web
8. SPSS statistical software package
9. Editor to review dissertation

Summary

In this chapter the target market and research methods were outlined. The survey instrument, along with validation requirements for the constructs used was presented. The survey was designed to match the research questions to be answered in this study and the independent and dependent variables were identified. It was noted that the survey was designed based on the framework for the TAM methodology originally designed by Davis (1989). Additional constructs of self-efficacy, and facilitating conditions of support and training were added to the framework. Construct validation was discussed for each construct in the model and it was determined that Cronbach's Alpha was the validation method used to assess validation. Each construct passed Cronbach's validation criteria with at least a 7.0 or above in previous studies.

Finally, the approach for securing IRB approval at each college or university was outlined, indicating the challenges experienced while undergoing this process. Also of note in this chapter is the recommended process for attaining the best response from participants when using the survey method. The resource requirements for continuing this study were also identified.

Chapter 4

Results

While many researchers have studied the use of CMS in higher education institutions (HEIs), they mainly focused on non-HBCUs (Keesee & Shepard, 2011). A shortage of research regarding faculty use of CMS at HBCUs exists, and currently an inadequate amount of research with regard to factors, such as perceived ease of use, perceived usefulness (Davis et al., 1989), facilitating conditions, computer efficacy (Waheed & Jam, 2010), and attitude toward technology (Chen, 2009) in HBCUs exists.

Researchers of previously conducted exploratory studies have shown that sufficient differences exist between HBCUs and non-HBCUs to warrant a separate study of CMS use at HBCUs (Gasman & Bowman, 2011; Minor, 2008; Smith, 2011). This study involved 4-year private HBCUs. The United States has 105 HBCUs, 49 of them are private institutions (IPEDS, 2016). The researcher chose private 4-year HBCUs that only offer bachelor's degrees for this study because the researcher works at this type of institution. Twenty-five private 4-year HBCUs were contacted to complete the IRB process for this study, and eleven of them completed the IRB process. This study was based on information collected from this process.

Data Collection

A total of 11 private 4-year undergraduate HBCUs granted approval to survey their faculty. At each of these institutions, surveys were sent to all applicable faculty (i.e., those serving in an instructional role on a full-time basis with 10 to 12-month contracts). Participants received the surveys through an email with a link to Survey Monkey, where

the survey was hosted. The HBCUs surveyed were geographically dispersed, so survey responses were drawn from Alabama, Arkansas, Georgia, Mississippi, Ohio, South Carolina, Tennessee, and Texas. The representation of HBCUs from a widespread geographic range was beneficial to the external validity of the findings.

Respondents from each HBCU were counted to determine the degree to which each institution's faculty was represented in the data. Through a comparison between the total number of faculty at each HBCU and the number of survey responses from each HBCU, the researcher calculated the percent of responses. None of the surveyed schools had fewer than four respondents represented in the data, and the school that did supply four respondents had 35 applicable faculty, meaning that 11% of the institution's applicable staff were represented. The least represented applicable faculty was from Morehouse College, where 7% (11 out of 164) took part in the study. Oakwood University had the highest degree of representation from applicable faculty with 70% of the faculty taking part in the study. The researcher is affiliated with Oakwood University and is unknown personally to participants in the other universities. Table 2 presents each HBCU, the state of origin, and the degree of representation in regards to applicable faculty.

Table 2. *Representation of Each HBCU Applicable Faculty*

Name	State	Full-time Faculty	Survey Responses	Percent Responses
Benedict College	South Carolina	149	29	19
LeMoyne-Owen College	Tennessee	53	6	11
Morehouse College	Georgia	164	11	7
Oakwood University	Alabama	109	76	70
Philander Smith College	Arkansas	51	6	12
Rust College	Mississippi	48	6	13
Spelman College	Georgia	174	36	21
Stillman College	Alabama	53	7	13
Tougaloo College	Mississippi	98	10	10
Wilberforce University	Ohio	35	4	11
Wiley College	Texas	70	8	11

Descriptive Statistics

The researcher screened data for accuracy, missing data, and outliers. Descriptive statistics and frequency distributions were conducted to determine that responses were within the possible range of values (i.e., within the options on the given Likert scales) and that the data are not distorted by outliers. Outliers are extreme scores that are outside the range within which the vast majority of scores (i.e., 99%) are expected to fall. The researcher tested the presence of outliers by the examination of standardized values. Standardized values were created for each subscale score, and cases were examined for values that fall above 3.29 and values that fall below -3.29, which Tabachnick and Fidell (2012) identified as outliers. Stevens (2009) stated that, regression is highly sensitive to outliers and influential data points, which may skew the regression line in a positive or negative direction, and can have a disproportionately large effect on the results. He argued that even robust regression might no longer be effective when outliers are present. The decision to remove these outliers was based on Stevens' (2009) suggestion, as well as the violation of normality seen in regression one, which could combine with the effect

of outliers to negate the study's validity (Pagano, 2013). Although outliers may provide interesting information for the validity of the results and to minimize the error of the findings, the researcher removed outliers from the data set (Brown, Zaheeda, Douglas, & Stroebel, 2003).

The original data set consisted of 218 cases. No cases were removed for responses outside of the available Likert scales. The researcher removed three cases because of outliers in perceived usefulness, one for being an outlier in attitude, and two for being outliers in training. Several participants with one outlier score also had outliers on one or more of the other subscales, and as such, the researcher subtracted those full participant observations from the data set. This decision was based on the fact that participants with missing data for any of the variables of interest would not be available for use in any regression calculation which used these scales. According to Morgan, Leech, Gloeckner, and Barrett (2012), to be included in a regression analysis, each participant must have data for each variable in the model. According to Lamothe (2014), outliers are abnormal values and can corrupt or contaminate data by artificially increasing or decreasing average values. Lamothe further concluded that outliers can have a dramatic effect on a data set, and can misrepresent data patterns.

Because each regression model required a combination of all variables of interest (i.e., those that were assessed for outliers), removal of a single datum would result in their removal from the entire analysis. Thus, those with only one outlying case were also removed in their entirety so that the number of participants used in each analysis did not fluctuate based on spurious missing data. Based on a power analysis used to determine an adequate sample size, this did not result in a restrictively small sample and was deemed

appropriate (Faul, Erdfelder, Buchner, & Lang, 2014). After removing these six outlying cases, the final data set consisted of 212 participants.

Of the 212 participants in the final data set, 42.5% were male ($n = 90$) and 57.5% were female ($n = 122$). A majority of the participants were either Assistant (31.2%, $n = 63$) or Associate (32.7%, $n = 66$) professors. A large majority of participants had used Blackboard management software package (71.7%, $n = 152$). The most common course management system features that participants used were gradebook (91.5%, $n = 194$), e-mail (90.6%, $n = 192$), announcements (87.3%, $n = 185$), and posting lectures or slides (80.2%, $n = 170$). Table 3 presents the complete frequencies and percentages of demographic information.

Table 3. *Frequencies and Percentages of Demographics*

Demographic	<i>n</i>	%
What is your gender?		
Male	90	42.50
Female	122	57.50
Choose your major discipline		
Allied health	3	1.40
Biology, biological sciences	12	5.70
Business	22	10.40
Chemistry	9	4.20
Communication	5	2.40
Computer science	11	5.20
Economics	2	0.90
Education	24	11.30
Engineering	3	1.40
English, foreign language	29	13.70
Health, physical education	9	4.20
Management, information systems	5	2.40
Mathematics	13	6.10
Music	10	4.70
Nursing	7	3.30
Political science, history	10	4.70
Psychology, social sciences	27	13.20
Religion, philosophy	13	6.10

Table 3. *Frequencies and Percentages of Demographics*

Demographic	<i>n</i>	%
Other	11	5.20
What is your rank?		
Instructor	34	16.80
Assistant Professor	63	31.20
Associate Professor	66	32.70
Full Professor	39	19.30
What course management software packages have you used?		
Angel	9	4.20
Blackboard	152	71.70
Canvas	13	6.10
D2L	101	47.60
Moodle	58	27.40
Sakai	4	1.90
WebCT	74	34.90
Not Applicable	11	5.20
Other	48	22.70
What course management system features have you used?		
Announcements	185	87.30
Bulletin Board	65	30.70
Discussion	132	62.30
E-mail	192	90.60
Grades	194	91.50
Group	80	37.70
Posting lectures/slides	170	80.20
Quizzes	155	73.10
Student web pages	17	8.00
Survey	60	28.30

Note. Due to participants' ability to select one or more category for packages and system features used, percentages may sum to over 100%. The difference between Bulletin Board and Discussion is that discussions are asynchronous communications, where participants post messages to a bulletin board system. Asynchronous communications enable students to communicate at any time and from any networked location.

The years taught full-time at university level ranged from 0 to 49 with $M = 13.71$ and $SD = 10.56$. The years at current institution ranged from 0 to 48 with $M = 10.93$ and $SD = 9.24$. The years using computers ranged from 3 to 50 with $M = 23.35$ and $SD = 7.70$. The years using course management system ranged from 0 to 25 with $M = 9.79$ and $SD = 4.79$. Perceived usefulness ranged from 2.00 to 5.00 with $M = 4.35$ and $SD = 0.71$.

Perceived ease of use ranged from 1.83 to 5.00 with $M = 3.91$ and $SD = 0.70$. Attitude ranged from 2.00 to 5.00 with $M = 4.29$ and $SD = 0.65$. Self-efficacy ranged from 2.40 to 5.00 with $M = 3.64$ and $SD = 0.49$. Infrastructural support ranged from 1.00 to 5.00 with $M = 3.33$ and $SD = 0.94$. Technical support ranged from 1.00 to 5.00 with $M = 3.83$ and $SD = 0.91$. Training ranged from 1.60 to 5.00 with $M = 3.48$ and $SD = 0.68$. Table 4 presents the descriptive statistics of the continuous variables, and Appendix F contains histograms representing the data.

Table 4. *Descriptive Statistics of Continuous Variables*

Measure	<i>Min.</i>	<i>Max.</i>	<i>M</i>	<i>SD</i>
Years Taught Full-Time at University Level	0.00	49.00	13.71	10.56
Years at Current Institution	0.00	48.00	10.93	9.24
Years Using Computers	3.00	50.00	23.35	7.70
Years Using Course Management System	0.00	25.00	9.79	4.79
Perceived Usefulness	2.00	5.00	4.35	0.71
Perceived ease of use	1.83	5.00	3.91	0.70
Attitude	2.00	5.00	4.29	0.65
Self-Efficacy	2.40	5.00	3.64	0.49
Infrastructural Support	1.00	5.00	3.33	0.94
Technical Support	1.00	5.00	3.83	0.91
Training	1.60	5.00	3.48	0.68

Reliability

The researcher conducted Cronbach's alpha tests of reliability and internal consistency on scales, with one test per scale. The Cronbach's alpha provides a mean correlation between each pair of items and the number of items in a scale (Brace, Kemp, & Snelgar, 2006). The alpha values were interpreted using the guidelines suggested by George and Mallery (2010), where $\alpha > .9$ = excellent, $> .8$ = good, $> .7$ = acceptable, $> .6$ = questionable, $> .5$ = poor, and $< .5$ = unacceptable. Results for support of change indicated excellent reliability. Of the total number of 212 cases, all the scales have Cronbach's Alpha reliability statistics (α) as more than .70, except self-efficacy, which has a low

score of .19. Hence, the results for self-efficacy may not be reliable as the scale itself may not be reliable. Table 5 presents reliability statistics for the composite score.

Table 5. *Cronbach's Alpha Reliability Statistics for the Composite Score*

Scale	No. of Items	α
Perceived Usefulness	6	.93
Perceived ease of use	6	.90
Attitude	8	.94
Self-Efficacy	5	.19
Infrastructural Support	3	.84
Technical Support	3	.92
Training	5	.70

The self-efficacy construct had a low score on Cronbach's scale. Cronbach's alpha measures how unidimensional sets of questions are, where the more similarly the participants respond to each of the questions in the set, the closer to 1.00 Cronbach's alpha will be (Tabachnick & Fidell, 2012). When Cronbach's alpha indicates that a scale has low internal consistency, it can mean that the questions are not measuring a reliable construct and that a scale is flawed. This may have been the case in this study because in retrospect the self-efficacy scale may have measured participants' perceived experience with CMS as well as their perceived self-efficacy to use CMS.

Additionally, according to Schutte, Wolfensberger, and Tirri (2014), multidimensional scales usually yield lower alpha reliability, and operationalizing concepts that are highly abstract into intuitive items may contribute to low reliability. Therefore, respondents may have had a difficult time responding to the self-efficacy scale when faced with questions that also asked about experience. This may have led to the low internal reliability score.

Although the self-efficacy scale may have also measured respondents' experience with CMS, there is a close relationship between self-efficacy and experience (Barouch-Gilbert, 2016; Bandura, 1997). Barouch-Gilbert stated that self-efficacy beliefs are not just a collection of fragmented self-beliefs; instead, they are rooted in and structured by experiences and thought. Furthermore, Bandura, in his research on self-efficacy, found that mastery of experiences (related to an individual's past performance) could enhance or undermine people's beliefs in their skills.

When tested further, the self-efficacy scale was significant in Research Question 1b. Self-efficacy was the most significant variable, which demonstrated that a single unit increase also corresponded with a 0.28 unit increase in perceived usefulness when all other variables were held constant. Therefore, although self-efficacy had a low Alpha score on Cronbach's scale, it served as an important and significant variable for this study.

Pre-Analysis Data Assessment

The researcher created a Pearson correlation matrix among the perceived usefulness, perceived ease of use, attitude, self-efficacy, infrastructure support, technical support, and training scales in order to determine how these measures related to each other. This analytic measure was taken as an exploratory measure and was meant to provide an assessment of the variables and their reliability to one another prior to their use in the following analyses. Zumbo and Zimmerman (1993) stated that when Likert-type scales are combined for use in calculating composite scales, the number of possible categories increases to beyond the number of Likert-type responses. Upon dividing by the number of items, the composite scale becomes a continuous variable and may be used

with parametric analyses (Zumbo & Zimmerman, 1993). Pearson correlations are the appropriate correlation coefficients to use because the composite scores are on an interval scale. The researcher also conducted Spearman correlations because of the ordinal nature of the data.

However, the repetitive nature of these correlations may result in an increased chance at detecting a false positive finding. Stevens (2009) defined this problem as the Bonferroni inequality. When conducting multiple repetitive analyses, “we define the overall α for a set of tests as the probability of at least one false rejection when the null hypothesis is true” (Stevens, 2009 p. 6). Stevens (2009) clarified this by adding each of the test’s alpha values in a series of analyses to calculate an overall alpha. In the case of these six repetitive correlational analyses, the true alpha value would be modified from .05 to .30 (.05 + .05 + .05 + .05 +.05 +.05). Since each variable was used six times, a Bonferroni correction to the alpha level was required; thus, the new alpha level was .008 based on the division of the original alpha to correct for this inflated chance of error (.050 / 6). This modified alpha helps to guard against instances of Type I error or increased chances of a false positive.

The results showed that perceived usefulness was significantly positively correlated with perceived ease of use, attitude, self-efficacy, and infrastructure support. A significant positive correlation indicates that as scores on one scale increase, scores on the other scale also tend to increase. Perceived ease of use was significantly positively correlated with attitude and infrastructure support. Attitude was significantly positively correlated with self-efficacy and infrastructure support. Self-efficacy was significantly positively correlated with infrastructure support, technical support, and training.

Infrastructure support was significantly positively correlated with technical support and training. Technical support was significantly positively correlated with training. Table 6 presents the Pearson correlation, while Table 7 includes results of the Spearman correlations.

Table 6. *Pearson Correlation Matrix among Perceived Usefulness, Perceived ease of use, Attitude, Self-Efficacy, Infrastructure Support, Technical Support, and Training*

Scale	Perceived Usefulness	Perceived ease of use	Attitude	Self-Efficacy	Infrastructure Support	Technical Support
Perceived Usefulness	-					
Perceived ease of use	.36*	-				
Attitude	.75*	.52*	-			
Self-Efficacy	.24*	.16	.19*	-		
Infrastructure Support	.22*	.22*	.21*	.29*	-	
Technical Support	.18	.13	.15	.27*	.63*	-
Training	.16	.12	.08	.38*	.52*	.65*

Note. * indicates a Bonferroni corrected p value $\leq .008$.

Table 7. Spearman Correlation Matrix among Perceived Usefulness, Perceived ease of use, Attitude, Self-Efficacy, Infrastructure Support, Technical Support, and Training

Scale	Perceived Usefulness	Perceived ease of use	Attitude	Self-Efficacy	Infrastructure Support	Technical Support
Perceived Usefulness	-					
Perceived ease of use	.40*	-				
Attitude	.75*	.57*	-			
Self-Efficacy	.24*	.13	.15	-		
Infrastructure Support	.27*	.23*	.23*	.26*	-	
Technical Support	.24*	.17	.20*	.24*	.58*	-
Training	.19*	.11	.12	.34*	.50*	.61*

Note. * $p \leq .008$.

Summary of Results

The researcher conducted a series of regression analyses with the goal of informing the research questions. Findings were conclusive for each of the research questions. Results indicated that infrastructural support had a statistically significant relationship with perceived ease of use. Further analysis of Research Question 1 could support a significant relationship between self-efficacy and perceived usefulness. Analysis of Research Question 2 supported the hypothesis that perceived usefulness and perceived ease of use significantly predicted attitude. The researcher used Research Question 3 to combine these findings into a mediation analysis to determine if perceived usefulness or perceived ease of use mediated the relationship shown to exist between self-efficacy, infrastructural support, technical support, training and attitude. Results of this analysis suggested that both perceived usefulness and perceived ease of use

mediated, or carried the effect of, the independent variable to the variable of attitude. The results lead to the creation of Figure 2, supported by the findings.

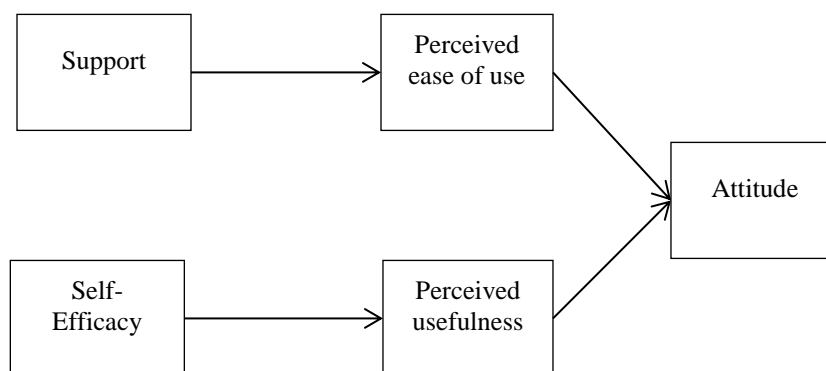


Figure 2. Modified TAM (Davis, 1989) based on study findings.

Detailed Analysis

Research Question 1(a)

To what extent do self-efficacy, infrastructure support, technical support, and training predict perceived ease of use of CMS at HBCUs?

H₀1(a): No relationship exists between the four predictor variables and perceived ease of use.

H_a1(a): A relationship exists between the four predictor variables and perceived ease of use.

To assess the first research question, the researcher proposed a multiple linear regression with self-efficacy, infrastructural support, technical support, and training to predict perceived ease of use. Though the correlation matrix suggested that not all predictor variables would be significant, it was important to retain all the predictor variables for the purpose of the research. This decision was made based on the goal of the research, which was to assess the effect of each variable in the presence of one another. Morgan et al. (2012) discussed the role of predictor variables in a regression equation,

stating that simultaneous entry of predictor variables is best to use when there is a reasonable small number of predictors and the researcher has no prior ideas about which combination of variables creates the best model. Morgan et al. (2012) go on to discuss the way that stepwise regression exploits chance more than many researchers find acceptable. Stepwise regression, the authors stated, is more appropriate when there is a relatively large pool of predictor variables and the entry of these variables would sacrifice the power of the analysis. Because the sample size requirement was met, the power of the analysis was not a concern, nor were there an unruly amount of predictor variables.

Stevens (2009) verified that the entry of multiple predictor variables in a linear regression allows for a comparative examination of each variable's influence on the outcome. Because the goal was not to examine each variable independently, but rather in a collective sense, this entry method was the most appropriate. Through the entry of all predictor variables at once, if the influence of one predictor were better explained by another variable's influence, the less significant variable's influence would be dimmed. This influence was an important aspect of the research, as the predictor variables were slightly related, and it was important to parse out the specific influence of each variable so that similar influences could be assessed side by side. Stevens (2009) and Tabachnick and Fidell (2012) suggested the use of this method unless a theoretical reason exists for the use of a stepwise method, as would be the case if the goal were to eliminate insignificant predictors.

Prior to conducting the analysis, the researcher assessed the assumptions of normality, homoscedasticity, and absence of multicollinearity. To check that the data fit a normal distribution, the researcher checked the normal P-P plot to ensure that the data

followed the normal line. As little deviation from the normal line existed, the assumption of normality was met (see Figure 3). To assess the assumption of homoscedasticity, or equal variance in the error terms, a scatterplot of standardized residuals as a function of standardized predicted values was used. Since the data points were randomly distributed around zero, the assumption was met (see Figure 4). The researcher assessed the assumption of absence of multicollinearity using VIFs. Values for VIFs less than 10 indicate that no extreme multicollinearity exists (Stevens, 2009). As the largest VIF in the model was 2.17, the assumption was met.

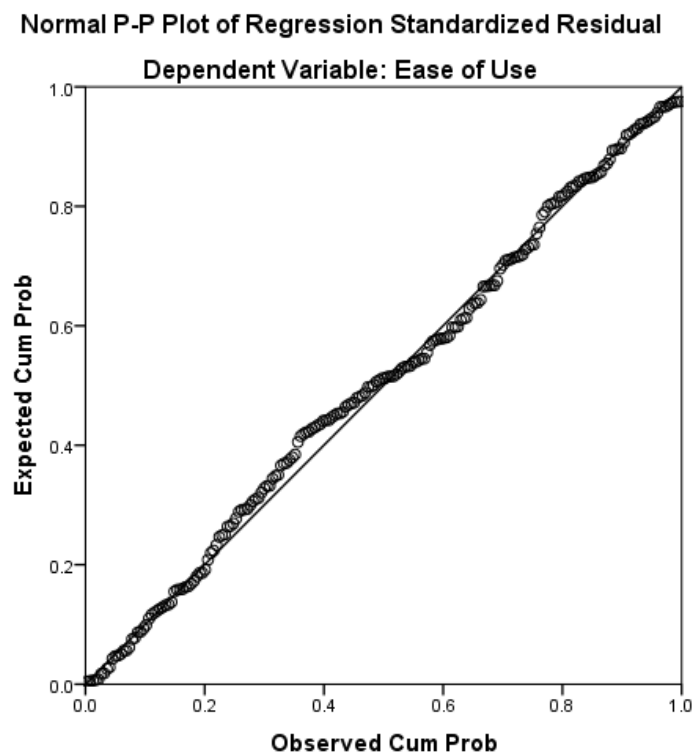


Figure 3. Normal P-P Plot.

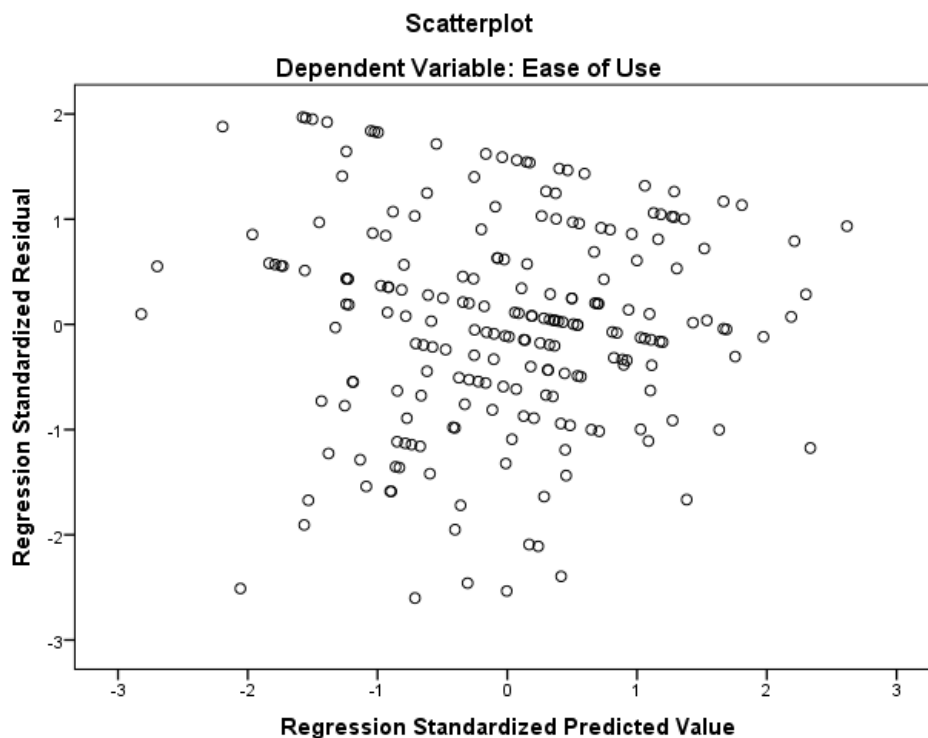


Figure 4. Scatterplot of standardized residuals as a function of standardized predicted values.

The three assumptions were met, and the researcher conducted the regression analysis to determine whether self-efficacy, infrastructural support, technical support, and training significantly predict perceived ease of use. The results of the analysis indicated that the model was statistically significant with a p value of .014, $F(4,207) = 3.21$, $p = .014$, $R^2 = .058$. The R^2 indicates that the model predicts 6% of the variability in the dependent variable. Although the model was significant, only one significant individual predictor existed—infrastructural support, $B = 0.15$, $t = 2.32$, $p = .02$. Based on the unstandardized beta value (B), these results suggest that a single unit increase in infrastructural support corresponds to a 0.15 unit increase in perceived ease of use when all other predictor variables were held constant, resulting in the following prediction equation:

$$\text{Perceived ease of use} = (0.16) \text{ Self-Efficacy} + (0.16) \text{ Infrastructure Support} - (0.02) \text{ Technical Support} - 0.01(\text{Training}) + 2.93$$

The results of the multiple linear regression indicated that the null hypothesis can be rejected in favor of the alternative, which states that a significant relationship exists between the four predictor variables and Perceived ease of use. Table 8 presents the results.

Table 8. *Results for Multiple Linear Regression to predict Perceived ease of use*

Source	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
Constant	2.92	0.38	-	7.79	<.001
Self-Efficacy	0.16	0.10	.11	1.54	.12
Infrastructural Support	0.15	0.07	.21	2.32	.02
Technical Support	-0.02	0.08	-.03	-0.28	.78
Training	-0.01	0.10	-.01	-0.11	.91

Note. $F(4,207) = 3.21$, $p = .014$, $R^2 = .058$.

Research Question 1 (b)

To what extent do self-efficacy, infrastructural support, technical support, and training predict perceived usefulness of CMS at HBCUs?

H₀1(b): No relationship exists between the four predictor variables and perceived usefulness.

H_a1(b): A relationship exists between the four predictor variables and perceived usefulness.

To assess the first research question, the researcher proposed a multiple linear regression with self-efficacy, infrastructural support, technical support, and training to predict perceived usefulness. Prior to conducting the analysis, the researcher assessed the assumptions of normality, homoscedasticity, and absence of multicollinearity. To check that the data fit a normal distribution, the researcher checked the normal P-P plot to

ensure that the data followed the normal line. As little deviation occurred from the normal line, the assumption of normality was met (see Figure 5). Beyond the fact that this deviation was extremely small, Stevens (2009) posited that normality can be assumed when the sample exceeds 30 observations. Stevens (2009) continued by stating that the *F* test, which includes regression analysis, is highly robust to even strong deviations from normality when the minimum of 30 observations are included in the calculation. Stevens cited Bock (1975) and noted, “Even for distributions which depart markedly from normality, sums of 50 or more observations approximate to normality. For moderately non-normal distributions, the approximation is good with as few as 10 to 20 observations” (p. 111).

To assess the assumption of homoscedasticity, or equal variance in the error terms, the researcher examined a scatterplot of standardized residuals as a function of standardized predicted values. As the data points were not randomly distributed around zero, the assumption was not met (see Figure 6). However, the influence of a large sample size on minimizing violation-related harms also applies to the concern of heteroscedasticity in this analysis (Stevens, 2009). The assumption of absence of multicollinearity was assessed using VIFs. Values for VIFs less than 10 indicate that no extreme multicollinearity exists (Stevens, 2009). As the largest VIF in the model was 2.17, the assumption was met.

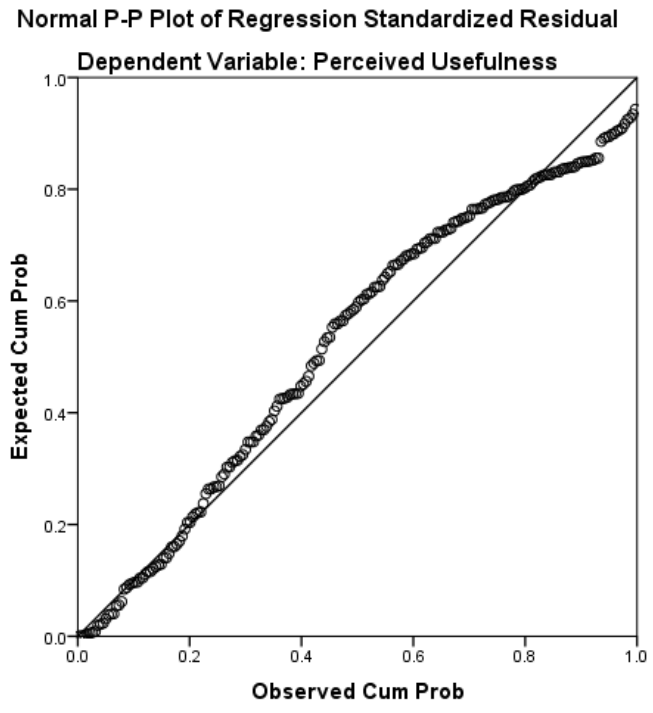


Figure 5. Normal P-P Plot.

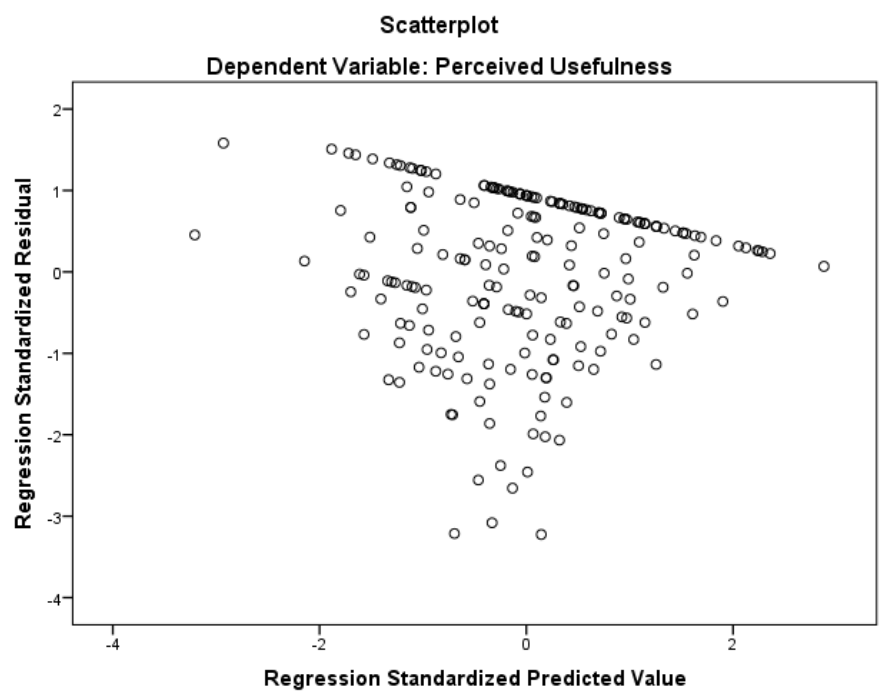


Figure 6. Scatterplot of standardized residuals as a function of standardized predicted values.

As all assumptions were met, the researcher conducted a regression analysis to determine whether self-efficacy, infrastructural support, technical support, and training significantly predicted perceived usefulness. The results of the analysis indicated that the model was statistically significant with a p value of .001, $F(4,207) = 4.82$, $p = .001$, $R^2 = .085$. The R^2 indicates that the model predicts 9% of the variability in the dependent variable. Although the model was significant, only one significant individual predictor existed—self-efficacy, $B = 0.28$, $t = 2.71$, $p = .007$. Based on the unstandardized beta value (B), these results suggest that a single unit increase in self-efficacy corresponds to a 0.28 unit increase in perceived usefulness when all other predictor variables were held constant, and resulted in the following predictive equation:

$$\text{Perceived Usefulness} = (0.28) \text{ Self-Efficacy} + (0.12) \text{ Infrastructure Support} + (0.03) \text{ Technical Support} - (0.03) \text{ Training} + 2.90$$

The results of the multiple linear regression indicated that the null hypothesis can be rejected in favor of the alternative, which states that a significant relationship exists between the four predictor variables and perceived usefulness. Table 9 presents the results.

Table 9. *Results for Multiple Linear Regression to predict Perceived Usefulness*

Source	B	SE	β	T	p
Constant	2.90	0.38	-	7.72	<.001
Self-Efficacy	0.28	0.11	.20	2.71	.01
Infrastructural Support	0.12	0.07	.15	1.73	.09
Technical Support	0.03	0.08	.04	0.44	.66
Training	-0.03	0.10	-.03	-0.27	.79

Note. $F(4,207) = 4.82$, $p = .001$, $R^2 = .085$.

Research Question 2

To what extent do perceived usefulness and perceived ease of use predict attitude toward CMS at HBCUs?

H₀2: No relationship exists between the two predictor variables and attitude.

H_a2: A relationship exists between the two predictor variables and attitude.

To assess the second research question, the researcher proposed a multiple linear regression with perceived usefulness and perceived ease of use to predict attitude. Prior to conducting the analysis, the researcher assessed the assumptions of normality, homoscedasticity, and absence of multicollinearity. To check that the data fit a normal distribution, the researcher checked the normal P-P plot to ensure that the data followed the normal line. As there was only slight deviation from the normal line, the assumption of normality was met (see Figure 7). To assess the assumption of homoscedasticity, or equal variance in the error terms, the researcher examined a scatterplot of standardized residuals as a function of standardized predicted values. As the data points were randomly distributed around zero, the assumption was met (see Figure 8). The researcher assessed the assumption of absence of multicollinearity using VIFs. Values for VIFs less than 10 indicate that no extreme multicollinearity exists (Stevens, 2009). As the largest VIF in the model was 1.15, the assumption was met.

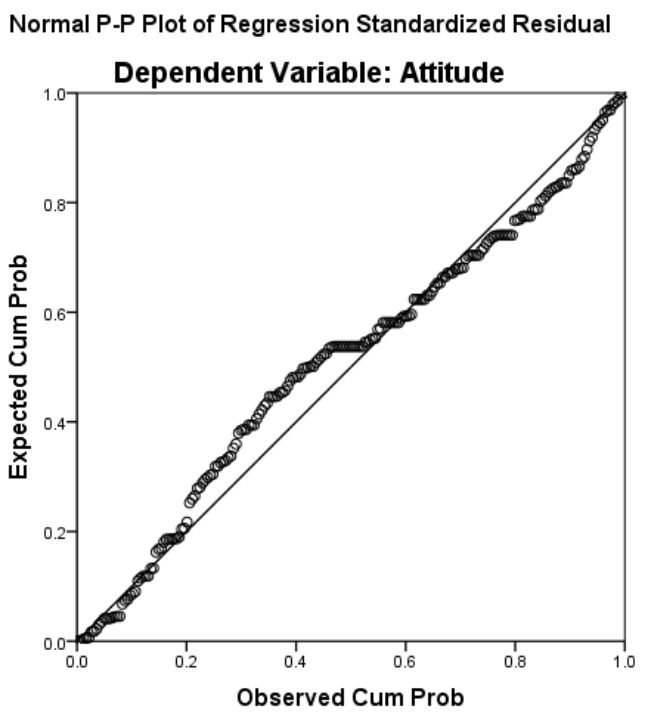


Figure 7. Normal P-P Plot.

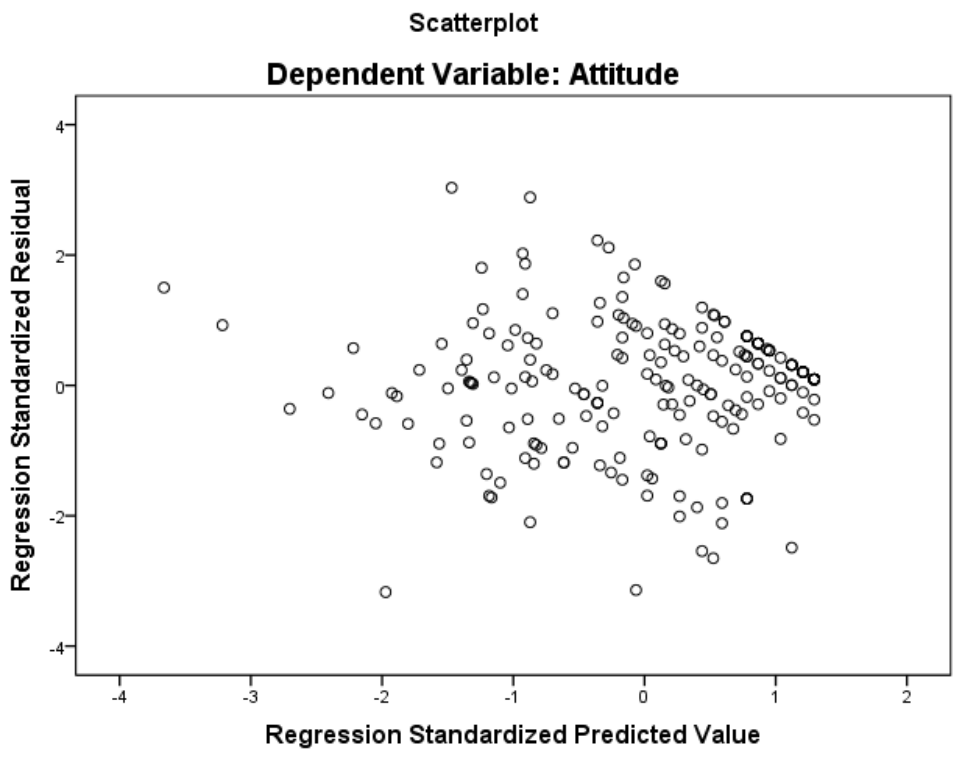


Figure 8. Scatterplot of standardized residuals as a function of standardized predicted values.

The assumptions for the regression analyses were met, therefore the researcher conducted the regression analysis to determine whether perceived usefulness and perceived ease of use significantly predicted attitude. The results of the analysis indicated that the model was statistically significant with a p value of less than .001, $F(2, 209) = 175.40$, $p < .001$, $R^2 = .627$. The R^2 indicates that the model predicted 63% of the variability in the dependent variable, which is very good. Another good aspect of the model is that not only it is significant, but both the individual predictors, perceived usefulness and perceived ease of use, were individually significant as well ($p < .001$ for both the variables). Based on the unstandardized beta values (B), these results suggest that a single unit increase in perceived usefulness corresponds to a 0.64 unit increase in attitude when perceived ease of use is held constant. Alternatively, an increase in one unit of perceived ease of use corresponds with a 0.29 unit increase in attitude when perceived usefulness is held constant. The findings corresponded with the following predictive equation:

$$\text{Attitude} = (0.59) \text{ Perceived Usefulness} + (0.27) \text{ Perceived ease of use} + 0.69$$

The results of the multiple linear regression indicated that the null hypothesis can be rejected in favor of the alternative, which states that a significant relationship exists between the two predictor variables and attitude. Table 10 presents the results.

Table 10. *Results for Multiple Linear Regression to predict Attitude*

Source	B	SE	β	T	p
Constant	0.69	0.20	-	3.48	.001
Perceived Usefulness	0.59	0.04	.64	14.16	< .001
Perceived ease of use	0.27	0.04	.29	6.29	< .001

Note. $F(2, 209) = 175.4$, $p < .001$, $R^2 = .627$

Research Question 3(a)

To what extent does perceived usefulness mediate the relationships between self-efficacy, support, and training predicting attitude toward CMS at HBCUs?

Hypothesis 3a Step 1

H₀3(a-1): Self-efficacy, infrastructural support, technical support, and training are not a significant predictor of attitude.

H₁3(a-1): Self-efficacy, infrastructural support, technical support, and training are a significant predictor of attitude.

Linear Regression

To examine the first step of the mediation analysis, the researcher conducted a linear regression to assess if self-efficacy, infrastructural support, technical support, and training predicted attitude and to establish a relationship between the independent variables and the dependent variable. The researcher assessed mediating effects of this relationship. In preliminary analysis, the assumptions of normality were assessed with a P-P scatterplot (see Figure 9). The assumption was met because the points did not deviate strongly from the normality line. The assumption of homoscedasticity was assessed with a residuals scatterplot (see Figure 10). The assumption was met because the points were randomly distributed and no clear pattern existed.

The results of the linear regression were significant with a p value of .005, $F(4,207) = 3.86, p = .005, R^2 = .069$, suggesting that variance in dependent variables explain 7% of the variance in attitude. Self-efficacy and infrastructural support were significant predictors of attitude (self-efficacy: $B = 0.21, t = 2.19, p = .03$; Infrastructural Support: $B = 0.13, t = 2.14, p = .03$). Based on the unstandardized beta values (B), these

results suggested that a single unit increase in self-efficacy corresponds to a 0.21 unit increase in attitude when all other predictors are held constant. Alternatively, an increase in one unit of perceived infrastructural support corresponded with a 0.13 unit increase in attitude when the other predictors are held constant. These findings corresponded with the following predictive equation:

$$\text{Attitude} = (0.21) \text{ Self-Efficacy} + (0.13) \text{ Infrastructural Support} + (0.04) \text{ Technical Support} - (0.11) \text{ Training} + 3.30$$

The first null hypothesis can be rejected, indicating that self-efficacy, infrastructural support, technical support, and training were significantly predictive of attitude. Table 11 presents results of the linear regression.

Table 11. *Results for Multiple Linear Regression predicting Attitude*

Source	<i>B</i>	<i>SE</i>	β	<i>T</i>	<i>p</i>
Constant	3.30	0.35	-	9.48	<.001
Self-Efficacy	0.21	0.10	.16	2.19	.03
Infrastructural Support	0.13	0.06	.19	2.14	.03
Technical Support	0.04	0.07	.06	0.57	.57
Training	-0.11	0.09	-.11	-1.19	.23

Note. $F(4,207) = 3.86$, $p = .005$, $R^2 = .069$.

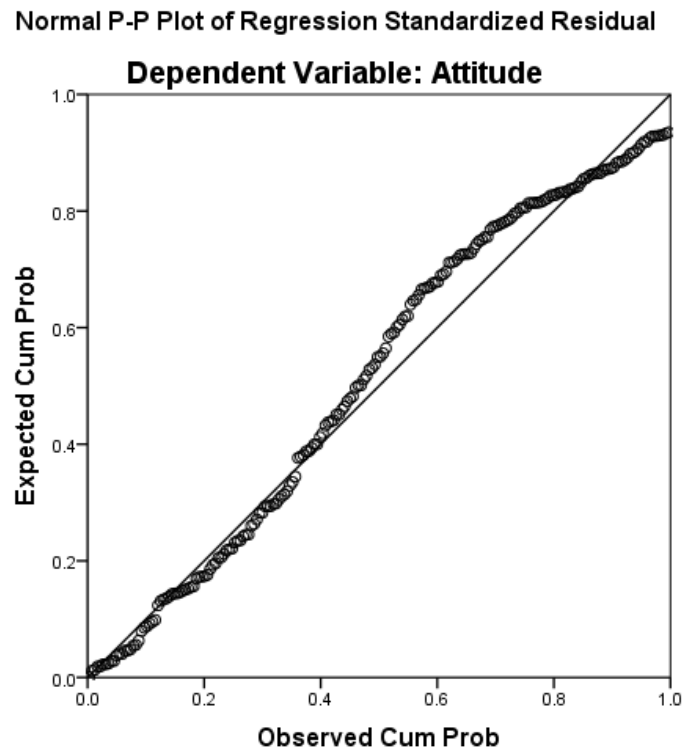


Figure 9. Normal P-P scatterplot.

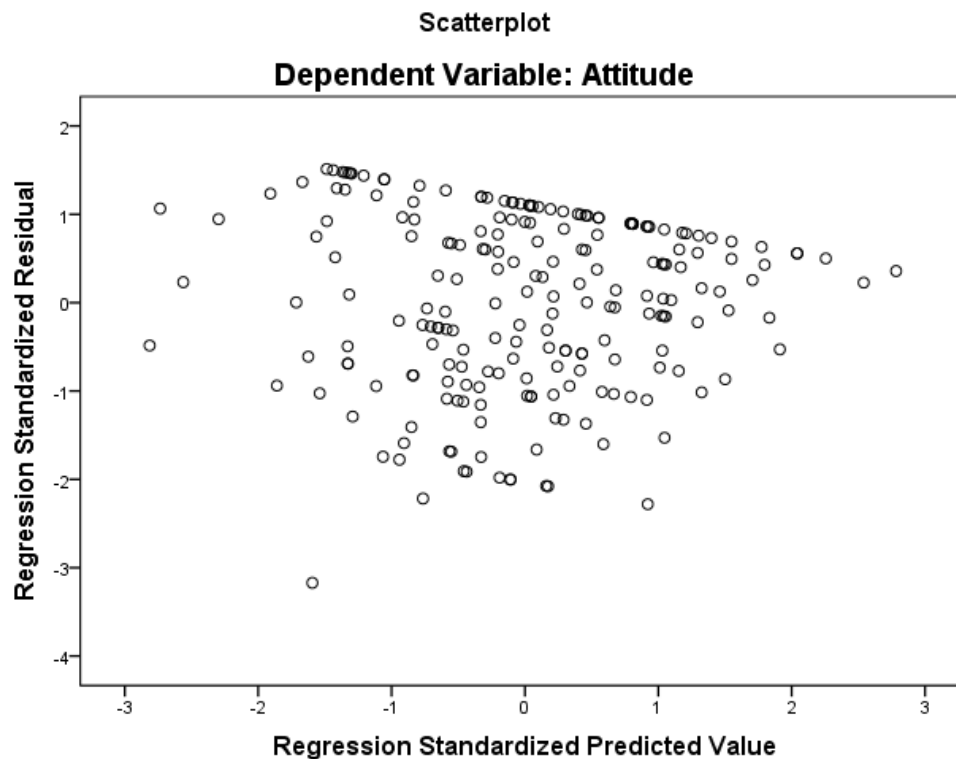


Figure 10. Scatterplot of standardized residuals as a function of standardized predicted values.

Hypothesis 3a Step 2

H₀3(a-2): Perceived usefulness is not a significant mediator for the relationship between attitude and self-efficacy, infrastructural support, technical support, training.

H_a3(a-2): Perceived usefulness is a significant mediator for the relationship between attitude and self-efficacy, infrastructural support, technical support, training.

Mediation

To examine the second step hypothesis, the researcher conducted a Baron and Kenny mediation analysis to assess if perceived usefulness mediated the relationship between self-efficacy, infrastructural support, technical support, and training with attitude (Baron & Kenny, 1986). In this analysis, the four independent variables were self-efficacy, infrastructural support, technical support, and training. The mediator is

perceived usefulness, and the dependent variable is attitude. To assess for mediation, three regressions were conducted. The researcher assessed the assumptions of normality and homoscedasticity with visual examinations of scatterplots, presented in Figures 7 and 8. Both assumptions were met as the data followed the normal P-P plot trend line, and the data were randomly spread in the residuals scatterplot. For mediation to be supported, four items must be met:

1. The independent variables (self-efficacy, infrastructural support, technical support, and training) must be related to the dependent variable (attitude).
2. The independent variables (self-efficacy, infrastructural support, technical support, and training) must be related to the mediator variable (perceived usefulness).
3. The mediator (perceived usefulness) must be related to the dependent variable (attitude) while in the presence of the independent variables (self-efficacy, infrastructural support, technical support, and training).
4. The independent variables (self-efficacy, infrastructural support, technical support, and training) should no longer be a significant predictor of the dependent variable (attitude) in the presence of the mediator variable (perceived usefulness).

First, the researcher conducted the regression with self-efficacy, infrastructural support, technical support, and training (independent variables) predicting attitude (dependent variable). The results of the regression were significant with a p value of .005, $F(4,207) = 3.86, p = .005$. This suggests that self-efficacy, infrastructural support,

technical support, and training were statistically associated with attitude. The first item of the Baron and Kenny method was met.

The researcher conducted the regression with self-efficacy, infrastructural support, technical support, and training (independent variables) predicting perceived usefulness (mediator) next. The results of the regression were significant with a p value of less than .001, $F(4,207) = 4.82, p < .001$. This suggests that the four independent variables were statistically associated with perceived usefulness. The second item of the Baron and Kenny method was met.

Finally, the researcher conducted a multiple linear regression with self-efficacy, infrastructural support, technical support, and training (independent variables) and perceived usefulness (mediator) predicting attitude (dependent variable). The results of the regression were significant with a p value of less than .001, $F(5,206) = 53.08, p < .001$. This suggests that self-efficacy, infrastructural support, technical support, training, and perceived usefulness predicted attitude. Perceived usefulness was a significant predictor of attitude ($B = 0.67, p < .001$). The third item of the Baron and Kenny method was met.

The four variables self-efficacy, infrastructural support, technical support, and training were insignificant predictors of attitude (all p values > 0.05 ; see Table 11) while in the presence of perceived usefulness. Because of the independent variable failing to predict the presence of the mediator, Item 4 of the Baron and Kenny method was met as well. Thus, the null hypothesis was rejected with sufficient evidence suggesting that perceived usefulness is a significant mediator for the relationship between self-efficacy,

infrastructural support, technical support, training and attitude. Table 12 presents the results of the regressions.

Table 12. *Regression Results with Perceived Usefulness Mediating the Relationship between Self-Efficacy, Infrastructural Support, Technical Support, Training, and Attitude*

Source	<i>B</i>	<i>SE</i>	β	<i>T</i>	<i>p</i>
Regression 1:					
Self-Efficacy	0.21	0.10	.16	2.19	.03
Infrastructure Support	0.13	0.06	.19	2.14	.03
Technical Support	0.04	0.07	.06	0.57	.57
Training	-0.11	0.09	-.11	-1.19	.23
Regression 2:					
Self-Efficacy	0.28	0.10	.20	2.71	.01
Infrastructure Support	0.12	0.07	.15	1.73	.08
Technical Support	0.03	0.08	.04	0.44	.66
Training	-0.03	0.10	-.02	-0.27	.79
Regression 3:					
Self-Efficacy	0.02	0.07	.02	0.32	.75
Infrastructure Support	0.05	0.04	.08	1.26	.21
Technical Support	0.02	0.05	.02	0.36	.72
Training	-0.09	0.06	-.09	-1.45	.15
Perceived Usefulness	0.67	0.04	.73	15.25	.00

Note. First regression: $F(4,207) = 3.86, p = .005, R^2 = .07$

Second regression: $F(4,207) = 4.82, p < .001, R^2 = .09$

Third regression: $F(5,206) = 53.08, p < .001, R^2 = .56$

Research Question 3(b)

To what extent does perceived ease of use mediate the relationships between self-efficacy, support, and training predicting attitude toward CMS at HBCUs?

Hypothesis 3b Step 1

H₀3(b-1): Self-efficacy, infrastructural support, technical support, and training are not significant predictors of attitude.

H_a3(b-1): Self-efficacy, infrastructural support, technical support, and training are

significant predictors of attitude.

Linear Regression

To examine the first hypothesis, the researcher conducted a linear regression to assess if self-efficacy, infrastructural support, technical support, and training predicted attitude. In preliminary analysis, the assumptions of normality were assessed with a P-P scatterplot (see Figure 11). The assumption was met because the points did not deviate strongly from the normality line. The assumption of homoscedasticity was assessed with a residuals scatterplot (see Figure 12). The assumption was met because the points were randomly distributed, and no clear pattern existed.

The results of the linear regression were significant with a p value of .005, $F(4,207) = 3.86$, $p = .005$, $R^2 = .069$, suggesting that variance in dependent variables explain 7% of the variance in attitude. Self-efficacy and infrastructural support were significant predictors of attitude (self-efficacy: $B = 0.21$, $t = 2.19$, $p = .03$; infrastructural support: $B = 0.13$, $t = 2.14$, $p = .03$). Based on the unstandardized beta values (B), these results suggested that a single unit increase in self-efficacy corresponds to a 0.21 unit increase in attitude when all other predictors were held constant. This means that as participants score one unit on self-efficacy, they score 0.21 higher on attitude.

Alternatively, an increase in one unit of perceived infrastructural support corresponded with a 0.13 unit increase in attitude when the other predictors were held constant.

Likewise, when participants score one unit on infrastructural support, they score 0.13 higher on attitude. These findings corresponded to the following predictive equation:

$$\text{Attitude} = (0.21) \text{ Self-Efficacy} + (0.13) \text{ Infrastructural Support} + (0.04) \text{ Technical Support} - (0.11) \text{ Training} + 3.30$$

The first null hypothesis can be rejected, indicating that self-efficacy, infrastructural support, technical support, and training were significantly predictive of attitude. Table 13 presents the results of the linear regression.

Table 13. *Results for Multiple Linear Regression predicting Attitude*

Source	<i>B</i>	<i>SE</i>	β	<i>T</i>	<i>p</i>
Constant	3.30	0.35	-	9.48	<.001
Self-Efficacy	0.21	0.10	.16	2.19	.03
Infrastructure Support	0.13	0.06	.19	2.14	.03
Technical Support	0.04	0.07	.06	0.57	.57
Training	-0.11	0.09	-.11	-1.19	.23

Note. $F(4,207) = 3.86$, $p = 0.005$, $R^2 = 0.069$.

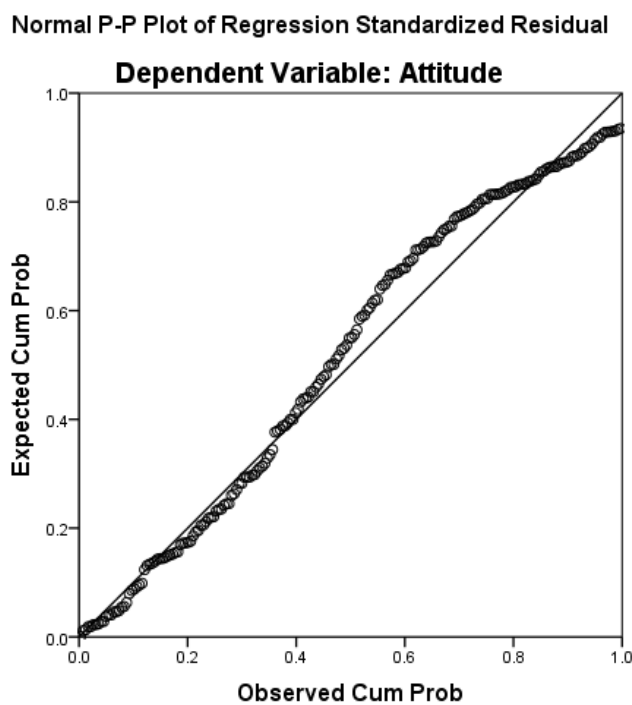


Figure 11. Normal P-P scatterplot.

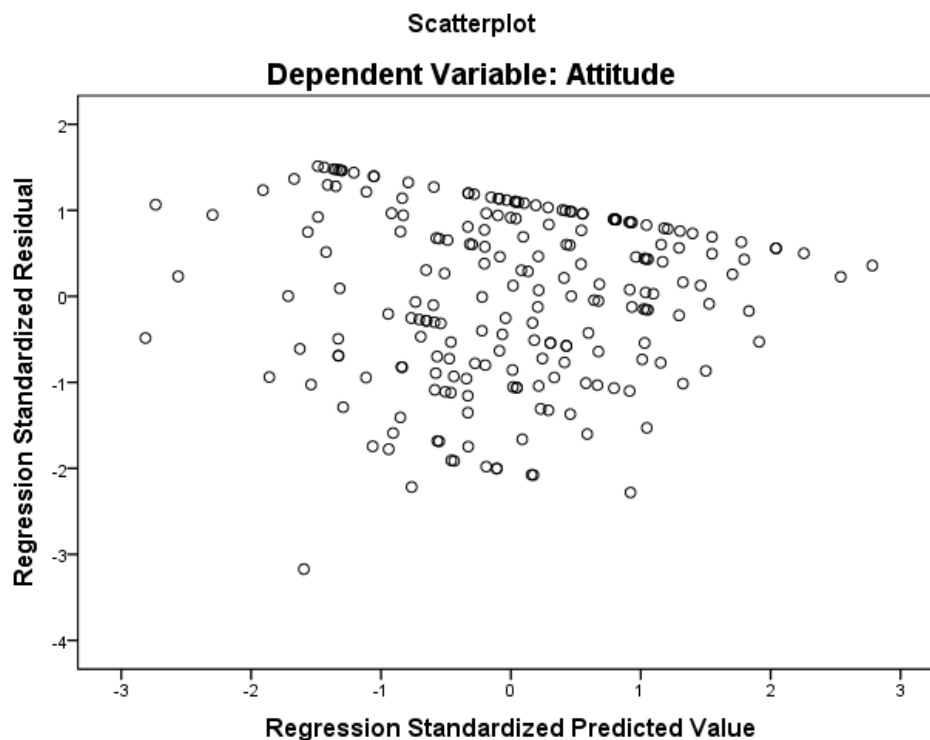


Figure 12. Scatterplot of standardized residuals as a function of standardized predicted values.

Hypothesis 3b Step 2

H₀3(b-2): Perceived ease of use is not a significant mediator for the relationship between attitude and self-efficacy, infrastructural support, technical support, training.

H₁3(b-2): Perceived ease of use is a significant mediator for the relationship between attitude and self-efficacy, infrastructural support, technical support, training.

Mediation

To examine the second hypothesis, the researcher conducted a Baron and Kenny mediation analysis to assess if perceived ease of use mediated the relationship between self-efficacy, infrastructural support, technical support, and training with attitude (Baron & Kenny, 1986). In this analysis, the four independent variables were self-efficacy, infrastructural support, technical support, and training. The mediator is perceived ease of use, and the dependent variable is attitude. To assess for mediation, three regressions

were conducted. The researcher assessed the assumptions of normality and homoscedasticity with visual examinations of scatterplots, presented in Figures 9 and 10. Both assumptions were met as the data followed the normal P-P plot trend line, and the data were randomly spread in the residuals scatterplot. In line with the previous analysis, for mediation to be supported, the four items outlined by Baron and Kenny (1986) had to be met.

First, the researcher conducted the regression with self-efficacy, infrastructural support, technical support, and training (independent variables) predicting attitude (dependent variable). The results of the regression were significant with a p value of .005, $F(4,207) = 3.86, p = .005$. This suggested that self-efficacy, infrastructural support, technical support, and training were statistically associated with attitude. The first item of the Baron and Kenny method was met.

Second, the researcher conducted a regression with self-efficacy, infrastructural support, technical support, and training (independent variables) predicting perceived ease of use (mediator). The results of the regression were significant with a p value of .014, $F(4,207) = 3.21, p = .014$. This suggested that the four independent variables were statistically associated with perceived ease of use. The second item of the Baron and Kenny method was met.

Finally, the researcher conducted a multiple linear regression with self-efficacy, infrastructural support, technical support, and training (independent variables) and perceived ease of use (mediator) predicting attitude (dependent variable). The results of the regression were significant with a p value of less than .001, $F(5,206) = 16.96, p < .001$. This suggested that self-efficacy, infrastructural support, technical support, training,

and perceived ease of use predicted attitude. Perceived ease of use was a significant predictor of attitude, $B = 0.45$, $p < .001$. The third item of the Baron and Kenny method was met.

The four independent variables self-efficacy, infrastructural support, technical support, and training were insignificant predictors of attitude (all p values > 0.05 ; see Table 11) while in the presence of perceived ease of use. Because of the independent variables being insignificant predictors in the presence of the mediator, item 4 of the Baron and Kenny method was met. Thus, the second null hypothesis was rejected with sufficient evidence suggesting that perceived ease of use is a significant mediator for the relationship between self-efficacy, infrastructural support, technical support, training and attitude. Table 14 presents the results of the regressions.

Table 14. *Regression Results with Perceived ease of use Mediating the Relationship between Self-Efficacy, Infrastructural Support, Technical Support, Training, and Attitude*

Source	B	SE	β	T	p
Self-Efficacy	0.21	0.10	.16	2.19	.03
Infrastructure Support	0.13	0.06	.19	2.14	.03
Technical Support	0.04	0.07	.06	0.57	.57
Training	-0.11	0.09	-.11	-1.19	.23
Self-Efficacy	0.16	0.10	.11	1.54	.12
Infrastructure Support	0.15	0.07	.21	2.32	.02
Technical Support	-0.02	0.08	-.03	-0.28	.78
Training	-0.01	0.10	-.01	-0.11	.91
Self-Efficacy	0.14	0.09	.10	1.64	.10
Infrastructure Support	0.06	0.05	.09	1.13	.26
Technical Support	0.05	0.06	.07	0.81	.42
Training	-0.10	0.08	-.11	-1.30	.19
Perceived ease of use	0.45	0.06	.49	8.04	.00

Note. First regression: $F(4,207) = 3.86$, $p = .005$, $R^2 = .07$

Second regression: $F(4,207) = 3.21$, $p = .014$, $R^2 = .06$

Third regression: $F(5,206) = 16.96$, $p < .001$, $R^2 = .29$

Summary

Chapter 4 presented the study purpose and problem to reframe the research. The chapter provided descriptive information of the sample of data and variables relevant to the analyses before presenting each research question. Detailed analysis on the research questions led to retention or rejection of the null hypotheses, as summarized prior to the detailed analyses. Chapter 5 presents these results in light of the theory, and details unexpected results. Chapter 5 presents a further discussion of the results, presenting logical conclusions to the findings, as well as suggestions for future research.

Chapter 5

Conclusions, Implications, Recommendations and Summary

Introduction

This chapter provides conclusions, implications, recommendations, and a summary of the study regarding faculty use of course management systems in private 4-year HBCUs. The United States has 105 HBCUs, and 49 of those are private institutions. Of the 49, 25 are private 4-year institutions that offer primarily bachelor's degrees. Through this study, the researcher explored faculty use of course management systems (CMS) in traditional courses at 11 of the aforementioned 25 institutions that completed the IRB process. The researcher chose private 4-year HBCUs that only offer bachelor degrees because the researcher works at this type of institution.

While many researchers have explored the use of CMS in higher education institutions (HEIs), the researchers mainly focused on non-HBCUs (Keese & Shepard, 2011). A shortage of research exists regarding faculty use of CMS at HBCUs as well as an inadequate amount of research regarding usage factors, such as perceived ease of use, perceived usefulness (Davis, 1989), facilitating conditions, computer efficacy (Waheed & Jam, 2010), and attitude toward technology (Chen, 2009) in HBCUs.

Conclusions

Research questions answered

The following research questions, as presented in Chapter 1, guided this research study.

RQ1a: To what extent does self-efficacy, support, and training predict perceived ease of use of CMS at HBCUs?

RQ1b: To what extent does self-efficacy, support, and training predict perceived usefulness of CMS at HBCUs?

RQ2: To what extent does perceived usefulness and perceived ease of use predict attitude toward CMS at HBCUs?

RQ3a: To what extent does perceived usefulness mediate the relationships between self-efficacy, support, and training predicting attitude toward CMS at HBCUs?

RQ3b: To what extent does perceived ease of use mediate the relationships between self-efficacy, support, and training predicting attitude toward CMS at HBCUs?

Research Question 1a: To what extent does self-efficacy, support, and training predict perceived ease of use of CMS at HBCUs?

The results of the multiple linear regression analysis indicated a significant relationship among the independent variables of self-efficacy, infrastructural support, technical support, and training as well as the dependent variable perceived ease of use. Faculty who are confident about their computer skills and who receive both infrastructural and technical support and training believe that use of CMS will be relatively easy and free from effort.

The analysis further revealed that one significant individual predictor existed—infrastructural support. This finding was in line with Alrawashdeh and Al-Mahadeen (2013) who found that facilitating conditions have a direct effect on individuals' intention

to use systems. The results in this study suggested that a single unit increase in infrastructural support resulted in a corresponding 0.15 increase in perceived ease of use when all other variables remain constant. The results indicated that when faculty received infrastructural support to use CMS, they perceived they would not have to exert a lot of effort to use the systems, which made them more likely to do so.

Although researchers have studied learning designs in reference to computer assisted learning technologies, such as CMS, no extensive link has been made regarding design and learning behavior or performance (Rienties, Toetenel, & Bryan, 2015). Rienties et al. (2015) found four learning designs that affected learning behavior in CMS—constructivist, assessment-driven, balanced-variety, and social constructivist modules. According to Rienties et al., instructors mainly design course work in CMS with an invisible blueprint in their minds. The researchers found that students' engagement with CMS depends on how instructors design the courses in the first place (Rienties et al., 2015).

Courses designed with learning design and related activities show stronger and more participation by students, while courses designed with a constructivist or assessment-based design tend to have substantially lower student participation. The authors concluded that without mapping and linking the planned learning designs with their respective learning activities (assessments, interactive, communications) in CMS, it is difficult to explain the peaks and valleys of student interactions with the systems (Rienties et al., 2015).

Knowing that students interact better with CMS that are intuitively designed, and that faculty are more likely to use CMS when facilitating conditions are present, it is

imperative that HEIs provide training and support for faculty to use the systems. Training and support will not only provide the impetus for faculty to use CMS, but they will also ensure that faculty design courses in the systems to help increase student interactions with their courses. The findings of this study are in line with existing literature, confirming information technology (IT) can shape organizational capabilities and result in performance gains (Benitez-Amado, Llorens-Montes, & Perez-Arostegui, 2010). Additionally, Sun (2012) noted that individuals were more likely to adapt system use when facilitating conditions are present.

Research Question 1b: To what extent does self-efficacy, support, and training predict perceived usefulness of CMS at HBCUs?

The results of this study indicated that faculty who perceived they had the computer skills and got both infrastructural and technical support and training also believed that CMS were useful and enhanced their job performance. Both Bandura (1997) and Teo and Van Schaik (2012) found that the stronger one's perceived self-efficacy, the more one exerted in meeting a goal. Prior researchers' findings on self-efficacy were in line with this study, but in contrast to other researchers who did not believe perceived self-efficacy is a strong determinant of behavior (Brown, Zaheeda, Douglas, & Stroebel, 2003; Puschel, Mazzon, & Hernandez, 2010; Venkatesh & Zhang, 2010).

The results of this study are in line with previous research regarding the effect facilitating conditions have on behavioral intention to use a system (Venkatesh et al., 2003). Both support and training are effective conditions for predicting the intention to use a system (Alrawashdeh & Al-Mahadeen 2013; Foon & Fah, 2011; Venkatesh, Zhang,

& Sykes, 2011). A more recent study conducted by Scholtz and Kapeso (2014) showed a positive relationship between training and the TAM variables. Scholtz and Kapeso's study revealed that both e-learning and m-learning training systems were positively related to both perceived ease of use and perceived usefulness. Likewise, a study conducted by Al-Sayyed and Abdalhaq (2016) showed that training positively affected both perceived ease of use and perceived usefulness toward instructors' behavioral intention to adopt and use e-learning systems, which is in line with the results of this study.

Training faculty to use CMS also requires motivation to learn on the part of faculty. It also requires proper communication on the part of Administrators. Ismail, Foboy, Abdullah, Mat, and Makhbul (2014) found that employees will have a strong motivation toward attending training programs and learning if administrators properly communicate requirements and select good delivery modes. Faculty will also be more motivated to get training to use CMS if administrators demonstrate an interest in learning themselves. According to Towler, Watson, and Surface (2014), employees place a higher priority on training and are more motivated to receive training when they perceive that leaders have positive attitudes and behaviors toward training. In order to motivate faculty to receive training to use CMS at HBCUs, administrators should communicate the need for and effectiveness of faculty receiving training, as well as demonstrate the importance of training through their behaviors.

The analysis also revealed that one variable was a significant predictor of perceived usefulness—perceived self-efficacy. The results suggested that for every single unit increase in self-efficacy, a 0.28 increase in perceived usefulness occurs when all

other predictor variables are held constant. This suggested that when faculty perceive that they possess the necessary computer skills to use CMS, it increases their beliefs that using the system will enhance their job performance. This finding is in line with prior researchers who found perceived self-efficacy as a direct determinant of behavior (Dasgupta, Paul, & Fuloria, 2011; Luarn & Lin, 2005; Sripalawat, Thongmak, & Ngramyarn, 2011).

Research Question 2: To what extent does perceived usefulness and perceived ease of use predict attitude toward CMS at HBCUs?

The results of the regression analysis indicated that both perceived usefulness and perceived ease of use were significant in predicting attitude. A single unit increase in perceived usefulness corresponded to a 0.64 unit increase in attitude when perceived ease of use was held constant and a single unit increase in perceived ease of use corresponded to a 0.29 unit increase in attitude when perceived usefulness was held constant. The findings of this study are in direct alignment with the findings of the TAM that both perceived usefulness and perceived ease of use influence both attitude toward and use of a system (Davis, 1989).

Research Question 3a: To what extent does perceived usefulness mediate the relationships between self-efficacy, support, and training predicting attitude toward CMS at HBCUs?

The results of this study indicated that the effect of the independent variables—perceived self-efficacy, infrastructural support, technical support, and training—are carried through perceived usefulness. Faculty perceptions of perceived usefulness are dependent on perceived self-efficacy, infrastructural support, technical support, and

training, but the effect those variables have on perceived usefulness carry over to attitude. When faculty believe they possess the skills to use CMS, and they get infrastructural and technical support and training, their perceptions of the system enhancing their job performance is enhanced and they become more favorably disposed to using the system. Therefore, perceived usefulness mediates the relationship between the independent variables and attitude.

Research Question 3b: To what extent does perceived ease of use mediate the relationships between self-efficacy, support, and training predicting attitude toward CMS at HBCUs?

The results of this study indicated that the effect of the independent variables—perceived self-efficacy, infrastructural support, technical support, and training—are carried through perceived ease of use. Faculty perceptions of perceived ease of use are dependent on perceived self-efficacy, infrastructural support, technical support, and training, but the effect those variables have on perceived ease of use carry over to attitude. When faculty believe they possess the skills to use CMS, and they get infrastructural and technical support and training, their perceptions of use of the system being free from effort is enhanced and they become more favorably disposed to using the system. Therefore, perceived ease of use mediates the relationship between the independent variables and attitude.

The findings for Research Question 3a and 3b were supported by research conducted by Almasri and Mohammad (2015) who found that employees' attitudes toward technology directly relate to their behavior and intention to use technology. The researchers also noted that the TAM assumes that external variables affect perceived

usefulness and perceived ease of use, which also mediate the effect of those variables on attitude (Almasri & Mohammad, 2015). Through this study, the researcher looked at independent variables self-efficacy, infrastructural support, technical support, and training as external variables to perceived usefulness and perceived ease of use and also conducted mediation testing of the effect of those variables on attitude. The researcher found that perceived usefulness and perceived ease of use do mediate the effect of the independent variables on attitude.

According to Shippis and Phillips (2013), TAM is rooted in the belief that the effects of perceived ease of use and perceived usefulness influence both the attitude and behavioral intent of individuals to use a particular computer technology. The authors also stated that both perceived ease of use and perceived usefulness are strong predictors of acceptance behavior (Shippis & Phillips, 2013). Other research findings also support the effects of perceived usefulness and perceived ease of use as influencers of use and behavioral intention to use systems (Lee, 2010; Ma, Chao, & Cheng, 2013; Terzis & Economides, 2011).

Overall, the findings of this study were supported by prior research. Other researchers also found that facilitating conditions have a direct effect on individuals' intention to use or adapt systems (Alrawashdeh & Al-Mahadeen, 2013; Sun 2012). Similarly, other studies supported the findings from this study that perceived self-efficacy usually results in goal achievement or is a direct determinant of behavior (Bandura, 1997; Dasgupta, Paul, & Fuloria, 2011; Luarn & Lin, 2005; Sripalawat, Thongmak, & Ngramyarn, 2011; Teo & Van Schaik 2012). Additionally, results from previous studies supported results from this study that both perceived ease of use and perceived usefulness

influence attitude toward use of systems, and they serve as mediators toward attitude in the presence of external variables (Almasri & Mohammad, 2015; Davis, 1989; Lee, 2010; Ma, Chao, & Cheng, 2013; Shipps & Phillips, 2013; Terzis & Economides, 2011).

Strengths, Weaknesses, and Limitations

This study is unique in that the researcher examined an area in which a limited amount of research exists. The exploratory pilot study completed before this study strengthened the need for this study and highlighted the differences between HBCUs and non-HBCUs among numerous variables, such as SAT and ACT scores, funding, revenues, investments, etc. The literature emphasized the benefits of CMS (Al-hawari & Mouakket, 2010; Costen, 2009; Crawley & Frey, 2008; Ioannou & Hannafin, 2008; Ready, Johnson, & Astani, 2011; van der Merwe, 2011), and in answering the research questions, the results of this study showed how HBCUs can reap these benefits using certain factors to encourage use. Finally, the researcher surveyed full-time faculty at 11 HBCUs, thus gathering information from a cross-section of faculty within 4-year private HBCUs.

A limitation of this study was that it did not include a comparison of factors affecting CMS use at the HBCUs in this study and similar non-HBCUs at the same time. Although this would have lengthened the study, such a comparison would have made this study richer. Additionally, the researcher could have assessed mediation analyses to see if attitude serves as a mediator between perceived ease of use and perceived usefulness in predicting use of CMS.

A further limitation of this study was that it only involved 4-year private HBCUs. Other private and public HBCUs exist that could have been a part of this study; however,

time, resources, and other constraints would have extended the study beyond a reasonable period. It took the researcher approximately one year to collect data from participants at the 11 universities that participated in this study. It would have taken considerably longer if the researcher tried to include more HBCUs, some of which received a request to participate but did not respond. All HBCUs began with the same purpose and experience similarities in culture, funding, and other variables; therefore, the results of this study may be applicable to other HBCUs.

In addition, the institution of the researcher represented a plurality of respondents to the study. Seventy percent of all faculty at the researcher's university responded to the survey request, while the next highest response percentage from the other ten institutions was 19%. Although all HBCUs began with the same purpose and experience similarities in culture, funding, and other variables, since the majority of responses is highly representative of one institution, the outcomes of this study may not be representative of the overall population, which presents a limitation of this study.

Next, this study did not incorporate students at HBCUs. It would have been beneficial to get students' perspectives on their perceptions of the benefits of CMS. In addition, this study was limited to full-time faculty and the perspectives of part-time faculty were not included, so the results may not be transferrable to all faculty.

A further limitation of this study is the low reliability of the perceived self-efficacy scale. The scale may have also measured respondents' experience with CMS. Although experience with and perceived ability to use a system are closely related (Barouch-Gilbert, 2016; Bandura, 1997), the findings and results for the self-efficacy scale should be interpreted with caution due to the low internal reliability of the scale.

Implications

The results of this study presented implications that will contribute to the body of knowledge regarding faculty use of CMS at HBCUs. The results of this study revealed how faculty at HBCUs can be encouraged to use CMS to supplement traditional courses. The student population at HBCUs is changing, and as a result, so are their needs. As many HBCUs see a decrease in African American enrollment, and an increase across other demographics, they must strive to compete with other colleges and universities (Gasman & Nquyen, 2015; National Center for Education Statistics, 2011). The use of CMS can contribute to the ever-changing needs of students attending HBCUs. Through this study, the researcher specifically examined how factors, such as perceived self-efficacy, infrastructural support, technical support, training, perceived usefulness, perceived ease of use, and attitude, affect the way faculty view CMS. As such, the researcher addressed ways in which these factors can be used to encourage use of CMS.

This study contributes to knowledge and professional practice in numerous ways. First, the factors studied can be used to help faculty at HBCUs. This study contributes to the body of knowledge by using the TAM and adding additional constructs to determine the factors that affect faculty use of CMS in HBCUs. While little research exists in this area, the results of this study were expected to not only contribute to the body of knowledge but also be used in future research to study other aspects of faculty use of and intention to use CMS in HBCUs. In addition, most research on CMS involved using them for online delivery; however, this research focused on faculty using CMS in traditional classrooms as a supplement to teaching. Supplementing teaching with CMS may enable faculty at HBCUs to adapt to the changing student demographics as well as compete with

non-HBCUs.

Additionally, although students believe CMS improve learning somewhat, educational researchers highlight that learning is not embedded in CMS; instead benefits of using the systems depend on the way instructors use them (Klobas & McGill, 2010). Students who frequently engage in use of CMS for courses tend to learn more from those courses. As noted by Klobas and McGill (2010), the more students are involved in using CMS for courses, the more they perceive that CMS use is beneficial to them. Furthermore, Klobas and McGill found that the perceived learning on the part of students was not matched by expectations of improved grades.

Although a high percentage of HEIs have CMS, and this industry is expected to be worth approximately \$7 billion by 2018 (Azmi & Singh, 2015), assessing the needs of faculty to successfully use these systems is challenging. According to Feldstein (2016), procurement practices at HEIs will continue to make assessing use of CMS challenging because HEIs do a poor job of correctly assessing just what is needed by faculty across campuses before investing premium dollars in these systems. Feldstein posited that if HEIs want to see these systems used in a more effective manner, they must conduct in-depth analyses regarding how teaching and learning happens across entire campuses, and then invest in features of CMS that have the capabilities to support those results.

The results of this study will help HBCUs use CMS functions more effectively. For example, the independent variables infrastructural support, technical support, and training all have a significant effect on faculty's belief that using the systems will be free from effort. Results also showed that the independent variables significantly affect faculty's belief that using CMS will enhance their job performance. Results of this study

therefore suggested that investments in CMS are futile if there are no corresponding investments in the technology, support, and training necessary to encourage faculty to use CMS.

Enrollment challenges

Between 1980 and 2014, many HBCUs experienced a decline in enrollment among African-American students. Likewise, some HBCUs have seen an increase in White enrollment, for instance, J. F. Drake State Technical College in Huntsville, Alabama, H. Councill Trenholm State Technical College in Montgomery, Alabama, and Lawson State Community College in Birmingham, Alabama Campus—all had between a 4% to 32% increase in White students (Gasman & Nguyen, 2015). Furthermore, with the increasing Asian and Hispanic demographics spurring an increased need for postsecondary education, it is imperative that HBCUs find ways of appealing to a wider audience that includes individuals of other ethnicities.

According to Gasman (2013), 24% of students enrolled at HBCUs are non-Black. This figure represents a big difference for enrollment at these same institutions in 1950 when almost 100% of the student body was made up of African Americans. Gasman further noted that much of the uptick in diversity at HBCUs occur in regions and states where the demographics are changing. For example, Gasman stated that in Texas, Prairie View A&M University has increased its Hispanic enrollment by 123% between 1980 and 2011, and the top three HBCUs with the highest enrollment of Asian-American enrollment are also in Texas. Therefore, amidst the declining enrollment of African Americans at HBCUs, such institutions need to reach out to other ethnic groups and

adopt non-traditional types of programs to stay relevant and compete in the postsecondary landscape.

Although some HBCUs have seen increased enrollment among White, Hispanic and Asian students, total enrollment has declined for HBCUs by 9% between 2010 and 2014 (IPEDS, 2016). Specifically, enrollment decreased by 12% among African Americans and 14% among Whites overall; however, enrollment increased by 9% among Asians, 12% among Hispanics, and 15% among other races, such as American Indian or Native Hawaiian during the same period.

With this decline in enrollment at HBCUs among African Americans, it is imperative that HBCUs adopt non-traditional methods of delivering education. Some HBCUs hope to boost enrollment through non-traditional offerings, such as online and night or evening programs (Stuart, 2012) in order to stay relevant in the higher education arena. However, HBCUs have to do more than hope; they have to take actionable steps toward non-traditional ways of delivering education. HBCUs are at a crossroads in higher education and in order to survive they must act quickly. According to Brown and Burnette (2014), HBCUs must be strategic in attracting more than just African Americans to their institutions, as they must also attract students from other ethnic and racial groups. Furthermore, HBCUs must be aware of the situation with for-profit institutions in their offerings of online degree programs, increasing competition. In addition, technology utilization and infrastructure updates for students are vital to competing with other institutions; however, moving forward, the challenges experienced by HBCUs in funding disparities must be alleviated.

Financial implications

The results of this study have significant financial implications for HBCUs and effective use of CMS. For Research Question 1(a), the researcher found that infrastructural support was a significant individual predictor of perceived ease of use. Therefore, if faculty at HBCUs have adequate levels of IT, advances in IT, and the right IT products, they believe using CMS will require less effort. This is a challenge for HBCUs because HBCUs face challenges with enrollment, retention rates, and diminishing budgets, and they have never been funded on par with their non-HBCU counterparts (Bettez, 2012). Brown and Burnette (2014) compared funding and spending between HBCUs and their non-HBCU counterparts from 2002–2010 and found disparities between the two. According to the authors, capital-spending patterns were statistically significantly higher for non-HBCUs than HBCUs for six of the nine years, and still disparities exist in funding for physical plant and major infrastructure upgrades between HBCUs and non-HBCUs (Brown & Burnette, 2014).

Likewise, the researcher also found that perceived self-efficacy is a significant predictor of perceived usefulness, which aligns with the original and modified TAM model (see Figures 1 and 2). Respondents to this study believed that if they possess the necessary skills to use CMS, then using the systems would enhance their job performance. In order to have the necessary skills to use CMS, faculty in HBCUs need the necessary training required to acquire those skills. Again, this presents a problem for HBCUs that may not be able to afford the necessary training for faculty.

However, hope exists for HBCUs to gain access to federal dollars that can support training efforts for their faculty. According to Toldson and Washington (2015), although

HBCUs are not funded to the degree that non-HBCUs are, a number of federally funded grant programs exist (DOE) to which they can apply. According to Toldson and Washington, the U.S. Department of Education is the largest federal funding body to HBCUs, totaling more than \$4.7 billion in HBCU funding in 2013. Much of this funding is through DOE grants from offices, such as Office of Innovation and Improvement, and grants such as the Teacher Quality Grants. For 2016, more than \$26 billion will be invested in DOE offices and grants, and although only a portion will be allotted to HEIs, HBCUs can take advantage of opportunities to apply for these grants.

The results of this study also indicated that both perceived usefulness and perceived ease of use significantly predicted attitude toward using CMS. When respondents perceived that using CMS would enhance their job performance and be free from effort, that perception positively affected their dispositions and intention to using the systems. The results supported the need for administrators at HBCUs to put the necessary tools and resources in place to enhance the likelihood of faculty being more comfortable with using CMS. The likelihood of providing the necessary resources for faculty at HBCUs may be offset by the lower budgets and funding at HBCUs (Mitchell, 2013).

As demonstrated by the exploratory research conducted in this study, HBCUs see far less funding in areas such as grant aid dollars received, instructional salaries and wages, instruction plant operation and maintenance, academic support, instruction total, and total revenues and investment returns (see Appendix A). Furthermore, Title III funding, which includes federal funds specifically designated to educate underrepresented

populations, are now scarce with the downturn of the U.S. economy. Consequently, the federal government is flat-funding designated HBCUs (Mitchell, 2013).

Faculty at HBCUs can achieve the skills, training, and perceived self-efficacy necessary to use CMS if administrators allocate more Title III and other funds to faculty training and development. As long as the institution receives Title III funding, the adequate amount of that funding should be designated for training faculty to use technology. Although a resistance to technology use exists by some faculty (Murthy, Iyer, & Warriem, 2015), active learning and hands-on techniques done in a timely manner while incorporating the strategy being taught is more effective than simply discussing the strategy. Training faculty in a student role is also important, as is the content, organization, and pedagogy of the training program (Murthy et al., 2015 p. 26).

Although it has been demonstrated in this study and others (Brown & Burnette, 2014; Mitchell, 2013; Toldson & Washington, 2015) that HBCUs experience disparities in funding with non-HBCUs, in order to stay viable they must seek other ways of training faculty to use CMS. Even if there were no additional funding available to HBCUs it is imperative that they seek other methods of training such as motivating faculty to do self-initiated training or find means of implementing low-cost or no-cost training using freeware or open source technology.

First, the concept of ubiquitous-learning or u-learning will help faculty use multimedia tools for training. U-learning simply means that faculty can use their portable devices and wireless network technology to gain access to anytime, anywhere software and training (Jeong, Hong, & Park, 2015). There are multiple freeware software tools available online of which faculty can take advantage. For example, faculty can train

themselves to use tools that can be incorporated in CMS to enhance their students' experiences. Free multimedia tools such as Jing for screencasting, video editing software such as iMovie for Mac or Windows Movie Maker for PC, or photo editing software such as Pixlr can all be downloaded free and embedded in CMS (University of Texas Austin, 2016). For faculty who perceive they have the self-efficacy and just need the infrastructure and support to use technology, these software can be valuable in enhancing CMS use.

There are also freeware and open-source multimedia tools available to faculty for CMS training. Some publishers make CMS training available to faculty who adopt their textbooks. These are step-by-step guides to using popular CMS such as Canvas, D2L, Blackboard, and Moodle that faculty can utilize. Publishers such as Pearson, Prentice Hall, and McGraw Hill all have CMS training available to faculty who use their products (McGraw Hill, 2016; Pearson, 2016). Furthermore, there are Websites such as Lynda.com, sponsored by LinkedIn, that offer free CMS training trials and spotlms.us that offer free CMS and training to use the system (Lynda, 2016; SPOT, 2016).

Furthermore, although the funding given to HBCUs is not on par with those allotted to non-HBCUs (Brown & Burnette, 2014; Mitchell, 2013; Toldson & Washington, 2015), it is imperative that HBCUs find creative ways of improving their technology infrastructure to provide faculty with the support needed to use CMS. One creative way of achieving the technology infrastructure necessary to support faculty use of CMS is to go back to the roots of support for HBCUs – philanthropy. As noted by Peeples (2010), the beginning of black higher education had a high emphasis on private education and was funded by philanthropists and philanthropic organizations. It is,

therefore, not out of place to conceive that since HBCUs still face financial problems, specifically as we discuss technology infrastructure and support in this study, that philanthropists fund improvements in this area, at least in part.

Development offices at private HBCUs should seek more funding for technology infrastructure support and training for faculty from church organizations, alumni, and philanthropic groups. According to Drezner (2013), 70% of all HBCUs report alumni giving, with participation from 0.1% to 50% of alumni. Drezner further reported that it is crucial to the existence of HBCUs that these HEIs increase their endowments and ways of raising annual funds, especially since HBCUs lag behind non-HBCUs in endowments and alumni giving. Drezner also stated that HBCUs have less staff in their Development offices than non-HBCUs, which complicates matters relevant to increasing endowments and alumni giving at HBCUs. Nonetheless, improving endowments and alumni giving present great opportunities in which private HBCUs can increase funding for infrastructure support to increase faculty usage of CMS.

Despite having financial problems, it is important to the landscape of American HEIs that HBCUs remain in existence. As noted by Bettez (2012), HBCUs graduate more than 50% of African-American professionals, more than 50% of all African-American teachers, and 70% of African-American dentists. Bettez further stated that 50% of African Americans who graduate from HBCUs go on to graduate or professional schools. Additionally, 33% of African Americans with Ph.D. degrees in science or engineering received their undergraduate degrees from HBCUs (Bettez, 2012). A review of the National Science Foundation (2015) site revealed that HBCUs are still relevant and important to African Americans (see Table 15).

Table 15. *Bachelor's degrees awarded by all HBCUs to Black U.S. citizens and permanent residents from 2010–2012*

Stem Field	2010	2011	2012
	%		
Agricultural Sciences	37.1	35.0	32.1
Biological Sciences	29.0	28.9	28.1
Computer Sciences	17.6	16.1	14.3
Mathematical Sciences	32.5	33.9	29.5
Physical Sciences	36.6	32.9	33.4
Engineering	20.1	19.8	19.0

West and Moore (2015) stated that HBCUs' importance to the landscape of America is supported by and evidenced in the amount of graduates who go on to graduate and professional schools. The authors noted that 75% of African Americans with earned doctorates, 80% of African American federal judges, and 85% of African American medical doctors earned their undergraduate degrees at HBCUs.

African Americans and other minority groups also need HBCUs to remain viable because they play a vital role in preparing minorities for higher paying STEM jobs. According to Leichter (2016), African Americans are underrepresented in college majors that lead to high-paying jobs, and overrepresented in majors that lead to low-paying jobs. However, since HBCUs serve an important role in educating African Americans in STEM and other disciplines, they are prepared and qualified for high-paying fields. This further underscores the importance of HBCUs to the American landscape, which is supported by previous literature (Albritton, 2012; Bettez, 2012; Lee, 2010; West & Moore, 2015). HBCUs contribute significantly to preparing African Americans for

STEM fields and therefore remain viable options as HEIs. Furthermore, HBCUs are known for admitting students who would not have otherwise been admitted to more selective institutions, and prepare them for some of the best graduate programs in the country. They accomplish this by creating a warm and nurturing environment that fosters self-efficacy, racial pride and academic readiness in Black students (Shorette & Palmer, 2015).

Implications for use of the results of this study are far-reaching. The model used in this study can serve as a framework for other HBCUs to explore their faculty use of CMS. The TAM also serves as a predictive model to examine how the variables perceived usefulness, perceived ease of use, self-efficacy, infrastructural support, technical support, and training contribute to attitude toward and use of CMS. Since the TAM was involved in this research, the results can be used in a predictive fashion since researchers have proven TAM useful and valid as a predictor of information system use (Davis, 1989; Tseng, Tu, Lee, & Wang, 2013; Venkatesh et al., 2003). The United States has 105 HBCUs, and although this study investigated faculty use of CMS at 11 HBCUs, the findings can be generalized to all HBCUs in assisting them with preparing faculty to use CMS.

This study also contributes to the fields of technology acceptance, information systems (IS), and higher education, namely HBCUs. The TAM is a widely used model for users' acceptance or rejection of IS (Davis, 1989), and it is seen as a valid and predictive tool across the field of IS (Almasri & Mohammad, 2015; Davis, 1989; Tseng et al., 2013; Venkatesh et al., 2003). According to Davis (1989), two variables influence a person's decision to use IS—perceived usefulness and perceived ease of use. The results

of this study also indicated that both perceived usefulness and perceived ease of use predicted attitude toward use of CMS, and they also served as mediators between self-efficacy, infrastructural support, technical support, training, and attitude.

Transferability and Generalizability

The findings of this study are applicable across wide spreads of major disciplines. In addition, most ranks within the disciplines were represented nearly equally. The results of this study are most applicable to users of Blackboard, WebCT, D2L, and Moodle.

Because of the low reliability of the self-efficacy scale, those results may not be transferrable to other non-HBCUs. However, because of the large sampling frame, where a Web-based survey instrument was used to facilitate participant attempts, the researcher used a broadly representative sample of potential respondents. This large sample was representative of a large number of schools, major disciplines, ranks, and management software packages. This boosts the generalizability by calculating results based on a largely representative sample.

Recommendations for Future Research

The results of this study provided recommendations for future research in the various areas. First, more research is needed in assessing faculty use of CMS in classes with emphasis placed on using the systems to supplement hybrid classes in HBCUs. Second, research is needed to definitively compare faculty use of CMS between similar HBCUs and non-HBCUs. Future researchers can assess whether the inherent differences between HBCUs and non-HBCUs result in factors affecting use in different ways at both sets of institutions. Third, future researchers should also focus on comparing use of CMS at private versus public HBCUs to examine the difference, if any, regarding how CMS

are used at both sets of institutions, although they are all HBCUs. Fourth, future researchers should focus more on actual use of CMS. Survey questions should be designed to capture factors that are instrumental in successfully predicting actual faculty use of CMS. Finally, future researchers should analyze if faculty use of CMS results in an improvement in student learning.

Changes in research method

Future researchers should consider using a professional group or listserv to survey faculty. This will allow researchers to collect survey data from faculty without necessarily going through individual IRB processes from each university. Additionally, future researchers should investigate whether attitude mediates the relationship between perceived usefulness, perceived ease of use, and actual use of CMS when using the TAM framework. Survey questions should be designed to analyze if significance exists among these variables.

The survey in this study involved constructs previously tested and estimated to be valid and reliable for research involving acceptance and use of IS (Davis, 1989), as well as questions for self-efficacy (Flosi, 2008). However, the scale for self-efficacy had low internal reliability and should be interpreted with caution. In addition, the adaption of support and training from existing research (Bhattacharjee & Hikmet 2008; Chan & Lin, 2009; Hassanein, Head, & Wang, 2010) were estimated to be valid and reliable and met the threshold of the variance inflation factor for this study. However, future researchers replicating this study should consider different questions for the self-efficacy construct, since those questions did not meet Cronbach's internal reliability test in this study, and may have also measured experience with CMS. Additionally, future research should

perform a functional analysis to determine which variables, if any, are not useful in a regression.

Also, future researchers should consider paper survey deployment as opposed to a Web-based survey deployment at least once to see if differences exist in responses between the two. Although Davis (1989) stated no difference exists between the two types of deployment for the TAM model, some researchers question which is better (Dillman, Smyth, & Christian, 2014).

Changes in theoretical concepts

Future researchers should also consider changes in the theoretical concepts when using TAM. Although constructs were added to the TAM specifically for this research study, given the limitations of TAM as noted in the literature (Shen, 2012), future research should consider adding more constructs, such as those that measure privacy, security, and social influence of CMS to see their effect on the original framework. In addition, future researchers should consider the effects of other demographic variables to the TAM. For example, researchers should look at how variables, such as gender and age of faculty, affect perceived usefulness and perceived ease of use.

Recommendations for Practice

The results of this study highlighted recommendations that HBCUs can use to increase the use of CMS by their faculty. First, HBCUs should make sure their infrastructural support are sufficient to increase CMS use by faculty. This study demonstrated that a good technical infrastructure increases faculty's intention to use CMS. It is therefore imperative that HBCUs provide faculty with the technology needed to use the systems effectively.

Second, HBCUs should consider training faculty to use the systems. According to this study, training will increase self-efficacy, which will in turn increase perceived ease of use and perceived usefulness of the systems. In considering training, HBCUs should look into free software and multimedia systems that can offer faculty the skills they need to use the systems. This includes training to use CMS offered by publishers whose texts are adopted by the institutions. In light of the budgetary problems experienced by many HBCUs, free software is a creative way to offer training.

Third, administrators at HBCUs should help increase faculty use of CMS by increasing their motivation for training. Administrators, making sure to delineate the need and benefits of training, can achieve this through proper and thorough communication. Furthermore, administrators must also demonstrate the importance of CMS use by themselves showing their interest by using the systems.

Finally, HBCUs should put processes in place to increase their endowments and alumni giving. This means properly staffing their Development offices and creating programs that will encourage giving, therefore providing badly needed funds to improve the technology infrastructure and provide means for training.

Summary

Many HEIs invest in CMS for faculty to use them to teach both online and traditional courses. Although the systems are used mostly to deliver online content, they are just as effective for supplementing traditional courses (Daniels, 2009). Even though approximately 75–80% of HEIs invest in the technology, faculty in these institutions are not using the programs at a high rate. Previous researchers discovered that for faculty who use CMS, 75% only use them primarily to upload course syllabi and class readings

(Malikowski, 2011). The faculty are not using the systems for more robust interactive learning experiences.

Course management systems are software packages that provide both instructors and students Web-based tools and resources to support the teaching and learning process. Prior research highlights the benefits of CMS in HEIs (Al-hawari & Mouakket, 2010; Costen, 2009; Crawley & Frey, 2008; Ioannou & Hannafin, 2008; Ready, Johnson, & Astani 2011; van der Merwe, 2011). The systems offer students and instructors access anytime and anywhere to features such as program information, discussion boards, teacher assistance, document sharing, learning resources, and more. Even in blended environments that combine traditional classes with online access, CMS provide students with courseware, documents, and access to materials they can view outside of the classroom.

Although researchers have studied CMS use in HEIs, much of that research occurred with non-HBCUs. A shortage of research exists regarding CMS use in HBCUs. The need for research about CMS in HBCUs is demonstrated by the benefits associated with CMS, as shown by previous research (Al-hawari & Mouakket, 2010; Costen, 2009; Crawley & Frey, 2008; Ioannou & Hannafin, 2008; Ready, Johnson, & Astani 2011; van der Merwe, 2011). Since benefits exist to using CMS in non-HBCUs, it was important to conduct research in HBCUs so recommendations can be made regarding CMS use in these institutions.

A need existed for a separate study on CMS at HBCUs because of the differences between HBCUs and non-HBCUs in terms of variables such as culture, funding, technology, infrastructure, resources, budgets, and more. The researcher conducted a

preliminary exploratory study and found HBCUs to be different from their non-HBCU counterparts on ten variables. For all variables, the non-HBCUs had a higher mean than their HBCU counterparts, and for six of those variables, the differences in the mean were statistically significant. Once this difference was established, the researcher examined CMS use for traditional courses at 11 private 4-year undergraduate HBCUs.

The goal for this study was to use the TAM framework to assess the effect of certain factors on use of CMS by faculty in HBCUs. The factors used were perceived usefulness, perceived ease of use, and attitude from TAM, and this study included the additional factors of self-efficacy, support (infrastructural and technical), and training.

The researcher tested all three research questions using regression analysis and the results indicated that faculty at HBCUs believe that if they feel comfortable using computer systems and receive the technology resources, IT support, and training they need to use CMS, using the systems will not require too much effort and will enhance their job performance. Faculty at HBCUs also believe that if using CMS will not require too much effort and will enhance their job performance, they will be favorably disposed toward CMS with a behavior toward using the systems. Finally, the belief that using the system is free from effort and will enhance job performance will reconcile the relationship between self-efficacy, support, and training and will lead to a disposition toward CMS with the behavior and intention to use the systems.

In light of changing demographics in the American landscape, HBCUs must find ways of reaching individuals of other ethnicities, for instance, Asian-Americans and Hispanics. With falling enrollment among African Americans in many HBCUs, these institutions must develop ways of increasing diversity among individuals and programs in

order to remain relevant. Universities can use CMS as tools to not only improve learning, but also to embrace other types of programs, such as online, distance education, and adult degree completion programs.

Financial problems at HBCUs may make it difficult for these institutions to employ methods and ways of increasing faculty use of CMS. Results of this study indicated that with the right IT resources, support, and training, faculty will be favorably disposed to and feel comfortable using CMS; however, this requires financial investments that HBCUs do not possess. HBCUs are not funded in the same way as their non-HBCU counterparts (Bettez, 2012), and falling enrollment numbers add to financial woes (Albritton, 2012); however, HBCUs are important to the landscape of HEIs in the United States and contribute to the success and viability of African Americans in the workforce (Leichter, 2016).

The researcher suggested future research and recommendations to further study this topic, such as looking at faculty use of CMS for hybrid classes, comparing these results to those at non-HBCUs, comparing use at private to public HBCUs, and examining the effects of CMS use on student learning. The researcher suggested changes in research practice and theoretical concepts regarding deploying a paper survey, changing questions for self-efficacy construct, and adding other constructs to the survey for future iterations of this study. Finally, the researcher offered recommendations for practical use of CMS by HBCUs through emphasis on training faculty to use CMS and administrators creating the motivation to receive training, better technical infrastructure that increases access for CMS use, and increase endowment and giving to offset diminishing budgets at HBCUs. The results and knowledge learned in this research study

will help HBCUs become more aware of the importance of faculty use of CMS for traditional classes, and help them invest in the right resources for more effective use of the systems.

Appendix A
Variables Comparisons

Table 1
Comparisons of HBCUs and Non-HBCUs on Different Variables for 2011/2012

Variables	Mean – HBCUs	Mean – Non-HBCUs
SAT Math 75% 2012	469	580
SAT Critical Reading 75% 2012	476	588
Grant Aid Dollars Received 2011/2012	\$ 12,516,629	\$ 22,918,539
Instruction Salaries and Wages 2011/2012	\$ 4,780,234	\$ 7,539,519
Total Student Services 2011/2012	\$ 3,780,019	\$ 7,500,367
Instruction – Plant Operation & Maintenance 2011/2012	\$ 1,031,615	\$ 1,478,015
Academic Support 2011/2012	\$ 2,339,173	\$ 3,671,777
Instruction Total 2011/2012	\$ 8,349,687	\$ 14,291,164
Total Revenues and Investment Returns 2011/2012	\$ 30,791,039	\$ 41,004,245
Total Expenses 2011/2012	\$ 30,980,137	\$ 42,022,625

Appendix B

Student's t Test for Mean Differences between HBCUs and Non-HBCUs

Table 2
t tests showing differences between HBCUs and non-HBCUs on selected variables for 2011/2012

Variables	HBCUs		Non-HBCUs		t value	Sig.
	<i>N</i>	<i>Mean</i>	<i>N</i>	<i>Mean</i>		
SAT Math 75% 2012	11	469	11	580	4.64 3	.000
SAT Critical Reading 75% 2012	10	476	10	588	3.69 8	.002
Grant Aid Dollars Received 2011/2012	22	\$12,516,628	20	\$22,918,538	2.65 7	.011
Instruction Salaries and Wages 2011/2012	22	\$4,708,234	20	\$7,539,519	2.00 7	.050
Total Student Services 2011/2012	22	\$3,780,019	20	\$7,500,367	2.78 0	.008
Instruction – Plant Operation & Maintenance 2011/2012	22	\$1,031,615	20	\$1,478,015	1.06 7	.293
Academic Support 2011/2012	22	\$2,339,173	19	\$3,671,777	1.44 4	.157
Instruction Total 2011/2012	22	\$8,349,687	20	\$14,291,164	1.95 1	.050
Total Revenues and Investment Returns 2011/2012	22	\$30,791,039	20	\$41,004,245	1.17 9	.245
TOTAL EXPENSES 2011/2012	22	\$30,980,137	20	\$42,022,625	1.37 0	.178

Financial data were not adjusted for FTE enrollment but instead represent actual amounts. Parity and not equivalency was used when HBCU institutions were matched to their non-HBCU counterparts.

Appendix C

Table 3

4-year Private Undergraduate Instructional HBCUs and their Carnegie Classifications

Name	Control	Fall Term 2013 Enrollment	Carnegie Classification	Highest Degree	Religious Affiliation
Allen University	Private not-for-profit	651	Undergraduate Instructional	Baccalaureate	African Methodist Episcopal Baptist
Benedict College	Private not-for-profit	2512	Undergraduate Instructional	Baccalaureate	Baptist
Bennett College	Private not-for-profit	680	Undergraduate Instructional	Baccalaureate	United Methodist Church
Edward Waters College	Private not-for-profit	862	Undergraduate Instructional	Baccalaureate	African Methodist Episcopal
Jarvis Christian College	Private not-for-profit	609	Undergraduate Instructional	Baccalaureate	Christian Church
Lane College	Private not-for-profit	1554	Undergraduate Instructional	Baccalaureate	Christian Methodist Episcopal
LeMoyne-Owen College	Private not-for-profit	1023	Undergraduate Instructional	Baccalaureate	United Church of Christ
Livingstone College	Private not-for-profit	1175	Undergraduate Instructional	Baccalaureate	African Methodist Episcopal
Miles College	Private not-for-profit	1666	Undergraduate Instructional	Baccalaureate	Colored Methodist Episcopal
Morehouse College	Private not-for-profit	2170	Undergraduate Instructional	Baccalaureate	Multi Denominational
Morris College	Private not-for-profit	824	Undergraduate Instructional	Baccalaureate	Baptist
Oakwood University	Private not-for-profit	1903	Undergraduate Instructional	Baccalaureate	Seventh-day Adventist

Table 3
4-year Private Undergraduate Instructional HBCUs and their Carnegie Classifications

Paine College	Private not-for-profit	924	Undergraduate Instructional	Baccalaureate	United Methodist Church
Philander Smith College	Private not-for-profit	556	Undergraduate Instructional	Baccalaureate	United Methodist Church
Rust College	Private not-for-profit	922	Undergraduate Instructional	Baccalaureate	United Methodist Church
St. Augustine College	Private not-for-profit	1299	Undergraduate Instructional	Baccalaureate	Episcopal
St. Paul's College	Private not-for-profit	584	Undergraduate Instructional	Baccalaureate	Protestant Episcopal Church
Spelman College	Private not-for-profit	2229	Undergraduate Instructional	Baccalaureate	Baptist
Stillman College	Private not-for-profit	863	Undergraduate Instructional	Baccalaureate	Presbyterian
Talladega College	Private not-for-profit	932	Undergraduate Instructional	Baccalaureate	United Church of Christ
Texas College	Private not-for-profit	971	Undergraduate Instructional	Baccalaureate	United Church of Christ
Tougaloo College	Private not-for-profit	878	Undergraduate Instructional	Baccalaureate	United Church of Christ
Voorhees College	Private not-for-profit	536	Undergraduate Instructional	Baccalaureate	Episcopal Church
Wilberforce University	Private not-for-profit	479	Undergraduate Instructional	Baccalaureate	African Methodist Episcopal
Wiley College	Private not-for-profit	1392	Undergraduate Instructional	Baccalaureate	United Methodist Church

Appendix D
Survey

Major discipline

Allied Health
Biology, Biological Sciences
Business
Chemistry
Communication
Computer Science
Economics
Education
Engineering
English, Foreign Language
Health, Physical Education
Political Science, History
Mathematics
Management Information Systems
Music
Nursing
Psychology, Social Sciences
Religion, Philosophy
Other (please specify) _____

Gender

Male
Female

How many years have you taught at the university level? Please put whole number.

Full-time _____

How long have you worked at your current institution? Please put whole number.

Full-time _____

What is your rank?

Instructor
Assistant Professor
Associate Professor
Full Professor
Other (please specify) _____

How long have you been using computers? (Ex: email, typing, research, entering grades) Please put whole number. _____

How many years have you used course management systems? Please put whole number.

What course management software packages have you used?

Blackboard

WebCT

Angel

Moodle

D2L

Not Applicable

Other (please specify) _____

What course management system features have you used? Check all that apply.

Announcement

Discussion

Grades

E-mail

Group

Bulletin Board

Survey

Quizzes

Student Web pages

Posting lectures/Slides

Please use the scale to select the answer that most closely matches your response

Perceived Usefulness	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Using course management software in my job enables me to accomplish tasks more quickly.					
Using course management software improves my job performance.					
Using course management software improves my productivity.					
Using course management software improves my effectiveness on the job.					
Using course management software makes it easier to do my job.					
I find it useful to use course management software.					

Perceived ease of use	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Learning to operate course management software is easy to me.					
I find it easy to get course management software to do what I want it to.					
My interaction with course management software is clear and understandable.					
I find that interacting with course management software is flexible.					
It is easy for me to become skillful at using course management software.					
I find course management software easy to use.					

Attitude	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Using course management systems for instruction is a good idea.					
Using course management systems for instruction is beneficial.					
Using course management systems for instruction is advantageous.					
Using course management systems for instruction is a positive step toward instruction.					
Using course management systems for instruction is convenient.					
Using course management systems for instruction is pleasant.					

Course management systems provide an attractive environment for learning.					
I like using course management systems for instruction.					

Self-efficacy	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I am an experienced course management system user.					
The university encourages the use of course management software.					
I am anxious about using course management software.					
A lot of time is needed to implement course management systems.					
The facilitating conditions (training, facilities, etc.) are available for me to implement using course management software.					

Infrastructure Support	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
The level of IT provided at my work place is adequate to perform my job.					
My organization is keeping up with advances in IT.					
My organization would provide additional IT products to improve the quality of my work.					

Technical Support	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
IT support staff is responsive to my needs.					
IT support staff is competent in providing their services.					
I find it easy to interact effectively with the IT support staff concerning my problems.					

Training	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Effective training is available to me for using the course management system at work.					
A technology support person is available to help me troubleshoot the course management system at work.					
My institution provides the necessary training to me for all course management systems features I need to implement at work.					
I have access to support resources (including training) for course management systems technologies that I use routinely for teaching.					
I do not have the knowledge necessary to properly use the course management system at my institution.					

Appendix E
Recruitment Statement

Nova Southeastern University
Ph.D. Candidate

My name is Hyacinth Burton and I am conducting research on faculty use of course management systems (CMS) in private 4-year historically Black colleges and universities (HBCUs). I invite you to participate in this study to help determine faculty acceptance and use of CMS in HBCUs. The Technology Acceptance Methodology will be used to measure factors such as perceived ease of use, perceived usefulness, attitude, support, training, and self-efficacy as independent variables, and their effect on the dependent variable – use of CMS. Many studies have been conducted on CMS use in higher education; however, these studies have mostly been conducted at Non-HBCUs. There is a dearth of research on this topic conducted at HBCUs.

This study will benefit HBCUs by recommending best practices for acceptance and use of CMS; in light of the fact that numerous studies have shown that using CMS have proven beneficial to institutions of higher learning.

Completing the survey indicates your voluntary participation in the study. Please click the link below to complete the survey. Thank you for your participation in and contributions to this study.

Appendix F

Histograms Displaying Descriptive Statistics of Continuous Variables

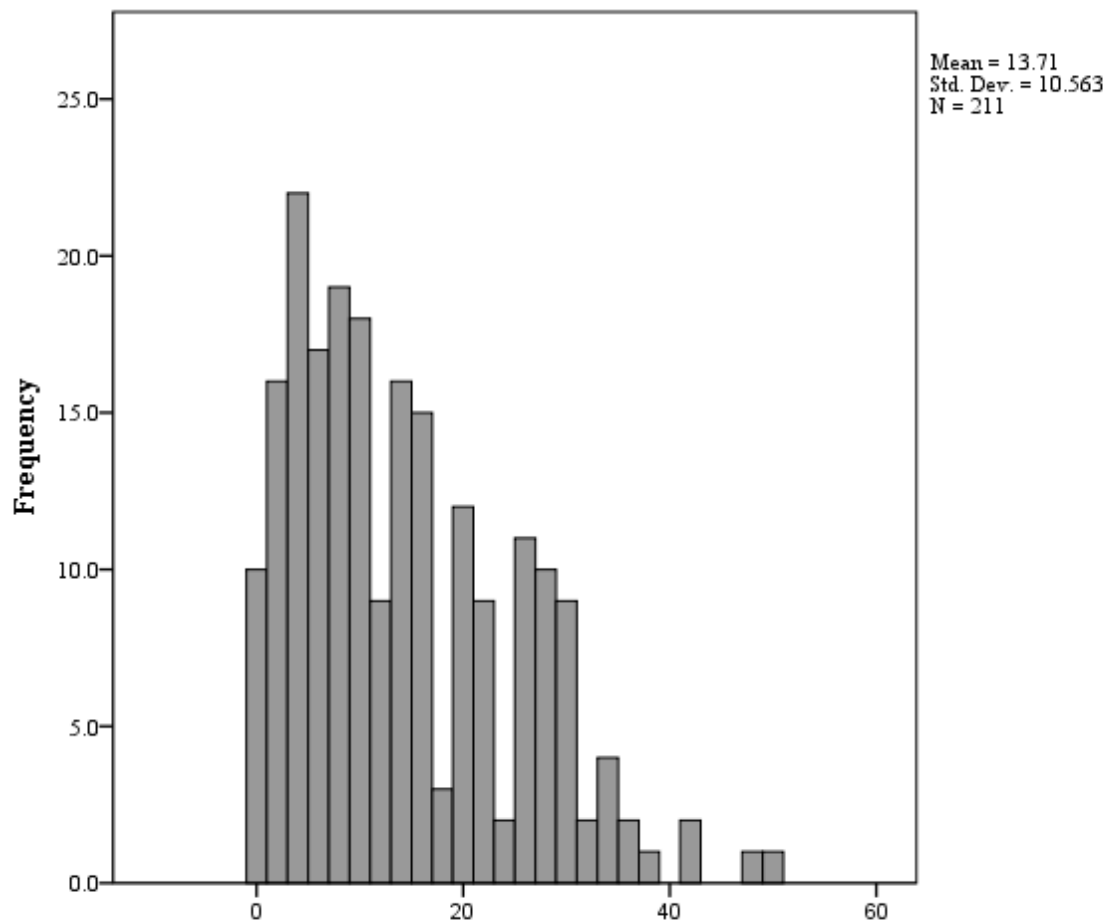


Figure 1. Histogram displaying years taught full-time at the university level.

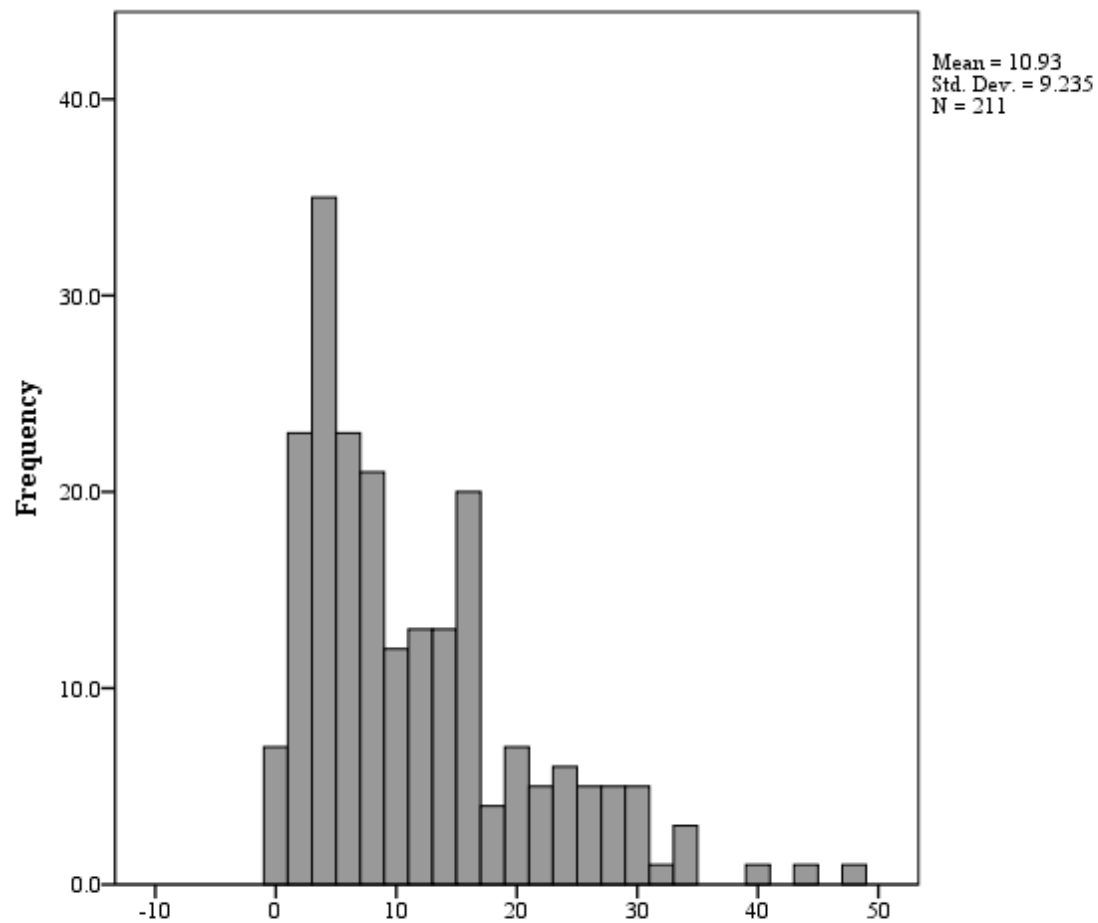


Figure 2. Histogram displaying years taught at current institution.

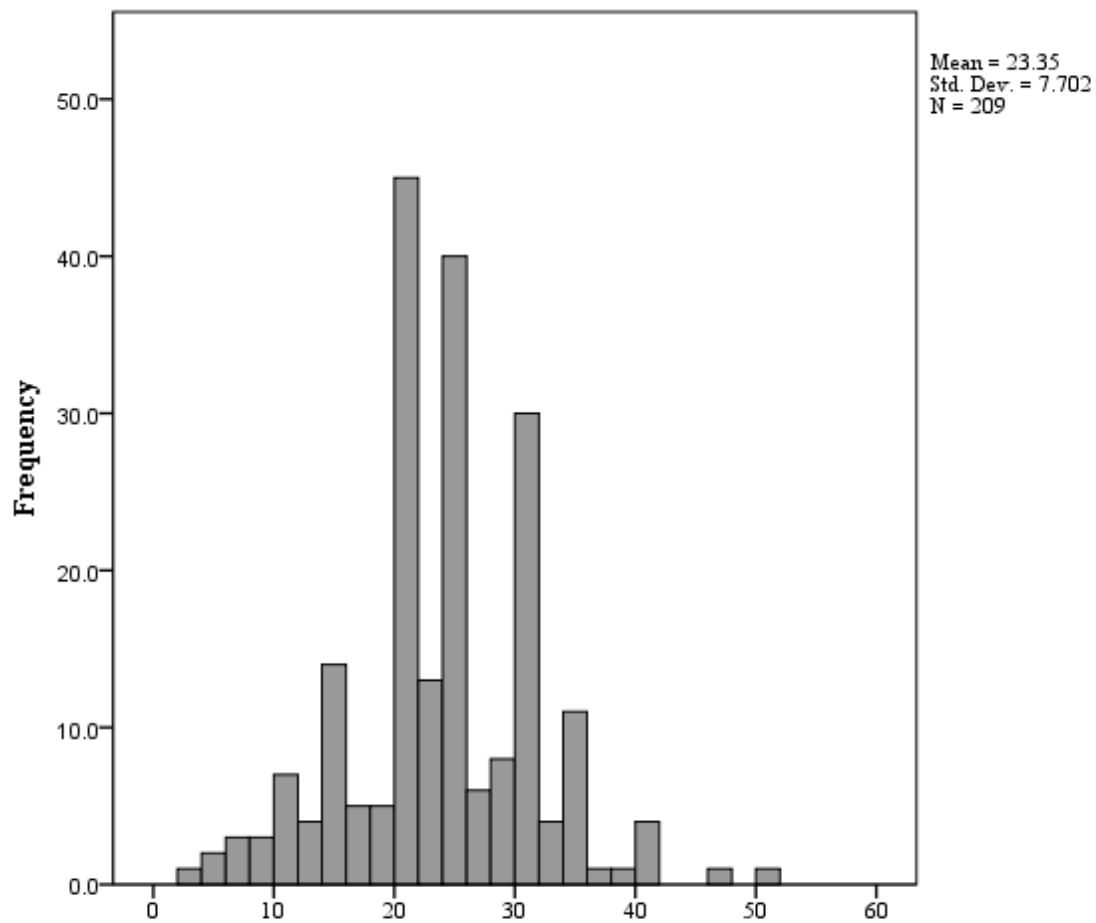


Figure 3. Histogram displaying years using computers.

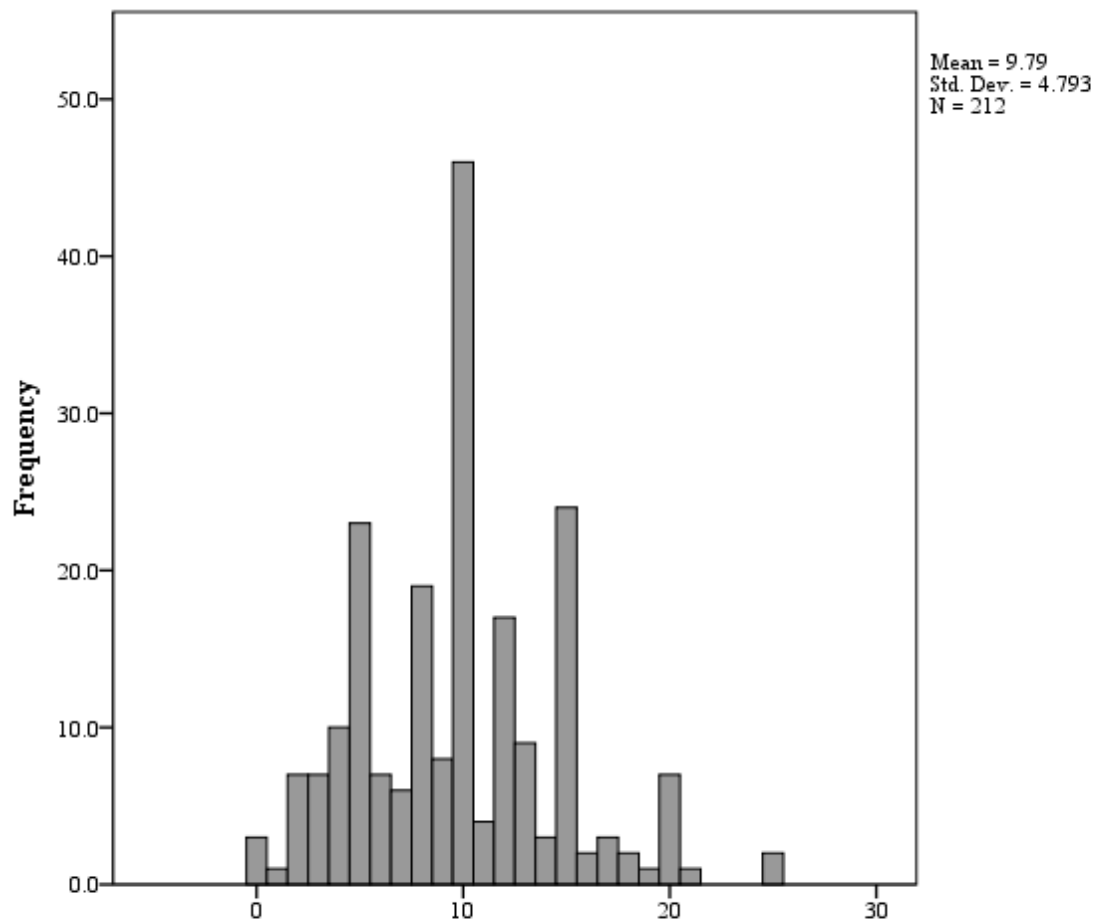


Figure 4. Histogram displaying years using course management systems.

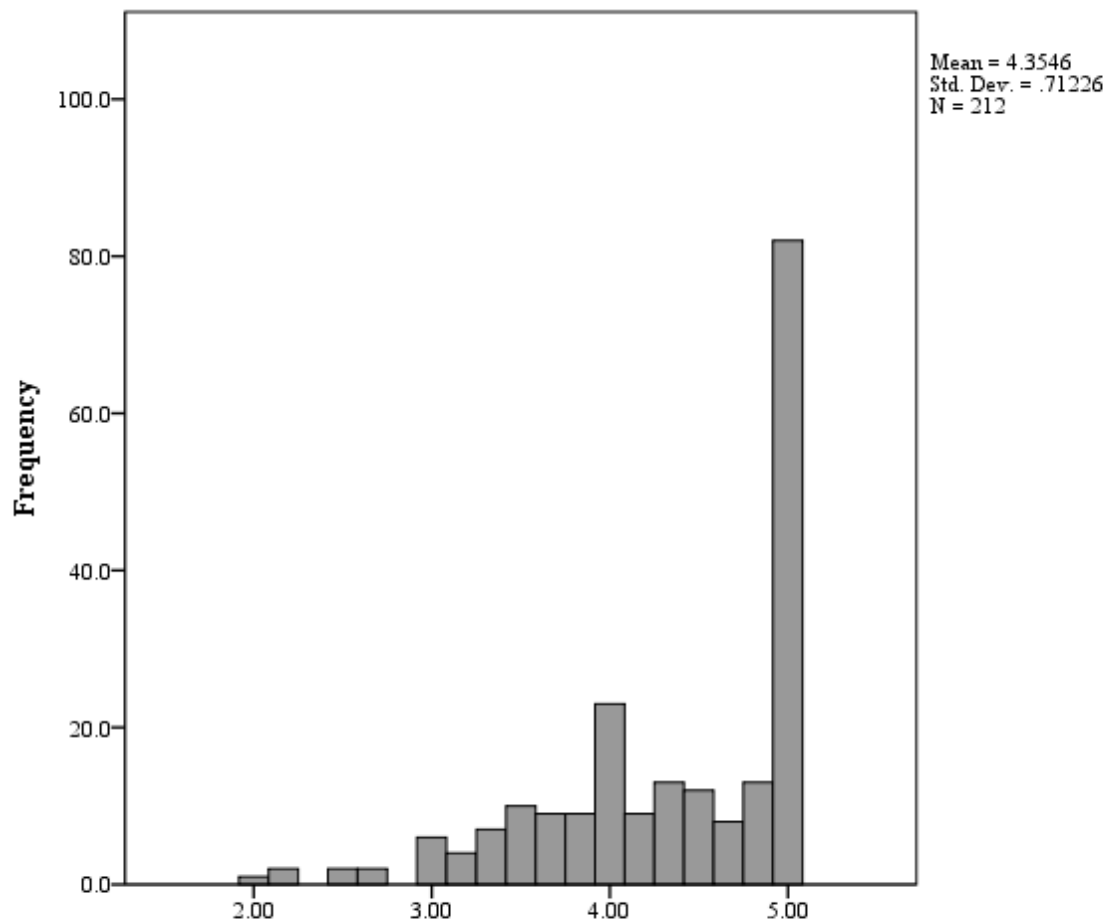


Figure 5. Histogram displaying perceived usefulness.

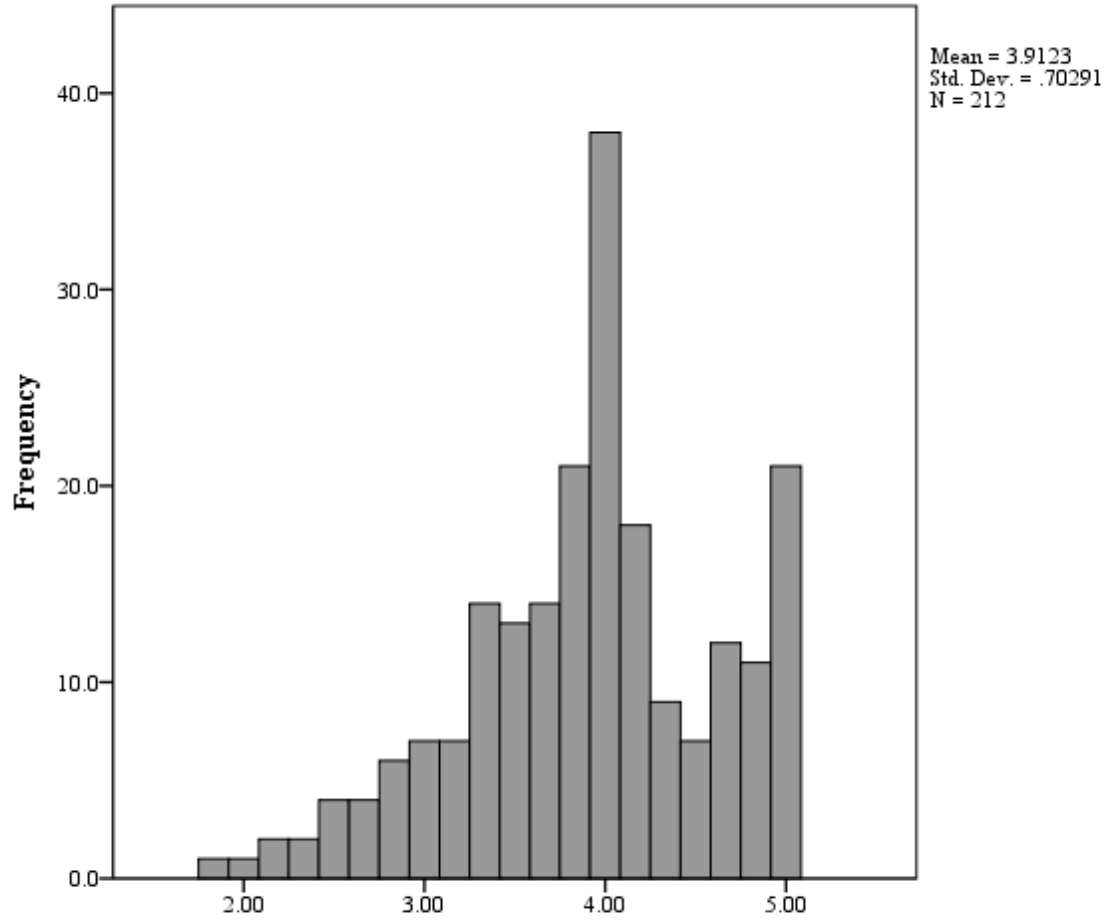


Figure 6. Histogram displaying perceived ease of use.

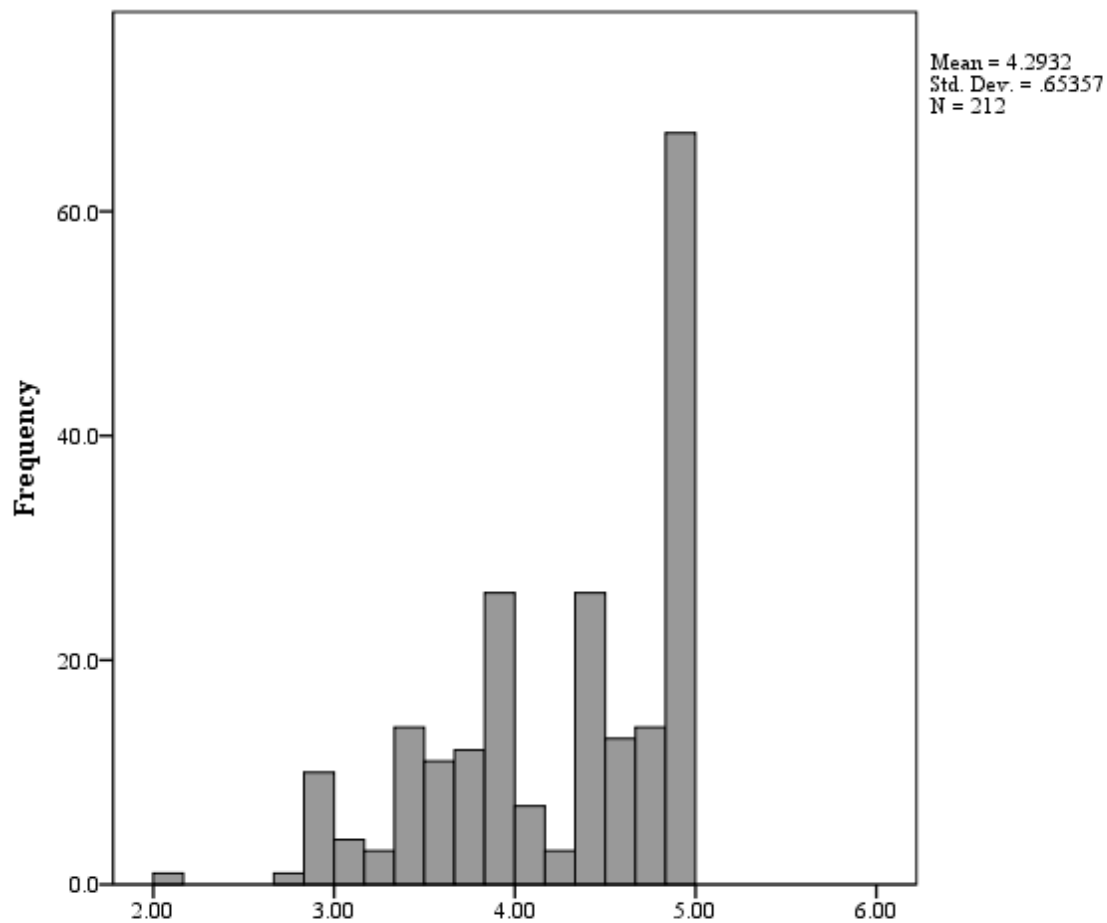


Figure 7. Histogram displaying attitude.

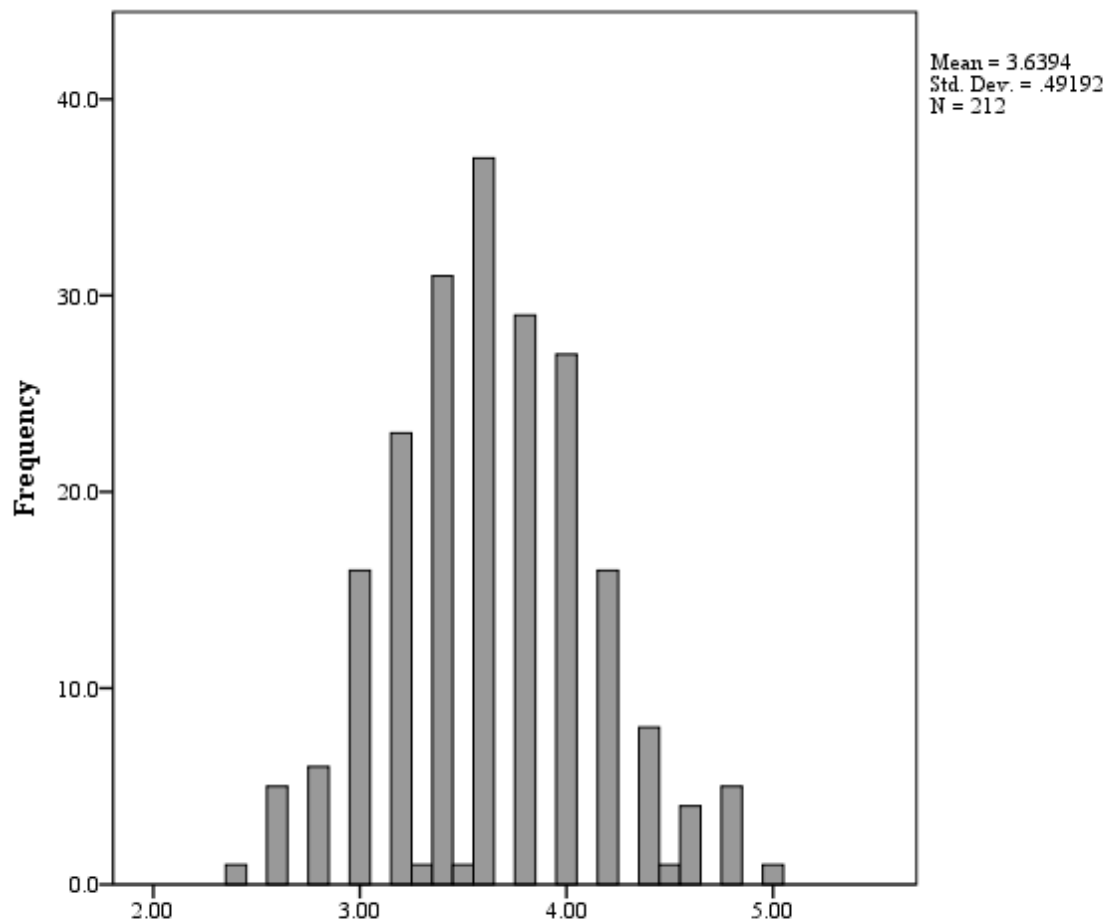


Figure 8. Histogram displaying self-efficacy.

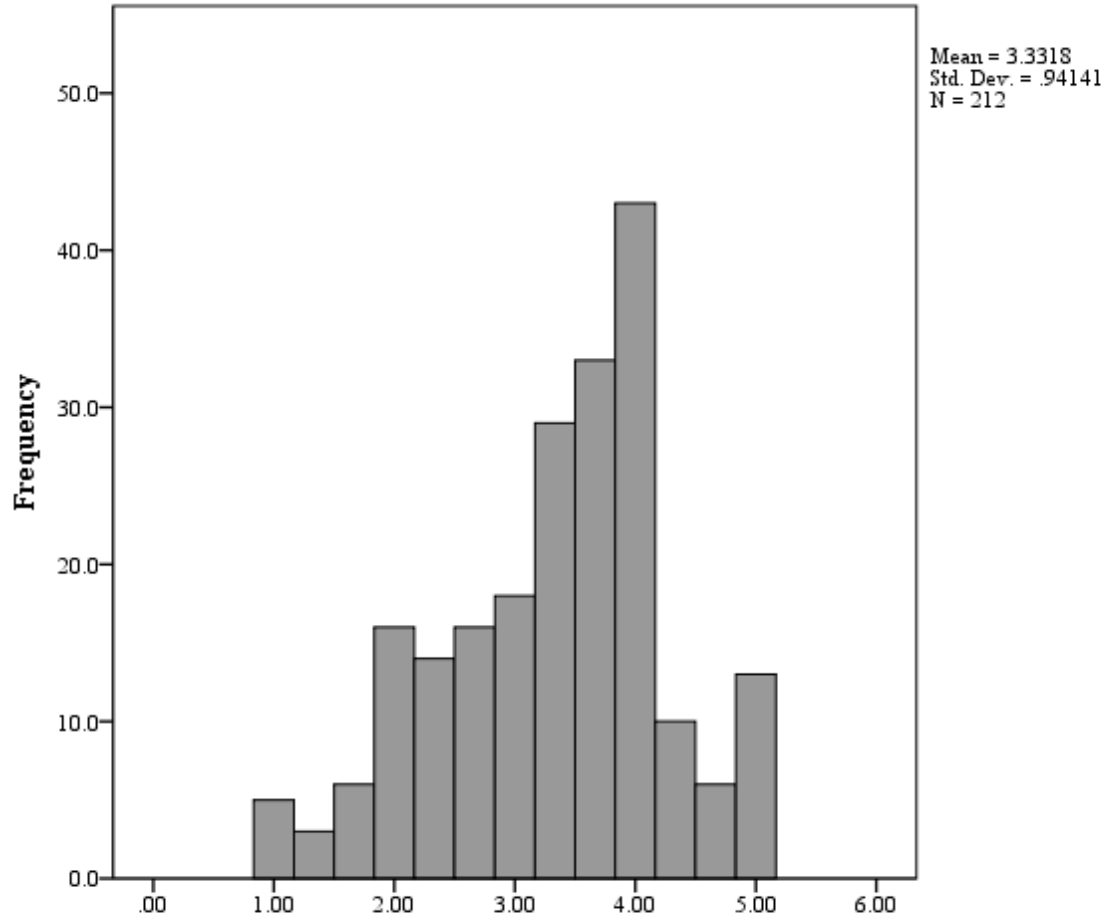


Figure 9. Histogram displaying infrastructural support.

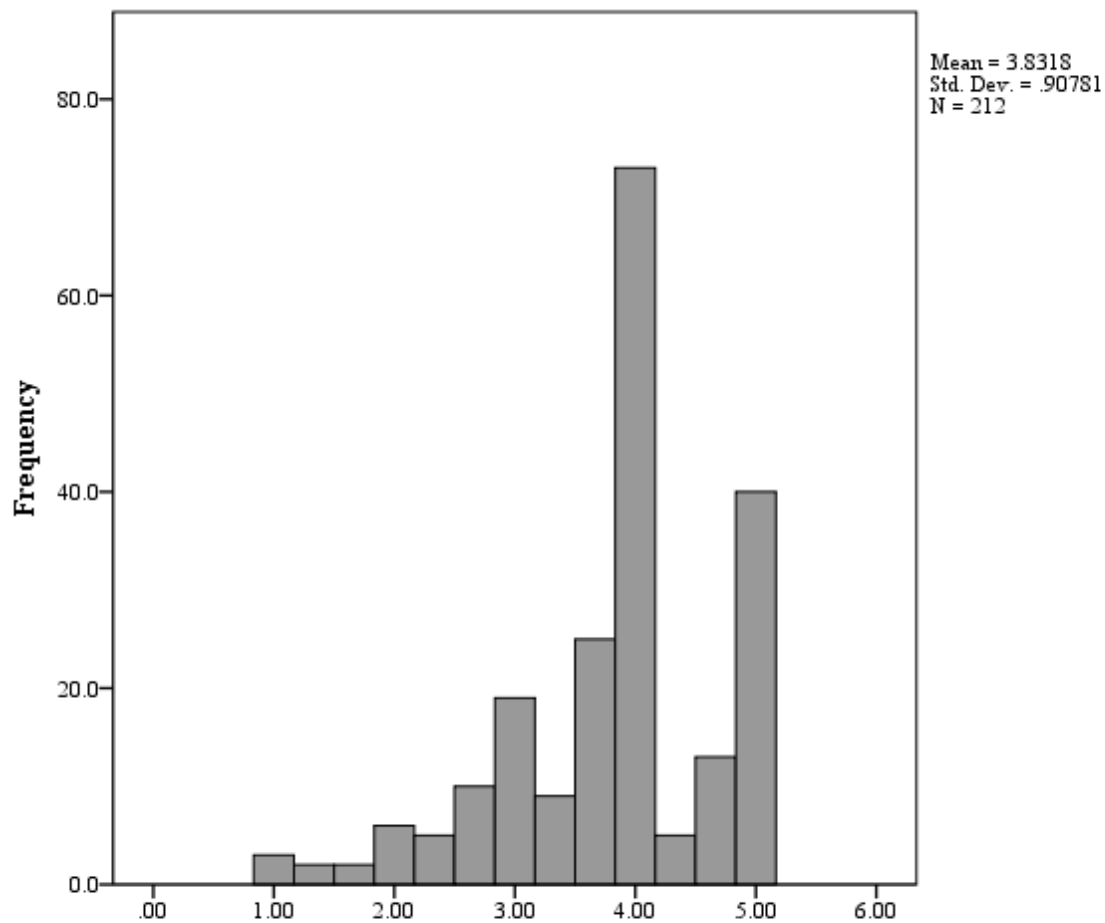


Figure 10. Histogram displaying technical support.

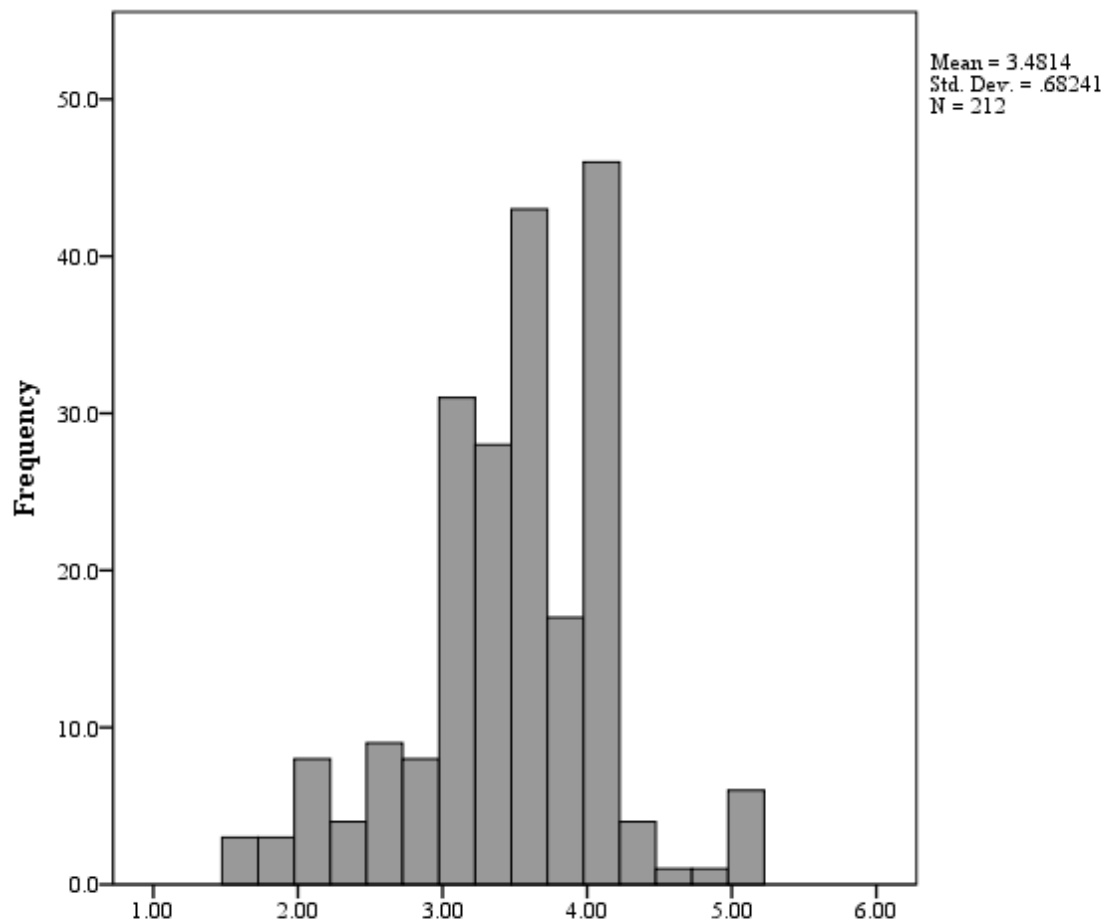


Figure 11. Histogram displaying training.

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