
Perceived Attributes Predict Course Management System Adopter Status

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Abstract

This quantitative, nonexperimental study utilized Rogers's diffusion of innovation theory as the theoretical base to determine instructors' perceptions of the attributes (relative advantage, compatibility, complexity, trialability, observability) of the course management system used in order to predict adopter status. The study used a convenience sample of 137 full-time faculty members at five Historically Black Colleges and Universities in two southeastern states. Logistic regression was used to predict group membership (i.e., adopter status) and to provide information about the relationship and strengths among the variables. The findings of this study provided evidence that faculty in the different adopter categories have different perceptions related to adoption and use of the CMS which can be used to predict adopter status. Identifying faculty attitudes can be used to properly design changes in related programs that will lead to a broader base of users.

Introduction

Through the integration of communication, assessment, and administrative tools, course management systems (CMS) such as Blackboard, e-College, and Moodle provide a powerful set of tools that "make it easy for faculty to use technology in instruction" (Morgan, 2003, p. 16). CMS are often adopted for the entire institution as a means of facilitating distance education programs and supporting traditional classroom offerings. Research has shown that the introduction of a CMS positively correlated with instructors' levels of adoption of online education (Elgort, 2005; Mitchell, Clayton, Gower, Barr, & Bright, 2005). The *2008 Campus Computing Survey* revealed that CMS continue to play a significant role in institutional infrastructures with the number of institutions establishing a "single product" standard for course management software steadily increasing since 2000 (Green, 2008). Although Blackboard continues to dominate the market, Moodle is gaining in popularity.

Diffusion of innovations theory explains that adoption of an innovation is not a single, baseless act, but a continuous process that can be examined, facilitated, and promoted. First published in 1962, Rogers's theory described the relationship between five perceived attributes of an innovation—compatibility, relative advantage, trialability, observability, and complexity—and the adoption and utilization of innovations in various organizations, fields, and socioeconomic classes. Rogers identified five categories of adoption that explained how people react to the acceptance of a new innovation: innovators, early adopters, early majority, late majority, and laggards. Using logistic regression analysis, this study used the perceptions of faculty toward their CMS to determine if Rogers's perceived attributes are predictors of adopter status.

Tornatzky and Klein (1982) proposed that relative advantage, compatibility, and ease of use were the most relevant attributes for adoption research. Rogers (2003) asserted that relative advantage and compatibility were the most important attributes for explaining and predicting adoption of an innovation. McQuiggan (2006) found that observability was a significant factor for nonadopters. Davis (1989) claimed that perceived usefulness and perceived ease of use were the primary characteristics influencing a person's attitude toward and potential adoption of technology.

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

- Innovators comprise approximately 2.5% of the population. They tend to be risk-takers who have a high degree of exposure to mass media. They are willing to invest the time and energy required to learn new technologies.
- Early Adopters encompass 13.5% of the population. They are respected opinion leaders and role models in their social system. They identify the benefits of potential innovations and are willing to try them out and provide advice and assistance to later adopters.
- Early Majority and Late Majority adopters comprise the apex of the adoption bell curve with each comprising 34% of the population. Early Majority adopters are often willing to adopt an innovation, but only once it has been vetted by other members, and they can be assured that adoption will be relatively hassle-free.
- Late Majority adopters are skeptical toward any change and often adopt an innovation under pressure or when the innovation has become commonplace.
- Laggards compose 16% of the population and are usually the last to adopt, if they ever adopt, an innovation. They prefer traditions and status quo and are critical of change.

Rogers indicated that the successful adoption of an innovation such as online education by an organization depends on the Early Adopter category achieving a critical mass, which generally occurs when 15-30% of the population adopts the innovation. According to Al-Ali (2007), higher education faculty tend to fall into the last three categories (Early Majority, Late Majority, and Laggards) when it comes to using technology because, despite the range of access on most campuses, the use of innovative technologies continues to be low.

Historically Black Colleges and Universities (HBCUs) were chosen for the target population. HBCUs are minority serving institutions that in spite of often lacking resources are better at supporting African American students than PWCUs (DeSousa & Kuh, 1996; Flowers, 2002; Flowers & Pascarella, 1999). However, despite student perceptions of the benefits of instructional technology, many HBCUs have remained reluctant to offer online courses and/or programs. Much of the research related to faculty perceptions of online learning and CMS has failed to include minority serving institutions, preferring to focus attention on traditionally White institutions. Little or no research analyzed how faculty at HBCUs use CMS in their teaching practices and how their attitudes toward the CMS can help or hinder adoption of online teaching at their institution.

Given societal changes related to online learning, the expectations of students and employers regarding the use of technology in learning, the use of CMS to facilitate adoption of online learning, the reluctance of HBCUs to offer online learning options, and the underuse of CMS by instructors, this study sought to identify a predictive relationship between the adopter status and faculty perceptions of the perceived attributes of the CMS influencing adoption of the CMS for the purpose of predicting membership in one of the five adopter categories. The findings could be utilized by administrators and faculty development personnel to develop appropriate interventions to facilitate adoption of the CMS and online learning.

Method

This nonexperimental, quantitative study employed a web-based, self-developed survey titled *CMS Diffusion of Innovations Survey* to collect data. Demographic information and open-ended questions allowing for participant comments and clarification were also included. SPSS was used as the statistical package. Logistic regression was used to predict group membership in each of the adopter categories and to provide information about the relationship and among the variables.

Participants

The target population included 1038 faculty employed full-time spring semester, 2010 at three public and two private Historically Black Colleges and Universities (HBCUs) in Georgia and North Carolina. The five institutions represented both public and private, 4-year liberal arts institutions. All five institutions utilize a course management system. Viable responses were received from 137 full-time faculty members (38.7% male and 61.3% female).

Respondents included those who taught fully online, a combination of online and face-to-face, and only face-to-face courses. Faculty members ranged in age from 20 to over 60 although most participants were over age 50 (63%). The majority of the respondents (53.6%) had been involved in education more than 15 years and 47.3% had been in higher education more than 15 years. Most (55.9%) considered their level of expertise as moderate, i.e., competent in a number of CMS tools for instruction. This finding corresponded with responses indicating most of the participants had been employed at their current institution (52.9%) and had been using a CMS (62.5%) less than six years.

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

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

Instrument

This nonexperimental, quantitative study employed a web-based, self-developed survey titled *CMS Diffusion of Innovations Survey* to collect data. A combination of three existing validated scales as well as data from the literature review was used. The three surveys included: McQuiggan’s (2006) *Perceived Attributes Instrument*; Davis’s (1989) *Technology Acceptance Model* (TAM); and Moore and Benbasat’s (1991) *Adoption of Information Technology Innovation* survey. Demographic information and open-ended questions allowing for participant comments and clarification were also included. Respondents were asked, using a 5-point Likert scale, to indicate their level of agreement (“Strongly Disagree” to “Strongly Agree”) with 46 statements relative to the five perceived attributes.

Cronbach’s alpha test was used to assess the internal reliability of the instrument. An alpha coefficient of .95 for the survey instrument demonstrated internal reliability for the measure. Relative advantage (.96), compatibility (.89), and complexity (.91) demonstrated strong internal reliability. An alpha coefficient of .74 was found for trialability, and .73 for observability

Adopter Categories

Inferential statistics analysis used participants’ response to Question #7 as a dichotomous dependent variable in a logistic regression analysis. The percentage of respondents for each category was used to calculate the distribution of adopters responding to the survey. The categorization of participants’ raw scores is presented in Table 2. The number of participants for each adopter category was Innovators = 23; Early Adopters = 77; Early Majority = 21; Late Majority = 8; and Laggards = 8. Categorization resulted in 16.8% of participants being categorized as Innovators, 56.2% as Early Adopters, 15.3% in the Early Majority group, and 5.8% in both the Late Majority and Laggard categories.

Table 2
Self-reported Adopter Categories

Adopter Category	Frequency	%
Innovator		
I am often one of the first persons to try new technologies such as the CMS. I tend to be a risk-taker and active-information seeker. I tend to latch on to new technology as soon as it is available to me. My interest tends to be more with the technology itself than with its application to specific problems. I am willing to invest time and energy to learn on my own and adapt quickly to new technologies.	23	16.8%
Early Adopter		
I explored the CMS for its potential to bring about improvements in my teaching. I am willing to try new things technologies and am not averse to occasional failure. I share my experiences with the CMS with my colleagues. My colleagues often ask for my advice/help regarding the CMS. I experiment with a new CMS feature to see if it might improve teaching and learning.	77	56.2%
Early Majority		
I adopted a “wait and see” attitude toward the CMS. I wanted examples of close-to-home successes before adopting the CMS. I wanted to see the value of the CMS before adopting it. I wanted to make sure that adoption would be easy and hassle-free. I wanted to make sure I would have the necessary technical support and advice to learn/use the CMS.	21	15.3%

Late Majority		
I was skeptical about using the CMS. I accepted the CMS later in the game once it had become established among the majority of the faculty. I accepted the CMS only when it became a necessity. I began using the CMS because of pressure from my peers and/or students. I tend to use CMS features that seem similar to the ways I have always taught.	8	5.8%
Laggard		
I am usually not interested in adopting new technology. I see no use for adopting the CMS in my teaching practices. My current teaching practices have worked well so far without using the CMS. Just because everyone else is using the CMS, doesn't mean that I need to.	8	5.8%

Logistic Regression Analysis

Logistic regression was used to predict group membership in each of the adopter categories and to provide information about the relationship and strengths among the variables. The researcher tested whether a positive perception of the perceived attributes could be used to predict Adopter Status. The five independent variables (relative advantage, compatibility, complexity, trialability, and observability) were used as predictors. Logistic regression coefficients are similar to linear regression coefficients in that those above zero reflect positive relationships, and those below zero signify negative relationships. The Wald test is a parametric statistical test used in logistic regression to test whether the parameters associated with a group of variables is zero. Hauk and Donner (1977) asserted that Wald is useful because it requires fitting the model under the hypothesis only once. Odds ratios ($Exp(B)$) are centered on 1. An $Exp(B) > 1$ indicates that higher scores on a predictor variable *increase* the odds that the outcome (i.e., adoption) will occur, whereas an $Exp(B) < 1$ means the predictor variable *decreases* the odds that the outcome will occur. If the odds ratio = 1.0, the predictor variable has no effect. Because odds ratios are defined in terms of the scale of the independent variables, they can only be compared across adopter groups, not within the groups.

In order to apply logistic regression analysis, the mean of each independent variable was calculated. Each mean is a subscale and was included in the logistic regression analysis as a predictor factor. Table 3 displays the number of items for each perceived characteristic that comprised the mean score for that characteristic and the descriptive statistic.

Table 3
Number of Items and Descriptive Statistics for Perceived Attributes

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

Results

Of the five perceived attributes, only complexity was found to be a significant predictor of adopter status for all five adopter levels. Compatibility was a significant predictor for Innovators, Late Majority, and Laggards, while compatibility with their level of technology expertise and experience was a significant individual predictor for Early Adopters and Early Majority adopters. Relative advantage and observability were predictors for Early Adopters and Laggards. Observability was also significant for Late Majority adopters. Trialability, specifically being aware of opportunities to try out various uses of the CMS, was a significant predictor for Late Majority adopters. Significant observability factors for both Early Adopters and Early Majority Adopters related to organizational support issues—being able to try out the CMS and being able to try it out long enough to see what it could do. Table 4 provides a summary of the scale means and individual factors that were found to be significant predictors for each category.

Table 4
Predictive Factors by Scale and Individual Factors

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

** $p < .01$

* $p < .05$

Discussion

This research revealed that faculty in different adopter categories have varying characteristics and needs related to adoption and use of the CMS. Of the five perceived attributes, only complexity was found to be a significant predictor of adopter status for all five categories.

Innovators

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

Relative Advantage. Contrary to Rogers's (2003) assertion that relative advantage is one of the two most significant attributes in the adopter-decision process, it was not a predictor for Innovators. Although Innovators are generally considered "techies" who are primarily interested in technology for technology's sake, this study found that the only relative advantage predictor for Innovators was the CMS's ability to "encourage student engagement with the course content." This finding indicates that Innovator instructors at these institutions are more concerned with the benefits for the students rather than the technological innovation itself. Comments by Innovators also reflected their interest in the CMS primarily for the benefit to students. "Blackboard is way behind the times, as far as we are concerned. Our students also find the technology very clunky." Another indicated, "I did not fully understand the benefits when I elected to utilize the technology; however, I like to try technologies that will make the transmission of information [sic] to students more effective."

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

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

Early Adopters

Predictive factors for Early Adopters were relative advantage, complexity, and observability. All six scales were found to be significantly associated with an increased likelihood of adoption of the CMS, having odds ratios greater than 1.0. This suggests that the odds of adoption of the CMS increases per respondents' positive perceptions of: relative advantages (1.74 times or 17%), compatibility (1.465 times or 15%), complexity (1.625 times or 17%), trialability (1.120 times or 11%), observability (1.686 times or 17%), and organizational support (1.202 times or 12%).

Relative Advantage. Generally, Early Adopters are technologically savvy, but their focus lies in the relative advantages of the CMS to solve professional and academic problems. Therefore, not only was relative advantage a significant predictor, but observability and specifically having the results of using the CMS apparent to them were also significant predictors. Although the mean for relative advantage was a significant predictor of Early Adopter status, none of the individual statements was a significant predictor of Early Adopter adoption of the CMS. Comments by Early Adopters supported the findings that Early Adopters felt "generally the benefits outweigh[ed] the hassles." However, they noted that inconsistency of support and the inability to "keep the system operational" were significant drawbacks to using the CMS at their institution. Early Adopters also commented that the limited features and "chunkiness" of the CMS design were deterrents to more effective use of the software. One respondent stated, "Our CMS system really only provides very limited features and does not provide the kinds of features which would be most helpful to my teaching. Many of the features provided which would be helpful have substantial flaws which prevent me from using them... As a result of these sorts of short-comings, I find that the benefit of our CMS is strictly an increase in student access to information but at the cost of more work on my part. I do not object to that trade-off, but I also do not believe it necessary." Since the majority of survey respondents self-designated as Early Adopters, their comments are relevant, especially since Early Adopters have the highest degree of opinion leadership among the adopter categories.

Compatibility. Although the mean for compatibility was not a significant predictor of Early Adopter status, that the CMS would be compatible with their level of technology expertise and experience was a significant predictor of Early Adopter status. Comments by Early Adopters, however, seem to indicate that compatibility with their teaching philosophy was more significant, which also had an odds ratio of 1.934. "Instructor's enthusiasm is difficult to mirror online. Some aspects of teaching online fit well with my philosophy - others - NO. The person to person contact in the face to face context can improve student motivation" and "Some students need more 1:1 interaction with faculty; some have not developed independent learning skills & need the traditional classroom structure." Early Adopters are willing to try new technologies and are not adverse to an occasional failure. Therefore, the CMS would seem to be compatible with the Early Adopter's level of technology expertise and experience because they are more technologically savvy in the first place.

Complexity. Although the mean for complexity was a significant predictor for Early Adopters, none of the

individual predictors was significant. Early Adopter comments regarding complexity tended to focus on individual features such as the grade book or the test functions. They acknowledged, "It takes a lot of upfront time to use the features such as weekly quizzes or set up of group projects," which relates to the relative advantage of using the software as well as the ease of use. One Early Adopter concluded, "I find Blackboard to work slowly and unreliably, so that it is often quite difficult and time-consuming to accomplish tasks that should be simple, like opening an already constructed lesson in an online course."

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

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

Early Majority

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

Compatibility. Although the mean for compatibility was not a significant predictor for Early Majority adopters, that the CMS "would be compatible with my level of technology expertise and experience" was a predictive factor. The finding indicates that making sure that Early Majority adopters have sufficient expertise and experience with the CMS might promote adoption. One respondent commented, "I have developed online courses and supplements to regular in-class courses as a matter of adapting to new societal realities rather than as a pedagogical value."

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

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

Trialability. Although the mean for trialability was not a significant predictor of adoption, being able to "use the CMS on a trial basis long enough to see what it could/can do" was a significant predictor for Early Majority adopters. The odds ratio (2.195) also indicates that this factor increases the likelihood of adoption by Early Majority. This finding supports Tabata and Johnsrud's (2008) study that "being able to gain first-hand information, assistance, and experience in distance education may help to foster positive attitudes that encourage

participation (p. 638). These adopters are deliberate in adopting an innovation, and their innovation decision usually takes more time than it takes Innovators and Early Adopters. Therefore, being permitted time to practice and experiment with the CMS is an important characteristic.

Late Majority

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

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

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

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

Laggards

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

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

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

Compatibility. Although the mean for compatibility was a significant predictor of Laggards, none of the

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

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

Recommendations for Action

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

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

1. **Provide systematic technical support for the maintenance of the CMS.** Frustrations with the operation of the system can impact faculty members' perceptions of the complexity of the system. Faculty comments reflected that generally the benefits of providing students with greater access to course content in managing course-related tasks outweighed the hassles. However, faculty reported that lack of institutional support for the CMS hindered adoption. Although the "hassle factor" was not a significant predictor of adopter status, comments frequently included issues with "multiple technical problems" which made faculty apprehensive about expending the energy to either learn to use or use the CMS. One faculty noted, "When it works the system is helpful, but it's [sic] unpredictability and lack of cohesion among its features can be extremely problematic." They admitted being frustrated with the system often being down and working extremely slowly. Several reported that institutional response and follow-up were lacking. One faculty member noted, "Things break and are often left, broken." Another faculty member summed up, "As a result of these sorts of short-comings [with the CMS], I find that the benefit of our CMS is strictly an increase in student access to information but at the cost of more work on my part."
2. **Diversify professional development activities to accommodate the different adopter characteristics.** With respect to training, faculty responses were across the board ranging from awful to adequate to glowing recommendations for the specific staff members. Frequency data indicated that the earlier adopters (Innovators, Early Adopters, and Early Majority) were more satisfied with the effectiveness of the professional development activities than the Late Majority and Laggards. One faculty member indicated, "Complexity not an issue—"with training" and another stated, "With some aspects the learning curve is too steep, especially if I have a heavy teaching load. Although, even then if I had someone who could show me, I could do more." These faculty comments reflect the importance of organizational support in defining adopter's perceptions of the complexity of the CMS.
3. **Provide training programs that incorporate support for learning how to operate the technology as well as pedagogical support for the integration of the technology in faculty teaching practices.** Several faculty members reported that the CMS did not conform to their style of teaching. Therefore, using the CMS caused frustration with teaching within a rigid format. Others indicated that the CMS was "old technology" and was inadequate for teaching critical thinking or technology-intensive courses. Another faculty member commented, "Technology use in education - just for its use is pointless. Technology as a tool to improve student access or make materials more interesting or engage students is appropriate IF there is a foundation of theory or previous practice...or research." Finally, one faculty member summed up a number of comments: "I still believe in classroom learning as the best method of delivery; I have

developed online courses and supplements to regular in-class courses as a matter of adapting to new societal realities rather than as a pedagogical value.”

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

Conclusion

The findings of the study indicate that adopter status can be predicted based on faculty members’ perceptions of the perceived attributes of the course management system. As Bates (2000) noted, faculty buy-in for technology adoption is essential for the successful implementation of any technology initiative. Many institutions have implemented course management systems as a means to facilitate the adoption of online education. By identifying faculty attitudes toward online education and the CMS, administrators and faculty development staff may be able to account for factors that influence or impede adoption and diffusion. Faculty comments reveal that administration must show a commitment to allocating resources and revising policies and procedures to reduce obstacles to faculty and student use of the CMS. In addition, a one-size-fits-all approach to faculty development may not be the best approach. The findings support that faculty in different adopter categories have different needs. Many faculty indicated that they still used the CMS in ways that reflected the methods with which they were most familiar even after several years of use. Faculty development initiatives should challenge the Innovators and Early Adopters to extend their use while supporting the Early and Late Majority adopters who need more hand-holding and personal interaction.

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