

**Upgrading LMSs:
Understanding Faculty Perceptions and
Use for Improved Implementation**

Abstract

Like most colleges and universities, Adventist schools are in a constantly changing academic environment and are under consistent pressure to implement the latest technologies, such as Learning Management Systems (LMSs). This research study seeks to provide a better understanding of faculty perceptions of their LMS by using a survey developed from the Technology Acceptance Model 3 with the addition of change fatigue. The results helped us determine what factors lead to successful use of LMSs by faculty. Responses from two hundred surveys from nine North American Adventist universities explored the factors that lead to intention and use. The study highlighted seven important factors in the implementation of an LMS. These factors included: Perceptions of LMSs, Experience, User Participation, Training, Peer Support, Voluntariness, and Change Fatigue. We expect that those administrating and directing Learning Management Systems that consider these factors will be more likely to experience successful implementation.

Introduction

The category of software programs known as Learning Management Systems (LMS) has arisen in response to the educational desire to organize and administer instruction with Internet-hosted learning materials (Chapman, 2005). An LMS is defined as “software that has been used in a learning content presentation which has a significant role and complexity in [an] e-learning environment” (Aydin & Tirkes, 2010, p. 176). An LMS, “provides a place for learning and teaching activities to occur within a seamless environment” (Unal & Unal, 2011, p. 19). This Web-based technology enables faculty to both provide learning materials and track participation and progress of students (Chapman, 2005; Falvo & Johnson, 2007). The LMS industry, like most technology-based industries, is in a continual state of transition as it has been for since it began (Beatty & Ulasewicz, 2006). As a result, universities must constantly review, update and upgrade

their software to provide faculty and students with online learning tools that are reliable, simple, powerful, and intuitive.

Faculty members determine, to a large degree, the rate of adoption they pursue. When describing those resistant to adoption, Talke and Heidenreich (2014) suggest that they can have a predisposition to resist change rather than naturally accepting it. This challenging response is even more likely when faculty have seen many changes in their careers—some have been helpful, but often the changes are short-lived and seen largely as a waste of time. The faculty can experience change fatigue—“a sense of malaise, frustration, and cynicism that any change effort was destined to fail” (Ace & Parker, 2010, p. 21). Understandably, administrators and those tasked with directing LMSs are deeply interested in making decisions that will lead to a quick and low-hassle adoption technology within their educational systems.

Adventist higher education is no exception. We expect that the faculty in these institutions hold perspectives towards technology changes, some positive and other negative. We also expect that many within these institutions seek to better understand their faculty’s perceptions.

Fortunately, the TAM 3 (Technology Acceptance Model 3) can help us better understand what faculty intend to do (Behavioral Intention) and their resulting implementation (Use Behavior) (Venkatesh & Bala, 2008). The TAM 3 model also focuses on the determinants that influence how faculty perceive the usefulness of the technology (Perceived Usefulness) and how easy the innovation is to use (Perceived Ease of Use).

Using the TAM 3 as a theoretical framework, this study seeks to better understand the factors that influence the use behavior of LMSs by faculty members among nine Adventist

institutions of higher learning in North America. In addition, this study evaluates how change fatigue impacts the adoption process.

Relevant Literature

Much study has been undertaken regarding innovation and specifically how technological innovation impacts organizations. Everett Rogers (2003) is perhaps the grandfather of innovation, through his book *Diffusion of Innovation*, now in its fifth edition. Rogers identified five groups of people whose behaviors enable innovations to move from being considered risky to being well accepted: innovators, early adopters, early majority, late majority, and laggards. Understanding and using Rogers' principles can assist administrators in understanding their faculty and helping them to move toward adoption.

Moreover, barriers also exist to hamper the adoption of new technologies, particularly in higher education. Introducing adaptive learning technologies, such as LMSs, comes with the expectation that more students will be educated at a lower cost with at least similar, but hopefully better educational outcomes (Bacow, Bowen, Guthrie, Long, & Lack, 2012). In evaluating the structures in educational institutions, it is important to notice that some structures may be both barriers to and drivers for change. As such, careful analysis is required to know how to manage structures (Svanström, et al., 2012).

Carter (2008) looked at the model Kurt Lewin originated, in which the organization needs first to unfreeze its members by convincing them of the need for change. After the change, refreezing is necessary to ensure that the organization's new course is reinforced by its procedures and practices.

Carter also indicated that an important part of successful change is the skills transfer to those affected by the change. The development of skills ensures that acceptance of the change

comes more easily. Carter also created a seven-step model: “set up for success, create urgency, shape the future, implement, support the shift, sustain momentum, and stabilize the environment” (Carter, 2008, p. 23).

Organizational learning is critical for success in higher education organizational change. The kinds of change involved with the change of an operating system is a transformational kind of change, requiring that the innovation be brought into the institution’s boundaries and aligned with its culture in order to be successful (Boyce, 2003). Tools such as inquiry, dialogue, and action learning can be helpful in creating a culture of learning within an organization that will facilitate change.

Understanding barriers to change is important because the fear, panic and skepticism they may create can lead to resistance, disengagement, and burnout (Auster & Ruebottom, 2013). Many barriers are related to the response of faculty to the technology. Some faculty appreciate the relationships they have with students and feel that technologies will disrupt that relationship, creating distance between them and their students (Bacow, et al., 2012; Francis & Shannon, 2013). Another concern is that the technology will reduce their job security, as the online systems are perceived to replace faculty jobs (Bacow, et al., 2012; Francis & Shannon, 2013; Shannon, Francis, & Torpey, 2012).

An integrative model of the factors limiting the adoption of innovation (Schiavone & MacVaugh, 2009) looked at several factors that influence when new technology will not replace older technology. As far as technology is concerned, certain conditions seem to predict when new technologies will fail to replace their older counterpart: When users perceive the utility of the innovation to be less than the older technology; when the innovation is so complex that it causes users to focus more on the overall effectiveness rather than on the newest features; and

when using older technologies with other items leads to higher total utility than when using newer technologies. Specifically, in the domain of learning, when the capacity to learn is limited or the access to education is limited, when what the users learned to use the older product doesn't help them with the innovation, and when the switching costs are high, then newer technology run are at high risk of not replacing the older technology.

In the realm of higher education, technological change is influenced by professors' perceptions of risk. The greater the feeling of risk that a new technology will bring, the greater can be the reluctance of teachers to embrace the new technology. Howard (2011) discovered that the willingness of teachers to accept risk is linked to teachers' affect for technology and the value of the technology in teaching. The appreciation and openness of teachers, and the positive feelings that they have toward technology, combined with the positive impact the technology can have on the educational experience appears to increase the willingness of teachers to innovate with technology.

Methodology

This research study was an empirical, non-experimental, descriptive and confirmatory quantitative study, using survey methods that were built on the TAM3 within the context of a sample of North American Adventist university faculty. This design allowed one-time data collection, and enabled several comparisons of relevant variables across different universities, different learning managements, genders, age groups, etc. Path analysis was conducted in instances where there was a possible mediated influence of one or more variables.

The subjects for the study were faculty members from nine Adventist institutions of higher learning, including Andrews University, Burman University, La Sierra University, Loma

Linda University, Pacific Union College, Southern Adventist University, Southwestern Adventist University, Union College, and Washington Adventist University. The population of the study was limited to full-time salaried faculty members who use LMSs.

Since the calculated number of faculty members at the nine institutions was 2000. The target sample size was set at 10% of the total full-time faculty members at the nine institutions, 200. This number of participants yielded a margin of error of approximately 6.56%. With 203 completed surveys, and three dropped because of abnormalities, the final N was 200 respondents.

Results

The results are reported in the following factors: Perceptions of LMSs, Experience, User Participation, Training, Peer Support, Voluntariness, and Change Fatigue.

Perceptions of Learning Management Systems

The four LMSs in use at the studied universities were *Blackboard*, *Canvas*, *Desire2Learn* (now branded as *BrightSpace*), and *Moodle*. Post hoc comparisons using the Bonferroni method with an alpha of .05 found that for faculty Use Behavior, *Canvas* ($M = 5.07$) was used significantly more than *Moodle* ($M = 3.98$), *D2L* ($M = 3.63$) and *Blackboard* ($M = 3.31$). For Perceived Usefulness, *Canvas* ($M = 6.26$) was found to be significantly more useful than *Moodle* ($M = 5.14$), *Blackboard* ($M = 4.63$), and *D2L* ($M = 4.50$). For Perceived Ease of Use, *Canvas* ($M = 5.70$) was found to be significantly easier to use than *Blackboard* ($M = 4.33$), *Moodle* ($M = 4.27$), and *D2L* ($M = 3.96$).

The LMS *Canvas* achieves significantly higher ratings than all other LMSs on the three central variables with significant differences (Use Behavior, Perceived Usefulness, Perceived Ease of Use). It is likely, however, that other factors, including Voluntariness, balance the values for Behavioral Intention. Behavioral Intention is not considered here because intent to use an

LMS is more likely associated with administrative decision-making than with the faculty comparison of relative merit of a particular system. In fact, most faculty members would not be aware of the relative merits of the LMS used at their university as compared with others. The features of a specific LMS are more directly tied to faculty Perceived Usefulness and Perceived Ease of Use rather than a direct comparison to another system.

Additionally, while Use Behavior was demonstrated to be higher among *Canvas* users, there are likely to be additional factors involved in use, such as the requirement or campus culture towards the use of LMSs on the campuses where *Canvas* was used. We made no attempt to compare these variables in this study.

Experience

Not surprisingly, the data also reveal that faculty members with more experience (greater number of years teaching) were found to have lower scores in factors for successful LMS adoption. The following factors were each found to be statistically significant. Those faculty members with more experience: Use the LMS less ($r=-.245, p<.001$), have lower intention to use it ($r=-.176, p=.006$), perceive the LMS as less useful ($r=-.194, p=.003$), perceive the LMS as more complex ($r=-.098, p=.083$ – marginally significant), perceive the LMS as less relevant to their job ($r=-.189, p=.004$), show lower computer playfulness ($r=-.154, p=.015$), have lower computer self-efficacy ($r=-.154, p=.015$), and demonstrate higher computer anxiety ($r=.168, p=.009$).

Discussion and Application

User Participation

User participation is primarily associated with the five predictors of Perceived Usefulness and Perceived Ease of Use. Faculty members, in cooperation with administrators who are

involved in the process, will make efforts to maximize the benefit of these five predictor variables. Because of their efforts they will be keenly aware of why one system is chosen over another and why additional features are selected. This can then be communicated with enthusiasm to other faculty members. This communication will have far greater impact than a command decision and announcement from administration that “This is the system we have selected. Use it!”

Training

Training is a key intervention with any new innovation, and especially with technology-rich innovations. Training makes and reinforces connections between the technology and the duties of the faculty member, thus increasing Job Relevance. Training should occur several times, and as needed, to ensure that faculty with different levels of computer ability have enough opportunities to develop competence. Training clearly improves Output Quality and Result Demonstrability, as faculty members learn the features of the LMS. This enables faculty to get the most out of the LMS and trainers have the opportunity to make clear the benefits of the system so that faculty are able to explain them to others. In short, training is tied to enjoyment and perceived ease of use.

Peer Support

In addition to formal training, peer support interventions have shown to influence: Job Relevance, Output Quality, Result Demonstrability, and Perceptions of External Control. Others who have used and are familiar with LMSs can quickly share the qualities that make it relevant to the job, share tips for increasing the quality, and communicate the elements of the results that they have experienced, showing other faculty how to achieve similar results. Perceptions of External Control are enhanced as they feel in control of their LMS use through the support of

their peers. Thus, peer support also encourages both Perceived Usefulness and Perceived Ease of Use.

Voluntariness

Another factor over which administration has direct control is Voluntariness. However, as dichotomous as the concept of “mandating usage” may be, as a variable it is surprisingly continuous. In fact, the actual distribution rates in the “excellent” range for skewness and kurtosis as normally distributed. This suggests that while administration at a particular university may mandate use of an LMS, faculty do not seem to view this as black and white. The variability of reaction is typically due to whether adherence or not has consequences.

For instance, one faculty member may say, “I have excellent resources that accomplish the same purpose as the LMS and would prefer to use them.” If administration’s response is “That seems fine,” this encourages the perception that the requirement is not so absolute. On the other extreme, if administration docked pay for those who did not use the LMS, it is likely that everyone would use the LMS or change employment. However, history has demonstrated that an arbitrary, unpopular, decision may cause reactance (Brehm, 1966), that is, participants actually rebelling against use of the system.

An answer may seem to lie in an administrative decision that is supported by the faculty. For instance, if administration did an excellent job of selecting the best system, involving faculty in the process, demonstrating clear management support of the decision, organizing the LMS so that benefits were experienced by faculty, allowing faculty to have the best support, ensuring powerful organizational support, and creating structure for faculty to support one another, it is likely that an informed requirement might produce the best results.

Change Fatigue

While administration cannot directly influence Change Fatigue, decisions can be made that provide an environment that helps faculty deal with its effects. The goal is to facilitate faculty willingness to use an LMS despite the potential for frustration and cynicism that many changes can bring. However, the support from the leadership, organization, and peers all reduce frustration that may have been felt in the past with technology. Implementing effective training and clear alignment of incentives support will help encourage faculty.

Additionally, one must appreciate that change fatigue has typically developed over a number of years and reduction of change fatigue may be a long and gradual process. However, with consistent adherence by faculty and staff to wise selection choices, administrative and IT support, involvement of faculty in selection and modification of the LMS, and other recommended interventions, the incidence and severity of Change Fatigue can be reduced over time.

Application and Commentary

Faculty will use systems that are easy to use and that are relevant to their teaching practice. Some of the ease of use elements are predetermined by the selection of Learning Management System, as the study demonstrates significant differences in relevant factors among the various systems. Canvas is clearly the system that affords the greatest contributions toward faculty adoption and usage. For those unable or unwilling to change systems, other factors can be combined to increase the likelihood of adoption and use: effective training, mentorship from peer users, involvement of faculty in the system design and implementation processes, and careful attention to the amount and weight of change faced by faculty over time.

In this study, the faculty members from nine different Seventh-day Adventist universities were surveyed and the study highlighted eight important factors in the implementation of an

LMS. These factors included: system relevance, output quality, result demonstrability, perceptions of external control, perceived enjoyment, voluntariness, and change fatigue. Faculty that perceive the system to be meaningful and useful in their daily work, and enjoyable to use will use it. Administrative decisions that make usage required, and administrative support that facilitates adoption while easing change fatigue will lead to the greatest success.

Conclusion

Learning Management Systems have become a critical element in higher education and Adventist institutions are no exception. Understanding faculty perceptions can be particularly helpful when an organization is selecting a new LMS, changing to a different LMS, or upgrading an LMS to a significantly different feature set. Understanding interventions that increase the usage behavior of faculty members is a benefit for universities, their decision-makers and ultimately the students.

We believe that administrators, support staff, faculty and other stakeholders who implement the suggestions herein will find an improved understanding of faculty within Seventh-day Adventist higher education and will find ways of improving the implementation process when that time comes to improve, upgrade and/or change the campus LMS.

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