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Implementing SMART Boards in the Classroom: Creating Faculty Buy-in Through Change Management

CAPSTONE REPORT

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Abstract

This annotated bibliography addresses implementation of Smartboards in the classroom, how the Smartboard affects faculty pedagogy and how change management can ease the implementation of this educational technology in a higher education institution. The sources selected for this study contains information on understanding faculty resistance to or reluctance use new technology in the classroom and introduces Roger's Diffusion Theory and Technology Acceptance Model (TAM) frameworks that can be used in the change management process when implementing these technologies.

Keywords: SMART Board, implementation, change management, educational technology, faculty resistance

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Introduction

Problem

Educational technology has been a foundation to classroom pedagogy (Jugovich & Reeves, 2006). Classroom technology has evolved from oral and written communications from early B.C. to media tools such as radio and videos in the early 1920s and to the current state of technology, which includes the use of interactive whiteboards, collaboration displays and computers (Bates, 2015). According to the U.S. Department of Energy Information Administration, educational institutions have seen a steady increase in computer ownership, from 89% in 2003 to 95% in 2012 (Mayclin, 2016).

The decision to integrate technology into the classroom typically made by Information Technology departments, or at the request of a faculty member who has seen a compelling sales pitch for a device (Hollands & Escueta, 2017). Failing to consult faculty regarding new technology and its implementation typically leads to resistance and reluctance in using the new technology (Howard, 2013). However, for the faculty member who is technologically confident, new technology implementation is viewed favorably (Lewis, 2016). For the faculty members who are technology novices or who believes that the technology is not worth the time or effort to learn, and the new technology becomes a perceived hindrance to their instruction (Barnett, 2003).

One major reason that classroom technology implementations fail is from lack of communication to the faculty and understanding by them of how to use the technology in the classroom (Howard, 2013). According to Lewis (2006), the end-user is often not involved in the decision-making process when new technology implementation is contemplated. Implementing

technology without involving the end-user, leads to underuse of the technology, or refusal to use it at all (John, 2015; Reid, 2012).

Higher education faculty face different challenges than K-12 teachers in learning and using classroom technology (Bates, 2015). Higher education faculty typically have multiple classrooms assigned to them throughout the year, compared to K-12 teachers, who are typically assigned a single classroom; higher education faculty can therefore experience anxiety when the technology setup for each classroom on campus might be significantly different from other classrooms (Bates, 2015). Faculty also develop negative impressions of classroom technology when the equipment is unreliable or technical support is insufficient (Bates, 2015). These factors contribute to faculty resistance to classroom technology that should be considered an enhancement the instructors learning environment and leads to underuse of the technology or even refusal to use the technology in extreme cases (John, 2015; Reid, 2012).

Like many higher education institutions who are seeking to enhance the learning of their students through the introduction of classroom technology, Oregon Institute of Technology (OIT) is experiencing resistance by the faculty and reluctance to use new technology. OIT is the only polytechnic school in the northwest region of the United States; however, OIT has not upgraded educational technology in the classrooms since 1998. Due to this delay in upgrading the classroom technology, OIT faculty are not using current technology to enhance their pedagogy. OIT's customers and key stakeholders, the students, are suffering from the lack of technology in the classroom. Because OIT is lacking in classroom technologies, students may choose to go to another institution that has current technology, which can affect OIT's enrollment numbers and revenue.

In 2015, OIT's Commission on Classroom Technology (CCT) conducted a survey of current faculty members to understand the technology tools needed in the classroom to help with their faculty's pedagogy. The results from the CCT faculty survey show that less than 20% of the faculty were happy with the classroom technology, which prompted the Information Technology Services (ITS) department to work with members of CCT to invest in and implement new technology in various classrooms on campus (Oregon Institute of Technology - Commission on College Technology, 2015). Unfortunately, the type of classroom technology the faculty wanted was not identified in the survey, which led to the ITS department purchasing classroom technology without communicating with the faculty. As a result, some faculty struggled with the implementation and the use of the classroom technology.

Recently, OIT's ITS department chose one classroom to be set up as a showcase of classroom technology; this room includes two SMART boards, four displays for student collaboration work, and collaborative furniture. One component that concerned some faculty members was the Light Emitting Diode (LED) Digital SMART Board interactive displays. A SMART Board, or smartboard, serves as a continuous whiteboard for an instructor, an additional display for the computer, or a collaborative tool in the classroom (Min& Seigel, 2011). Various OIT faculty have trouble understanding how to use the smartboards and integrate them into their classroom practices. The use of smartboards in other higher education institutions has also proved challenging (Groff & Mouza, 2008). Al-Faki and Khamis (2014) suggest that faculty struggle with using a smartboard effectively to support their personal pedagogy and therefore have difficulty embracing the technology.

ITS did not anticipate any resistance or reluctance during the implementation of the SMART Boards because training on the use of SMART Board technology is provided on a

regular basis, however, some OIT faculty members continue to struggle with the new technology. After meeting with the CCT to hear faculty members' concerns, ITS determined that the process of implementing the SMART Board technology into the classroom was the main area of faculty reluctance in using the new technology. Some faculty responded that ITS implemented classroom technology without communicating with the faculty which created a negative impression of the SMART Boards. A lack of clear communication to the main stakeholder in the process led to faculty resistance to the training provided by the Educational Technologist. The ITS department has learned from this mistake and is researching more effective ways to encourage adoption of SMART Board technology in the classroom.

Purpose of the Study

The implementation of SMART Boards into the classrooms is meant to improve instruction, especially in a world that is filled with technology that millennials use daily (Min, 2011). Jelyani, Janfaza, and Soori (2014) note that for faculty, keeping the student engaged helps the student retain information learned. In addition to engaging students, the SMART Board can be a time saver by allowing the faculty member to retrieve information from the internet using the SMART Board's AM30 device, which can connect to a wireless network, or by using the onboard USB port to download SMART Notebook files (Jelyani, Janfaza, & Sorri, 2014).

However, successfully implementing SMART Boards in the classroom requires more than just mounting the board to a wall; a successful implementation also requires communication, training and faculty buy-in (Bates, 2000). The purpose of this research is to identify and synthesize scholarly literature that describes best practices for managing change for successful implementation of interactive whiteboard technology for faculty of higher education institutions.

Research Question

Main question. What are best practices for implementing educational technology change in higher education classrooms?

Sub-question. What best practices can assist faculty in adopting the SMART Board interactive whiteboard in higher education classrooms?

Audience

Higher education institutions are expanding their implementation of technology solutions, like SMART Boards, into the classroom (Al-Qirim, 2011). In some cases, faculty members may be resistant to changes coming into their classrooms (Khalil, 2013). This study will be helpful to educational technologists in higher education Information Technology departments who wish for successful implementation of technology in higher education classrooms.

The Chief Information Officer (CIO) of a higher education institution is the final decision-maker for purchasing educational technology. The CIO and other IT leaders will benefit from this study by learning about the process for selecting classroom technology and how an ITS department can successfully communicate with the faculty and other stakeholders about the implementation of the classroom technology (Hollands & Escueta, 2017). This study will also provide faculty members with an understanding of how classroom technology, such as the SMART Boards, can enhance their instruction.

Search Report

Search strategy. Initially, I used Google Scholar to find applicable and valid articles based on the topic of the study. If the article was relevant, I input the article title into the University of Oregon (UO) Library's Educational Resources Information Center (ERIC) or ProQuest Education Journal databases to ensure that the article was peer-reviewed. If the article

was peer-reviewed and accessible online, I downloaded the article for future reference. I

dismissed all non-peer-reviewed articles.

I also used the keyword search features of UO Library's ERIC and ProQuest Education

Journal databases keyword search features to find peer-reviewed article or books; however, I had

to fine-tune the keywords to reduce the number of articles that not related to the topic of this

study.

Keywords. I used the following keywords to search the UO Library's databases for

relevant and viable information related to this paper. The searches I conducted did not include

Boolean searches.

- Faculty technology buy-in.

- Change management classroom technology.

- Higher education change management.

- Managing change higher education.

- Faculty interactive whiteboards.

- Faculty resistance technology.

- Classroom technology.

- Technology training.

- SMART Board integration.

- SMARTboard integration.

- Student engagement.

- IWB integration.

- ICT.

- Information and Communication Technologies.

- Technology implementation failures higher education.

- SMART Board implementation failure higher education.

- IT/IS technology integration failure.

- Student Learning Engagement with SMART Boards.

Search engines and databases. The search engines and databases I used for this study include Google Scholar and the UO Library's ERIC and ProQuest Education Journal databases. Google Scholar did not return the type of results that were useful to this study. The ERIC and ProQuest Education Journal databases have an educational focus and the results could be set to return peer-reviewed articles with relevant information. The ERIC and ProQuest Education Journal databases were the most successful search engines used for this study.

Documentation Method

Documentation approach. To document references for the study, I kept track of all references using Citation Machine and Microsoft Word. I used Microsoft Excel to keep track of the different categories that pertain to this study.

Citation Machine is an online service that helps keep track of references used for writing papers. The software has an option to save the reference in APA format while giving a field to enter the abstract for the annotated bibliography. References saved at Citation Machine were downloaded as a Microsoft Word document for easy editing; in addition, the references are listed in alphabetical order.

Instead of having to access Citation Machine through the internet, I used Microsoft Word's *managed sources* (found under the references tab) to keep track of additional articles I found, during the process of writing this paper.

I used two sheets within a Microsoft Excel Workbook to categorize the results of the references used in the study. The sheets identify the following categories:

- Faculty Resistance to Classroom Technology.

- Managing Change for New Technology Implementation.

Reference Evaluation

Reference evaluation criteria. This study used educational journals and articles selected based upon criteria established by the Center for Public Issues Education (n.d.). The five areas of consideration include authority, lack of bias, quality, timeliness, and relevancy.

- When reviewing articles regarding classroom technology implementation for *authority*, I considered the roles of reference source authors within their organizations when available, to determine their expertise on the categories of this study. I also considered if other articles, written by the author, were similar in nature to the topic of this study. I used the peer-review option in the UO Library's database to identify valid articles.

- I prevented *biases* regarding classroom technology by finding articles that produced facts and data that supported statements made by the author. I avoided articles written by vendors or others with an obvious bias.

- While selecting sources, I carefully considered the *quality* of the articles and books. Typographical errors and poor grammar were bases for exclusion for this study. The articles and books also had to have clear indications that the information contained within pertained to the study.

- Articles published from 2007 until the present were considered *timely*, in recognition of the pace at which technology is changing. To provide background on the history of

classroom technology implementation, some foundational materials selected were from years as early as 1999.

- I selected only peer-reviewed articles and books for this research, as well as Educational Technology conference proceedings, and avoided non-scholarly sources. The articles, books and conference proceedings selected met the requirements for *relevancy* if they pertained to the topic of implementing technology into the classroom and how to use change management to reduce the anxiety of the affected faculty

Annotated Bibliography

Introduction to annotated bibliography

For this study, 15 references were selected for the annotated bibliography and placed into one of two categories (a) Faculty resistance to classroom technology and (b) Managing change for new technology implementation. Each source includes the bibliographic citation, an abstract and a summary written by this author that identifies areas that are relevant to the scope of this study.

Faculty resistance to classroom technology

Al-Faki, I. M., & Khamis, A. H. (2014). Difficulties facing teachers in using interactive

whiteboards in their classes. *American International Journal of Social Science, 3*(2), 146-

158. Retrieved October 30, 2017, from

http://www.aijssnet.com/journals/Vol_3_No_2_March_2014/16.pdf

Abstract: This study investigates the difficulties that teachers experience when they use the interactive whiteboard in English language classes. Although, the interactive whiteboard is easy to use, difficulties occur when teachers use it. While ICT presents new challenges for teachers, it also offers great opportunities for teacher education. ICT's media can improve training through providing access to educational resources, breaking the traditional isolation of teachers, and enabling individualized training opportunities. There are a few research studies, which investigate the drawbacks of IWB. This study focuses on the difficulties, which teachers face in the classrooms in the Saudi contexts. Those difficulties are categorized into four groups. These are teachers', school administrations', technical support's and students' factors. Each factor entails several challenges. The findings of the study have revealed that there are many challenges

that teachers face when using the interactive whiteboard. Those challenges interact together to hinder IWB integration into teaching and learning.

Summary: Al-Faki and Khamis try to understand the challenges faculty face when using an interactive whiteboard as well as the need for both pedagogical and technical support when using these tools. The researchers posed questions regarding teacher skills, training, and classroom support to glean information on the issues the faculty were having with the interactive whiteboards. The study has various graphics tables that identify areas of concern that faculty have with the interactive whiteboards, with the findings separated out into categories. The study identifies four areas of challenges: teacher, school administration, technical support and student factors. Understanding these factors can aid in successfully implementing classroom technology.

The teacher factor notes that many teachers struggle using the SMART Board because they did not receive training before the implementations. Some teachers faced frustration because they did not possess simple troubleshooting tools for the SMART Board. The challenges facing school administration come from having inadequate support for the faculty, including, lack of training materials and no clear vision of how to use the SMART Board in the classroom. In addition, some school administrations do not provide pedagogical support for the interactive whiteboard. Technology support is essential when implementing new classroom technology, but most institutions have small information technology departments that do not allow for immediate help or training on classroom technology. Students do not benefit from the implementation of the SMART Boards due to the other factors included in this study. While the paper focuses on Saudi Arabian schools, the problems associated with classroom technology integration are common in other countries such as the United States.

This article is relevant to this research study because it addresses challenges faced by faculty when using an interactive whiteboard. In addition, the paper discusses the need for pedagogical and technical support for the faculty who were asked to use these tools.

Al-Qirim, N. (2011). Determinants of interactive whiteboard success in teaching in higher education institutions. *Computers & Education, 56*(3), 827-838. doi:10.1016/j.compedu.2010.10.024

Abstract: This research evaluates the effectiveness of the Interactive White Board Technology (IWBT) in teaching in the Faculty of Information Technology (FIT) in UAE University. IWBT includes integrated hardware and software components to facilitate teaching process and hence, provides rich and interactive experience for both teachers and students. However, the IWBT is recent and issues emanating from its use in teaching and learning are scant and inconclusive. The research developed a theoretical framework to guide the research endeavor. Accordingly, the research attempted to unveil factors influencing IWBT introduction and use in different departments within FIT. The research findings reported different hurdles facing the integral use of IWBT in teaching in FIT. The research also suggested that the IWBT could be useful in teaching technical courses in FIT. This is contingent upon addressing certain factors highlighted in this research. This research introduces different recommendations to further IWBT use in FIT. The research highlights different theoretical and professional contributions and contentions and raises the need for more research in the IWBT field.

Summary: The author asserts that skepticism related to technology comes in all forms when working in a higher education institution. The author notes that many faculty members have created a working system that does not include classroom technology. However, the results of the author's study suggest that faculty members may not understand how classroom

technology such as an Interactive Whiteboards may improve their pedagogies. The author asserts

that through mentorship and training it is possible to show faculty how to use the technology to

their advantage. The author presents theoretical frameworks to identify reluctance to use

classroom technology and Rogers' Diffusion of Innovation Theory to identify five areas that

influence adoption of innovation:

- Relative advantage – innovation is considered better than the previous version.

- Compatibility – is the innovation consistent with the needs of potential adopters.

- Complexity - how the ease of use of the innovation is perceived.

- Trialability – the ability to experiment with the innovation before implementation.

- Observability – the degree that others can observe the innovation.

This article is relevant to this research study and introduces Rogers' Diffusion of

Innovation Theory (Rogers, 2003), which proposes influencing a new idea using invention, early

adopters, communication, and an organizations social system, especially in higher education

institutions that are expanding the implementation of SMART Board and other technologies.

Understanding these influencers will help Information and Educational Technologist become

better decision-makers when introducing new technology in the classroom.

Groff, J., and Mouza, C. (2008) A framework for addressing challenges to classroom technology

use. *Association for the Advancement of Computing in Education (AACE)*, *15*(1), 21–46.

https://www.learntechlib.org/p/24421/

Abstract: Creating effective learning environments with technology remains a challenge

for teachers. Despite the tremendous push for educators to integrate technology into their

classrooms, many have yet to do so and struggle to find consistent success with technology-

based instruction. The challenges to effective technology integration have been well-documented

in the literature. In this article, we present a comprehensive review of the literature on the

challenges associated with effective technology integration in the classroom and the ways in which they interact with one another. Based on this review we have developed a framework, the Individualized Inventory for Integrating Instructional Innovations (i5), to help teachers predict the likelihood of success of technology-based projects in the classroom and identify potential barriers that can hinder their technology integration efforts. Identifying potential barriers upfront can empower teachers to seek solutions early in the process, thereby increasing the likelihood of experiencing success with technology integration.

Summary: The authors note that problems that cause faculty members to be reluctant to use technology in their teaching is not just with the faculty members or Information Technology departments, but instead is a mix of various components such as; the school, the students, and the classroom technology projects. The authors address the fact while there has been an increase in technology implemented in the classroom, and use of the technology sees little or no use. The authors identify six different categories of classroom technology implementation challenges: research and policy, the school, the teacher, the project, the students, and the technology.

Research and policy challenges encompass lack of quality research pertaining to the successful implementation of classroom technology, unclear goals for technology projects, and technology that does not meet the needs of the classroom instruction. Challenges for the school focus on the organization's culture, lack of human and infrastructure support and inadequate technology resources. Challenges related to technology deficiencies of the teacher include limited access to school resources, or the teachers' own attitudes and beliefs regarding technology. Classroom technology implementation projects can be challenging if the implementation team does not understand the school's culture and current practices. Student challenges are similar to teacher challenges because students must be comfortable with how an

instructor uses the technology in the classroom. Finally, the technology challenges include technology reliability, ease of use, and technology support.

This article is useful for this study because the authors provide a framework that can help to predict how faculty will use technology if the Information Technology department and other stakeholder meet the challenges presented.

Howard, S. K. (2013). Risk-aversion: Understanding teachers' resistance to technology integration. *Technology, Pedagogy, and Education, 22*(3), 357-372. doi:10.1080/1475939x.2013.802995

Abstract: Teachers who do not integrate technology are often labelled as "resistant" to change. Yet, considerable uncertainties remain about appropriate uses and actual value of technology in teaching and learning, which can make integration and change seem risky. The purpose of this article is to explore the nature of teachers' analytical and affective risk perceptions, and how these influence decisions to integrate technology in their teaching practice. These ideas are explored through an in-depth qualitative analysis of teacher interviews focusing on experiences with, and beliefs about, technology and teaching. Results suggest decisions to integrate technology into teaching are influenced by negative affective responses to technology, general risk-aversion in teaching, and the perceived value of technology in teaching. The risk analysis framework and findings presented in this paper can be used to support communication with teachers to minimize perceived risks and, where appropriate, help support future technology use.

Summary: Howard uses the concept of risk-aversion to explain why faculty members are resistant to classroom technology integration. Issues with classroom integration appear to be a universal problem, regardless of whether the technology implemented is in a K-12 classroom or

a higher education institution. Change in the classroom will cause some faculty members to lose their sense of comfort, and some will blame the technology. However, teachers and faculty members who have confidence in their computer skills are more likely to take on the challenge of new technology. Howard suggests that one reason faculty are reluctant to work with new classroom technology, such as a SMART Board, is due to lack of technical knowledge or understanding of how technology enhances their teaching pedagogy. Training or professional development is one avenue to reduce resistance to technology, as well as communicating the change to faculty in advance.

Risk-aversion is another aspect of faculty resistance and reluctance to new classroom technology. This paper gives insight into how to position faculty members' first perceptions of new technology into positive experiences

Jelyani, S.J., Janfaza, A., Sorori, A. (2014). Integration of SMART boards in EFL

classrooms. *International Journal of Education and Literacy Studies, 2*(2). 20–23.

doi:10.7575/aiac.ijels.v.2n.2p.20.

Abstract: The current study described the uses of smart boards in English as foreign language (EFL) classrooms. This study also investigated the role of smart boards in promoting student engagement, the benefits of smart boards for teachers, using smart boards for improving motivation, and smart boards in the service of linguistic and cultural elements. The review of previous studies revealed that smart boards are very innovative and powerful support for language acquisition. Moreover, they increased learning process.

Summary: The authors of this paper discuss the effects of SMART Boards in an English as a foreign language (EFL) classroom and note that whether the SMART Board or other classroom technology implementation depends on the instructor or how the instructor perceives

the classroom technology. The authors of this study focus on student engagement and motivation with the use of the SMART Board through interaction between the faculty member, the student, and other students. The results of this study indicated that SMART Board use resulted in the students feeling more engaged because of the hands-on work. The study results also indicated that communication increased between students and the teacher with the use of the SMART Board.

The teachers benefited from the SMART Boards by saving time since they could save notes written on the boards. Documents created in various programs are used in multiple classes on the same subject, which the teachers could save with needed annotations. Interaction with students also increased with the use of the SMART Board.

The authors identify outcomes and resistance to new technology that arises with technology are implemented unsuccessfully, such as unhappy and frustrated teachers; however, the study results suggest when teachers are trained properly, they may find that the SMART Boards become timesavers in the classroom.

While Information Technology departments are part of classroom technology decision-making, how the faculty uses SMART Boards in the classroom is equally important.

Jugovich, S. M., & Reeves, B. (2006). IT and educational technology: What's pedagogy got to

do with IT? *EDUCAUSE Quarterly, 29*(4), 58-60.

http://net.educause.edu/ir/library/pdf/eqm0649.pdf

Abstract: Recently, these authors had the opportunity to present "IT and Educational Technology: What's Pedagogy Got to Do With IT?" at the 2006 EDUCAUSE Midwest Regional Conference. The presentation addressed IT staff as teachers of pedagogy--not just trainers of how to use a tool--and how this change came about. The authors thought that the topic would capture

the attention of many people in higher education, but they had no idea just how interested they

would be. The presentation generated numerous questions and stimulated many conversations for

the duration of the conference. The topic centered on three issues: (1) Recognizing the need for

IT staff to teach both the mechanical skills of using an educational technology tool and its

pedagogical uses; (2) Gaining acceptance of IT staff as teachers of pedagogy; and (3) Measuring

acceptance of IT staff as teachers of pedagogy. The presentation detailed the authors' solutions to

these issues and included recommendations for IT departments at other universities.

Summary: This article highlights the relationship between IT and pedagogy. While

many of the successes and failures of technology implementations fall on the organizations

Information Technology department, faculty members also need to embrace modern practices.

The authors advocate for allowing members of the Information Technology departments to teach

the teachers how to use new technology and make this practice part of an organization's culture.

The authors address challenges in gaining acceptance of Information Technology in the

classroom and recommend that IT members develop trust using communication and creating a

safe environment for faculty to learn the new technology. The authors identify ways faculty

acceptance of the technology in their pedagogy such as the faculty asking the Information

Technology departments how to effectively incorporate the new technology, faculty requesting

workshops, and the increase of communication between faculty, the Information Technology,

and Instructional Design departments.

The authors note that teachers are not the only individuals affected by the implementation

of classroom technology, such as the Information Technology and Instructional Design

departments are also impacted. Information Technology and Instructional Design support

personnel typically do not have backgrounds in instruction and pedagogies and may make

decisions based on the technology and not the needs of faculty. This paper highlights the need

for communication, a core feature of change management, for successful implementation of

classroom technology.

Min, K., & Siegel, C. (2011). Integration of SMART board technology and effective teaching. *I-manager's Journal on School Educational Technology, 7*(1), 38-47.

http://digitalcommons.fairfield.edu/cgi/viewcontent.cgi?article=1054&context=education-facultypubs

Abstract: The proposed paper reports on the results of a study conducted to explore the influence of SMART Board technology on student engagement in and perception of classroom activities. Using momentary time-sampling procedures, this study examined differences in second grade students' on-task and off-task behaviors during 30-minute math and science lessons that did and did not include the use of a SMART Board. Student perceptions were measured via questionnaire. Observation results revealed that (a) effective teaching, without technology, can promote above-average levels of student engagement, (b) the integration of SMART Board technology can further increase on-task behavior, and (c) the combination of effective teaching and SMART Board technology can maintain high levels of student engagement throughout a multi-component lesson. Questionnaire results provided modest support for the use of the SMART Board to engage students. While none of the participants favored lessons without the SMART Board, only half rated their attention and participation higher in classes that included the SMART Board compared to those that did not. Further research is needed to determine if the integration of SMART Board technology and effective teaching enhances the engagement of students at other grade levels, or other demographic backgrounds, and in other subject areas.

Summary: The purpose of this study is to understand how SMART boards are utilized in the classroom to engage students. While this study was conducted in a K-12 school setting, the information gleaned can be translated to higher education. This article highlights the successful implementation of classroom technology and engaging millennial students. The authors found that faculty who volunteered to have SMART boards implemented in the classroom were offered training had a positive experience. The information technology department communicated the implementation and training of the SMART Board, which gave the faculty members the feeling that they were part of the implementation process, thus securing buy-in. The authors found that student engagement increased when there was instruction using the SMART Board.

This article is helpful to understand the student and faculty member's perception of a successful SMART board implementation in a classroom environment that is accompanied by appropriate training. Students and faculty who were questioned as part of the study responded that successfully implemented technology created a positive and engaging experience.

Reid, P. (2012). Categories for barriers to adoption of instructional technologies. *Education and Information Technologies, 19*(2), 383-407. doi: 10.1007/s10639-012-9222-z

Abstract: Although higher education has spent millions of dollars on instructional technologies, often higher education administration complains that instructors are not adopting them. Without a full understanding of possible barriers, higher education institutes are hard-pressed to develop either appropriate goals or sound strategies for the adoption of instructional technology. A review of the literature on barriers to instructor adoption found conflicting results, in which some issues present more of a barrier than others. These range from a lack of definition of successful adoption (how many adopting instructors are enough?) to inadequate or inappropriate professional development (meeting differing instructors' needs) to resistance

(based on self-efficacy, beliefs in pedagogy, etc.). Five categories are described based on literature researched: technology, process, administration, environment, and faculty. Within each of these categories is a description, based on the literature, of each barrier. A fish-bone diagram displaying the categories and barriers within them is presented. This review of the literature provides a framework for further research in methods for minimizing the impact of each barrier. The framework of categories of barriers presented here provides institutions with a starting point to approach adoption of instructional technology with a plan to mitigate and minimize as many barriers as possible, giving adoption a better chance of success.

Summary This study by Patrick Reid describes the various issues surrounding barriers that higher education institutions face when instituting new technologies in the classroom. The author discusses different reasons why faculty shows little or no interest in adopting new classroom technologies including resentment at having to set up the technology and uncertainty on how to use the technology for instruction. The author defines the barriers to adoption of instructional technologies such as lack of technical support, faculty resistance to change, and lack of a strong technology background among faculty members. The author discusses the effects of the following barriers to implementing classroom technology:

- Technology barriers – Access to technology. Technology reliability. The complexity of technology.
- Process barriers – Poorly managed technology implementation. Lack of technical support for faculty, staff and students on the new technology.
- Faculty professional development barriers – Lack of effectiveness. No focus. Type of professional development offered is not relevant to new technology.

- Administration barriers - No institutional support for the new technology. No administration leadership for the technology. Not understanding the amount of effort required to learn new technology.

- Environment barriers – Culture of the organization. Learning new technology requires faculty to change roles. The tension between faculty and Information Technology departments, or with the administration.

- Faculty barriers – No understanding how to use the technology effectively. Some faculty is resistant to change. Some faculty will be concerned that they will not be able to learn the new technology. Some faculty will have a negative perception of the technologies effectiveness.

This paper is relevant to this study because it provides a framework for the barriers to the adoption of instructional technology.

Managing change for new technology implementation

Barnett, H. (2003). Technology professional development: Successful strategies for teacher change. *ERIC Digest Clearinghouse on Information & Technology (ERIC No. 477616)*. Retrieved October 30, 2017, from http://libproxy.uoregon.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true &db=eric&AN=ED477616&login.asp&site=ehost-live&scope=site

Abstract: The goal of any professional development program is to inform and change teacher behavior as a result of new information. Professional development activities need to be designed in a way that ensures that teachers' time and your investment in time and money pay off in increased student achievement. Getting teacher buy-in is important when technology is involved, especially for those who are not convinced technology is worth the time and effort. The first step of any sound professional development program is to develop a belief about

technology professional development that includes the idea that the curriculum drives the use of technology, not vice-versa, and that empowered teachers will find appropriate ways to include technology with their ongoing instruction rather than view it as an activity unconnected to the district's content standards. Technology professional development programs are successful when they focus on the teacher's stage of use. A teacher afraid of technology or a beginning user would be lost in a class for power users. Mandinach (1992) describes four stages of technology use: survival, mastery, impact, and innovation. A description of the four stages follows. Six technology professional development systems implemented by districts that will help teachers reach the "impact" and "mastery" stages are then discussed. Brief lists of "what works" and "what does not work" and indicators of success to determine if a technology professional development program is making a difference in how teachers incorporate technology are also included.

Summary: Barnett discusses the importance of faculty buy-in when introducing classroom technology and suggests the best way to achieve the buy-in needed is through professional development training. The author states that there are four stages of technology use: survival, mastery, impact, and innovation. Faculty members that are in the survival stage are expecting that everything that can go wrong will, and will not use the classroom technology, except when directed. A faculty member that is in the mastery stage will have some tolerance to hardware and software problems and will start to use classroom technology within the classroom without direction. In the impact stage, the faculty member embraces classroom technology and finds ways to balance instruction and construction. A faculty member who is in the innovation stage takes advantage of classroom technology to enhance instruction. Barnett asserts that understanding the stage that a faculty member is in will help drive the professional development

training that is appropriate for each category. The author also notes that understanding how faculty perceives technology will help with gaining buy-in.

This article is useful for this paper because it describes why faculty members at different levels of mastery might find new technology a hindrance to their instruction, shows how faculty members can use technology to enhance instruction and provides specific recommendations for adoption.

Bates, T. (2000). *Managing technological change: Strategies for college and university leaders*. San Francisco, CA: Jossey-Bass, Inc.

Abstract: Will your campus culture survive the changes brought by new technology? Retrofitting a college or university to become technologically competitive requires significant changes not only in hardware and software but in the basic management and operation of the academy. Managing Technological Change is a timely, practical guide for campus leaders seeking strategies for creating the new, technology-based academic organization.

Summary: Bates writes about successfully implementing classroom technology using change management. This book is for individuals who are responsible for technology implementation in higher education institutions, such as IT professionals who are in the process of upgrading classroom technology. The book provides key elements for the successful implementation of technology, leadership, vision and planning, planning and managing courses and programs, technology infrastructure and student access, supporting faculty, funding strategies, collaboration and competition and organizing for the management of educational technologies.

Technology in the classroom tends to create fear in faculty; this book addresses this fear with ways to support faculty during technology transitions, by keeping the lines of

communication open between faculty, administrators and the Information technology departments. This book will be useful for this study because of the information contained within identifies faculty's challenges with technology, the need to communicate the change to faculty and provide them with technological and pedagogical support. In essence, this book serves as a guideline for new technology change management.

Bates, T. (2015). *Teaching in a digital age: Guidelines for designing teaching and learning.*

Vancouver, BC: Tony Bates Associates LTD.

doi:https://opentextbc.ca/teachinginadigitalage/

Abstract: The book examines the underlying principles that guide effective teaching in an age when all of us, and in particular the students we are teaching, are using technology. A framework for making decisions about your teaching is provided while understanding that every subject is different, and every instructor has something unique and special to bring to their teaching. The book enables teachers and instructors to help students develop the knowledge and skills they will need in a digital age: not so much the IT skills, but the thinking and attitudes to learning that will bring them success.

Summary: Bates has written seven books on higher education technology and teaching. *Teaching in a Digital Age* has various chapters dedicated to the use of technology in the classroom. Bates states that understanding how faculty members use technology in the classroom benefits Information Technology departments who are looking for a successful implementation of classroom technology. This book does not discuss how to implement the technology but instead guides the reader to understand the faculty member's point of view on technology in the classroom with the addition of how technology helps to engage upcoming millennial students.

The authors introduce the framework S.E.C.T.I.O.N.S (Students, Ease of Use, Costs, Teaching functions, Interaction, Organizational issues, Networking, Security and privacy), a model created by Bates that gives higher education institutions a list of criteria to follow when selecting appropriate classroom technology. The first criterion focuses on the needs of the student population and provides questions for the Information Technology department, such as what is the likely demographic of the students, what kind of access will the school provide for students who lack technology devices and what kind of technology skills the students possess.

Ease of use focuses on the software and hardware that instructors need to conduct classes and if the software and hardware are easy to understand and use, thus increasing the likelihood that the available classroom technology will be used. Ease of use also pertains to how hard it is to maintain the technology and if it is reliable. Bates notes that technology support is equally important to ease of use.

Most higher education institutions are concerned about the cost of classroom technology. Deciding what classroom technology is installed in the classroom, without undue influence vendors or other solicitors will help to ensure the institution purchases practical technology. Having instructors that understand the technology will help to reduce cost because they will be able to mentor their peers on the equipment minimizing the need for outside training or support.

The questions related to teaching functions asks who are the students, what is the content of the instruction, what are the desired outcomes, what are the unique pedagogical characteristics of classroom technology, and what skills are being developed.

Bates notes that interaction can be both face-to-face communications or achieved with classroom technology when correctly. SMART Boards allow for face-to-face interaction with

students when used as a collaborative tool. Interaction is an important aspect of teaching and can be instrumental in choosing classroom technology that promotes interactivity.

Understanding the roles of the departments of a higher education organization will enhance the selection of classroom technology. Bates recommends that information technologists speak with the departments to get a clear picture of their needs for classroom technology. In turn, the faculty will need to talk with the information technologists to ensure that the requesting department gets the correct technology needed for instruction.

John, S. P. (2015). The integration of information technology in higher education: A study of faculty's attitude towards its adoption in the teaching process. *XIV International Business and Economy (IBEC) Conference. Bangkok, Thailand.* doi:10.2139/ssrn.2550007

Abstract: It is a reality that advancement of Information Technology revolutionized the business practices and strategies of entire industries. The field of higher education is not an exception to this phenomenon. Colleges and universities around the world are investing a considerable amount of money to create Information Technology resources that meet their student's and faculty's instructional needs. While universities encourage their faculties to adopt the new technologies for their preparation and delivery of classes, various other factors influence the integration or resistance of acceptance of these technologies. Age, highest education earned, teaching experience, computer competency, prior computer experience, availability of technology, Institutional support etc. are examples of these factors. Based on the theoretical support of Rogers' Diffusion Theory, a conceptual model is developed to identify the critical success factors that influence the adoption of Information Technology among faculties of tertiary educational institutions. The model is empirically tested among the faculty members of leading universities in Asian region. 261 full time lecturers participated in this study and the results show

that factors such as computer self-efficacy, relative advantage, compatibility and prior computer experience are significantly influencing their perceived ease of use and attitude towards using educational technologies.

Summary: The author introduces the Technology Acceptance Model (TAM) originated by Davis, Bagozzi, & Warshaw (1989), a model that leads to understanding how individuals adopt and use technology in the classroom. John also correlates faculty technology anxiety and the use of classroom technology, noting the higher the computer anxiety, the less likely the faculty member will use the technology. However, with proper training and faculty buy-in, Jones asserts that the anxiety will lessen. Understanding faculty anxiety and ways to reduce it will go a long way in getting faculty buy-in. The tables contained within the study supports the research.

John discusses variables that can influence a faculty member's likelihood to embrace or resistance to new classroom technology. The variables include, but are not limited to age, education, teaching experience, computer competency and availability of technical support. The author draws upon Rogers' Diffusion Theory (Rogers, 2003) is a standard of the paper, which identifies the success factors that build faculty buy-in to new classroom technology. The information that is contained within this paper will be useful for understanding how Rogers' Diffusion Theory can be translated to facilitate successful implementations of new classroom technology.

Khalil, S. M. (2013). From resistance to acceptance and use of technology in academia. *Open Praxis, 5*(2). doi:10.5944/openpraxis.5.2.5

Abstract: The phenomenon of faculty's resistance to using technology in higher education is the focus of this research as a secondary reading of the existing relevant research with the purpose of analyzing factors of resistance and finding the solutions. This paper is an

excerpt from a Doctoral dissertation and is focused on the causes of resistance and finding

possible solutions to re-think resistance (Matrosova Khalil, 2011, 2012). It is hoped that the

results of this study will contribute to the understanding of resistance factors, add to the

development of the theoretical basis of re-thinking resistance, and to create a path for redirecting

away from psychological defensive behavior expressed by faculty. This last aspect is

characterized as part of the emotional and behavioral resistance, which this research hopes to

transform from a negative to a positive attitude towards change.

Summary: The author focuses on resistance to classroom technology and finding

solutions that address faculty resistance. Khalil focuses on the evolution of technology in

teaching and learning and the causes and factors of faculty resistance to technology. A common

theme of resistance presents itself throughout the paper and the other studies selected for this

research paper. The author identifies causes of resistance that includes faculty who: (a) do not

want to spend the time to learn new technology (b) have uncooperative natures, (c) lack of

information or communication regarding the classroom technology, (d) lack of technical

expertise (e) are threatened by technology (f) lack access to the technology, and (g) are not

provide with positive organizational change. Supporting faculty in these areas will help with

managing the change that comes from new technology implementations.

This paper is relevant to this study because the author discusses reasons for faculty

resistance regarding new technology and ways that communication can alleviate faculty fears.

Hollands, F. M., & Escueta, M. (2017). EdTech decision-making in higher education. *Center for*

Benefit-Cost Studies of Education. Washington, D.C.: Columbia University. Retrieved

November 13, 2017, from https://www.edtechdecisionmakinginhighered.org/

Abstract: Chief Information Officers, Chief Academic Officers, and Chief Innovation Officers; Directors of IT, Digital, and eLearning; Deans and other higher education decision-makers are tasked with reconciling the need to promote student learning and support faculty research with pressures to keep up with technological advances. EdTech can promote these goals by facilitating access to content, providing opportunities for collaboration, increasing interactivity in instruction, allowing for individualization of instruction, and producing endless amounts of data to be studied. At the same time, it raises concerns about data security and privacy. Many higher education decision-makers are struggling to constrain free-for-all acquisitions across campuses that lead to EdTech proliferation. What are the EdTech decisions being made in higher education and how are these decisions being made? What role, if any, does research play in the decision-making process?

Summary: The authors describe educational technology the role of educational technology is in higher education institutions, and how decisions are made regarding educational technology. The authors provide a key definition for EdTech, noting that the term encompasses "…research, reading, writing, collaboration, communication, creation, logic, standardization, compliance, hardware, software, money, policy, privacy, accountability, practice, theory" (p.7). The authors define the goals of educational technology in higher education institutions as being affordable, accessible, and ensuring student success. The authors recommend that an institution follow its governance guidelines when deciding on educational technology in higher education. The authors include the four main types of EdTech decision makers: instructional designers, educational technologists, chief information officers, and academic department heads.

The authors also provide samples of interviews with faculty, which give insight into how faculty and staff perceive educational technology. Key findings focus on features and

functionality, the feasibility of implementation, cost considerations, and user experience and usability. Some faculty interviewed wanted to understand the reason classroom technology selected for installation into the classroom but more importantly how it worked. Other concerns focused on whether the classroom technology was possible or easy to implement as well as the ease of use. Cost considerations were shown to impact institution as a whole and respondents noted that classroom technology is typically listed as an expense and needs more consideration before a purchase.

The authors assert that communication between faculty and Information Technology departments is essential for the decision-makers to understand the needs of the instructor, the student, and the institution. The authors note that decision-making for EdTech is becoming a hot issue for faculty and administrators in higher education institutions. However, the authors caution against becoming overwhelmed with vendors that promise technology will fix instruction problems; instead, the authors recommend that institutions gain an understanding of EdTech to make decisions that enhance rather than inhibit instruction.

This source is useful for this study because it highlights various situations that other higher education institutions faced when considering classroom technology implementation, and the lessons learned when implementing new technology in the classroom.

Lewis, L. K. (2006). Employee perspectives on implementation communication as predictors of perceptions of success and resistance. *Western Journal of Communication, 70*(1), 23-46. doi: 10.1080/10570310500506631

Abstract: This study examines employee experiences in communicating with implementers of planned change and the effects of those experiences on employees' perceptions of success and of resistance to planned changes. Results indicate that the higher the perceived

value of their own input and of leaders' communication of vision, the higher their perceptions of

success were, whereas higher degrees of involvement of lower level staff and perceived

resistance militated against success. Further, the higher the evaluation of the quality of

implementation information, the less likely the employees were to perceive resistance to the

change. Also, the more forced the nature of the implementation, the more likely the employees

were to perceive resistance to the change. Mere frequency of communication (both in receiving

information and providing input) was unrelated to employees' perceptions of success.

Implications for implementers and future research directions are discussed.

Summary: Communication plays a large role in gaining buy-in from faculty regarding

classroom technology implementations. The author found that institutions that consulted faculty

regarding classroom technology had a higher rate of successful implementation, use, and

adoption. The author discusses the importance of communication throughout the implementation

process to gain faculty buy-in. However, the author points out that the communication needs to

be more in the dialogic process, not merely an informational exchange.

Lewis discusses the importance of communication for successful change management

and asserts how an individual perceives the communication of the impending change and how

the individual's input affects the final decision of classroom technology implementation impact

the likelihood that the faculty member will buy-into the new technology.

Conclusion

Bates (2000) notes that technology has become central to everyday living, and students expect to have their everyday technology as part of their higher education experience. Higher education institutions, as well as faculty members, need to be aware of students' technological expectations and be willing to embrace classroom technologies like the SMART Board, to fulfill these expectations (Al-Qirim, 2011; Bates, 2000; Barnett, 2003;Groff & Mouza, 2008; John, 2015; Reid, 2012). While implementing technology into the classroom provides benefits to higher education institutions (Bates, 2000), some faculty members may fear the challenges of learning new technologies, leading to resistance or reluctance to use the new technology (Al-Faki & Khamis, 2014; Groff & Mouza, 2008; Jelyani, Janfaza, & Soori, 2014; Min & Siegel, 2011). Minimizing faculty members' fears through training, communication, and change management can lead to successful implementation of classroom technology (Bates, 2000; Howard, 2012; Jelyani, Janfaza, & Soori, 2014; Khalil, 2013; Lewis, 2006; Rogers, 2003).

This annotated bibliography gathers scholarly sources to present information on the sources of faculty resistance to classroom technology and change management strategies to address the resistance. These sources will help inform those stakeholders who have an interest in the causes of and approaches to overcome faculty resistance to classroom technology.

Faculty resistance to classroom technology

Many faculty are resistant or reluctant to use classroom technology, perhaps due to a fear of technology (Howard, 2012; John, 2015; Min & Siegel, 2011; Reid, 2012). Recognizing how faculty perceives technology is the first step in identifying faculty resistance and changing it to faculty buy-in (Al-Faki & Khamis, 2014; Al-Qirim, 2011). In 1992, Ellen B. Mandinach and Hugh F. Cline introduced the four stages of instructor mastery of technology at the Annual

Conference of the American Educational Research Association (AERA) (Mandinach & Cline, 1992). The four stages they identified are:

- Survival stage – The instructor struggles against technology and will not use the technology as an enhancement to their instruction. These instructors actively avoid risk.

- Mastery stage – The instructor understands technology and can perform basic troubleshooting steps for classroom technology.

- Impact stage – The instructor is not threatened by technology and will incorporate the classroom technology into their instruction.

- Innovative stage – The instructor embraces and will take full advantage of classroom technology, and will form lesson plans that incorporate technology into their lesson. (Barnett, 2003)

Rogers' Diffusion Theory goes further than the four stages of instructor mastery of technology identified by Mandinach and Cline (Barnett, 2003) by identifying the types of adopters of technology:

- Innovators - those who are adventurous and eager to try new ideas

- Early adopters - leaders within their social circles who are willing to embrace new technology.

- Early majority - those who not leaders within their social circle, but are willing to adopt a new idea (John, 2015).

Rogers' Diffusion Theory also identifies the types who avoid new technology:

- Late Majority – those who more skeptical about new ideas and will not embrace new technology until those within their social circle talk about or show the merits of the new technology

- Laggards – those who are the last to adopt technology and are considered near isolates in their social circles (John, 2015)

Al-Qirim (2011) recommends using the three groups who identify as adopters of technology peer mentors to help other faculty members in the late majority and laggard categories who have not yet adopted the new technology.

Multiple authors noted that to overcome faculty resistance to of classroom technology it is important to relay the benefits of the technology as enhancements to the learning environment (Bates, 2015). Bates (2015), Jelyani, Janfaza and Soori (2014), and Min and Siegel (2011) note that most faculty members are looking for ways to keep students engaged in the classroom, and technology can be used to fill this need. Min and Siegel (2011) conducted a two-week study regarding student engagement with and without the use of a SMART Board, using math and science instruction as the subjects for the study and found that students had a significant increase in their engagement and motivation when the teacher used the SMART Board in their instruction. However, the teachers in the study were early adopters in the mastery stage of technology, received adequate training on the new technology, and had the ability to integrate the SMART Board into their instruction (Min & Siegel, 2011).

Rogers' Diffusion Theory also targets how technology that affects classroom technology rate of adoption using the following aspects of innovation:

- Relative advantage – is the technology better than the institution had before.

- Compatibility – is the innovation consistent with the needs, values, and beliefs of potential adopters.

- Complexity – is the technology easy to understand and use.

- Trialability – the ability to experiment with the innovation before implementation.

- Observability – the degree that others can observe the innovation (Rogers, 2003, p.

   213).

Managing change for new technology implementation

Murthy (2007) defines change management as "managing the process of implementing

major changes in information technology, business processes, organizational structures and job

assignments to reduce the risks and costs of change and optimize its benefits" (p. 22). Change

management asks how and why change happens and what personnel and organizational needs

needed to secure successful change (Murthy, 2007; Storberg-Walker & Torraco, 2004).

When implementing classroom technology, getting faculty to accept the change is

essential to the success of new the technology (Howard, 2012; John, 2015; Lewis, 2006; Reid,

2012. Securing faculty acceptance of new technology is a common challenge for many higher

education institutions, with various theories that address how to gain faculty buy-in and reduce

the reluctance or resistance to new classroom technology (Hollands & Escueta, 2017, John,

2015; Reid, 2012). Two frameworks in the development of faculty buy-in and change

management are the Technology Acceptance Model (TAM) by Davis, Bogozzi, and Warshaw

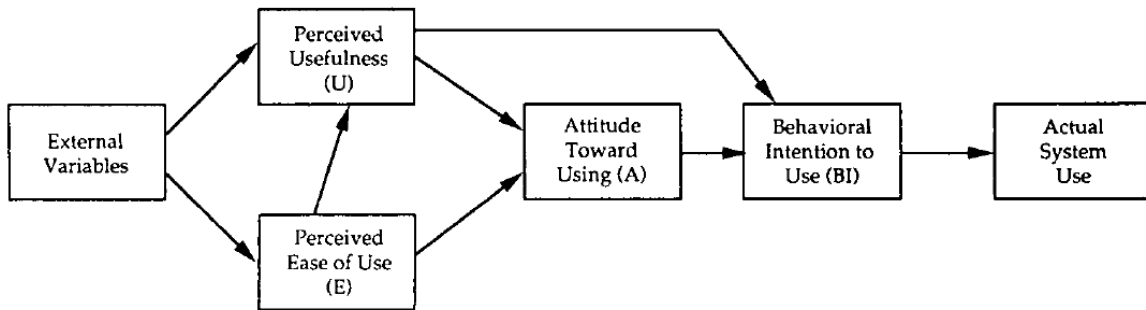(1989) (as cited in John, 2015) and the S.E.C.T.I.O.N.S theory by Bates (2015).

Technology acceptance model.

Figure 1. Davis, Bagozzi, & Warshaw (1989) Technology Acceptance Model (John, 2015)

Understanding how the user perceives technology helps to build faculty buy-in to new classroom technology (Bates, 2015; Epper & Bates, 2001; Khalil, 2013). The Technology Acceptance Model (TAM) places users into two categories of belief related to technology: *perceived usefulness* and *perceived ease of use* (Davis, Bagozzi, & Warshaw, 1989; John, 2015). Faculty who have a positive perception of the usefulness of the technology believe f that the technology will increase the faculty member's productivity and are therefore more likely to use the technology (Al-Faki & Khamis, 2014; Al-Qirim, 2011; Epper & Bates, 2001; Jugovich & Reeves, 2006). Faculty who have a positive perception of the ease of use of the technology believe they can easily incorporate technology into their instruction of pedagogy and therefore more likely to use the technology (Al-Faki & Khamis, 2014; Al-Qirim, 2011; Epper & Bates, 2001; Jugovich & Reeves, 2006). Perceived ease of use includes how easy the equipment is to use and its reliability (Bates, 2015; John, 2015). A faculty member who is in the survival state of

mastery (Lewis, 2006) will see the new technology as a challenge and may resort to risk-aversion

and underutilize the technology, or not use it at all (Epper & Bates, 2001; Howard, 2012).

S.E.C.T.I.O.N.S.

S.E.C.T.I.O.N.S stands for Students, Ease of Use, Cost, Teaching functions, Interaction,

Organizational issues, Networking, and Security and privacy (Bates, 2015). The categories of

interest for implementing a change management strategy for classroom technology from the

S.E.C.T.I.O.N.S framework are students, ease of use, teaching functions, interaction and

organizational issues; while the other categories are equally important, they do not affect faculty

buy-in of technology but instead focus on the decision-making aspect of purchasing classroom

technology (Bates, 2015)

Most institutions have students that come from diverse backgrounds, which will affect

how the students perceive classroom technology (Bates, 2015). Some students may come from

an area or region that does not have a high standard of technology and may feel insecure about a

technology-filled classroom (Bates, 2015). Higher education institutions are aware of this

diversity and should ensure that all students are treated in an equitable manner, whether it is

regarding culture or technology (Bates, 2015; Jelyani, Janfaza, & Soori, 2014). However,

students that come from areas that are lacking in access to technology and feel threatened by the

technology can pose a hindrance to an instructor and influence the instructor's willingness to

embrace classroom technology (Barnett, 2003). Bates (2015) recommends identifying the likely

demographics of the students such as their background and the type of technology assets to

which they have access. Understanding these student needs will give the instructor and the

information technology departments a better insight into what type of technology these students

have or have not worked with, as well as giving the instructor a direction to go with their

pedagogy (Bates, 2015; Jugovich & Reeves, 2006).

Ease of use is essential when seeking ways to understand why some faculty are resistant

to using classroom technology (Bates, 2015; Howard, 2012; Khalil, 2013; Reid, 2012). If the

faculty member is not computer literate, they may feel (Bates, 2015; Davis, Bagozzi, &

Warshaw, 1989; John, 2015) by the new technology, leading to little or no use in his or her

instruction (Bates, 2015; Groff & Mouza, 2008). Unreliable equipment leads many faculty to not

use the technology (Bates, 2015; Groff & Mouza, 2008). If the technology breaks down or does

not work at all, faculty will resist using the technology, even if they are computer literate (Bates,

2015; Groff & Mouza, 2008). The Information Technology department also needs to have an

understanding of how the technology works and how to repair it, within a short window, to

ensure that instruction is minimally affected (Bates, 2015).

The teaching functions of the S.E.C.T.I.O.N.S framework shift its focus to the instruction

of the class (Bates, 2015). The instructor must understand the content that needs to be covered,

what and how to use the classroom technology to enhance student learning and what the desired

outcome is for the students (Bates, 2015).

Bates (2015) notes that interaction in the classroom can happen in various ways: student

to teacher, student to student, and students with the material. Student-to-teacher interaction

requires interaction between the teacher and Bates, 2015). Using classroom technology such as a

SMART Board can help to make the student-to-teacher interaction more successful, whether the

student is a visual, audio, read/write, or kinesthetic type learner (Cakula & Sedleniece, 2011;

(Epper & Bates, 2001). SMART Boards are fully interactive in each of those areas and can help

enrich the instructor's pedagogy to reach these students (Cakula & Sedleniece, 2011; Jelyani, Janfaza, & Soori, 2014; Jugovich & Reeves, 2006).

The implementation of the new technology does not affect only faculty members, but the organization as a whole (Bates, 2015). Aside from obtaining faculty buy-in, an organization that is implementing new technology needs to consider how the institution structures the learning environment, the technology that is already in place and how it is used, the types of support the institution provides for the technology, and their governance processes. (Bates, 2015; Storberg-Walker & Torraco, 2004).

Understanding why there is faculty resistance and how to counteract it is the first step in the process of change management (Bates, 2000). Engaging the early adopters to by allowing them to test new classroom technology can provide insight into whether the technology is a valuable asset or another item that will remain unused (Rogers, 2003). This perspective will be helpful to the Information Technology department that wants to work with faculty to integrate technology in the classroom (Rogers, 2003).

The Technology Acceptance Model and Rogers' Diffusion Theory can help guide the institutions change management process for institutions that are planning to implement new classroom technology, ultimately increasing faculty buy-in and use through communication and training (Epper & Bates, 2001; John, 2015).

Summary

Technology is everywhere we look, and this is especially true of higher education institutions (Bates, 2000; Bates, 2015). As Millennials start infiltrating the classroom, these students expect to have access to current technology in their learning environments (Bates, 2015). However, some faculty members may not have the technical skills or want to learn new

technology to meet the students' expectations (Al-Faki & Khamis, 2014; Howard, 2012; Jugovich & Reeves, 2006). Higher education institutions must find ways to gain faculty buy-in and encourage the use of the technology to enhance the faculty members' pedagogies (Epper & Bates, 2001; Jugovich & Reeves, 2006; Reid, 2012).

This study suggests various ways to reduce faculty resistance to classroom technology and gain faculty buy-in, using methods such as communication and training (Bates, 2000; Epper & Bates, 2001; Groff & Mouza, 2008; Hollands & Escueta, 2017; Lewis, 2006). Communication and training are the keys to a successful change management process, which will help facilitate the changes that are becoming commonplace in higher education institutions (Bates, 2000).

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