Communication Barriers to Innovation Diffusion in the Context of E-technology Within Universities: A Synthesis of Case Studies

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The purpose of this Rapid Evidence Assessment study was to examine communication problems that hinder innovation in universities. One of the challenges managers face today in universities is managing the implementation of innovations in their organizations. Managers must not ignore communication problems that can hinder innovation. Ten case studies were examined, using the lens of Rogers' diffusion of innovations and Moore's chasm, to answer the research question, what are communication problems that act as barriers to hinder innovation diffusion in universities? Four themes of communication barriers were found to hinder innovation in universities.

INTRODUCTION

One of the many challenges for managers in today's universities is managing the implementation of innovations in their organizations. Due to rapid technological advances, often innovations take the form of electronic communication to enhance teaching and learning. During the change process, it is likely that opponents and barriers will appear and hinder implementation of the innovation, a new "idea, practice or object" to be adopted among a social system (Rogers, 1983). Managers must not ignore the resistance to an innovation because it obstructs progress (Husig & Mann, 2010, p. 182). Instead, they must strive to successfully facilitate the change process, so they can sustain innovation throughout their institutions (Husiq & Mann, 2010, p. 180-181) to compete in an ever-increasing technological society.

This study focuses on communication problems that act as barriers for hindering innovation among potential adopters in universities. It was determined while searching for literature on this topic, there is a lack of research for which the specific purpose was to examine problems related to communicating about innovations in universities. For example, there were no results from a search in the University of Maryland University College library database using the OneSearch tool and ABI database and the words "communication problems" and "innovation" and "university" in abstracts. However, there were nearly 40,000 results when "university" was removed from the search. Therefore, this study fills a research gap in scholarly literature about this topic as it relates to university settings.

LITERATURE REVIEW

Diffusion of Innovations

Rogers (1962), who developed the diffusion of innovations model, argues diffusion is a special type of communication which involves four elements: (1) innovation, (2) communication, (3) time, and (4)

social system (1983, p. 10). It involves a process through which messages about an innovation are communicated via specific channels over time among a social system (p. 10). People in a social system, such as an organization, "develop and share information" about the innovation. Those who have used the innovation may serve as influencers, also known as opinion leaders, champions, and change agents (Lundblad, 2003). Communication channels include mass media which are appropriate for communicating "knowledge" about innovations, and interpersonal networks, most effective for "forming attitudes and influencing adoption decisions" (Rogers, 2002, p. 990). Rogers' (1983) diffusion model specifies five categories of adopters based on their rate of adoption and distribution: (a) innovators (2.5 percent); early adopters (13.5 percent); early majority (34 percent); late majority (34 percent); and laggards (16 percent) (p. 247).

In order to identify or prevent communication problems that hinder innovation in organizations, managers need to understand how communication about an innovation may impact the rate of adoption. For the purpose of this study, hinder is defined as to delay, prevent, and make difficult (Merriam Webster, 2016). Therefore, the first claim to be argued in this paper is the following:

> *Claim 1 - Managers need to identify potential communication problems to innovation diffusion.*

Electronic Communication

Much of the scholarly literature on the diffusion and adoption of innovations in universities focuses on information and communication technology (ICT), also known as electronic communication. ICTs are commonly used throughout society, including government, business and most industries. It has changed how workers in organizations communicate, and perform their responsibilities as well as how managers implement practices and procedures. ICTs play an important role in organizations particularly as they manage the innovation process. In higher education institutions, ICTs are increasingly used as a tool to enhance learning and teaching. Betts (2003) and Cox (2000) noted that in education ICTs are used to re-structure the practice of teaching, prepare students for an advanced technological society, improve student learning outcomes and the quality of education (as cited in Alemu, 2015). Akbulut (2007) and Kozma (2008) acknowledged that ICTs can be used to conduct research and solve problems, as well as a creative, teaching and learning tool. Despite the potential benefits of ICTs in the education environment, the integration of the technology in these organizations has lagged behind that of other organizations (Alemu, p. 170).

Theoretical Lens—Moore's Chasm

Moore (1991) builds on Rogers' diffusion of innovations model by arguing there is sometimes a chasm, a major divide between the early adopters and the early majority, during the diffusion process (p.15). Although there is a minor slowdown in adoption between the other groups of adopters, the chasm is more difficult for diffusion. A key reason is both groups of adopters have different expectations for the innovation. The early adopters expect the innovation to be radically different from what they are used to, and the early majority do not want to disrupt what they are used to, but they want improvement (p. 15). Because of their differences, Moore argues early adopters do not make suitable references for the early majority, who need such references before they can decide whether to adopt (p. 15). Therefore, organizations need to be alert to this slowdown in the diffusion process when the early majority rejects, ignores or does not readily accept the innovation. The second claim to be argued in this paper is as follows:

> *Claim 2 - Since the idea of diffusion is to keep the process moving through each stage of adoption, when a chasm occurs, it jeopardizes implementation of the innovation for an organization.*

Moore (1995) updated his theory to discuss what happens after "crossing the chasm". He described the first part of the early majority as the bowling alley, when an organization should move from niche to niche (knocking over pins!) to increase adoption. If the organization is successful in offering a product which encompasses a series of niches, it may result in a tornado—this is when mass adoption takes place. Once the tornado happens, there is high demand and unfortunately the organization ignores the customer

to sustain success but after the tornado, the organization returns to main street (described also as the period before the tornado). During this stage, the organization should correct their mistakes by learning from the process, and demonstrate the value of the product and how it can meet the customers' needs (Daniel, 1996, p. 96). Organizations planning to implement an innovation may choose to incorporate the learning process before actually implementing the innovation. This leads to the third, and final claim to be argued in this paper:

> Claim 3 - Managers in universities should seek to better understand the needs of students, faculty, and staff before the adoption of an innovation begins in an effort to avoid or overcome communication barriers that hinder adoption.

In addition to filling a gap in the research on communication problems related to innovations in universities, this study informs managerial practice about these problems during the innovation process. It also adds to the scholarship on the diffusion of innovations, primarily ICTs, in universities because Rogers' diffusion model and Moore's chasm were used to synthesize 10 case studies to answer the research question, what are communication problems that act as barriers to innovation diffusion in universities? The following sections include the method, results, and discussion encompassing a narrative, conceptual framework, scholarly and practical implications of the research, conclusion, limitations and suggestions for future research.

METHOD

The method for this study is a Rapid Evidence Assessment (REA), a review of scholarly literature which is conducted in a limited timeframe and can serve to inform a more comprehensive, systematic review (Gough, Oliver, & Thomas, 2012, p. 39). Systematic reviews are designed to provide evidence-based research for management practitioners and policymakers to inform decision-making (p. 19), but in some cases, REAs may be more appropriate because of limited resources, time, and the purpose (p. 39). The purpose of this study was to identify 10 case studies, which focused on the diffusion of innovation in universities, and that also included findings related to communication about the innovation.

Search Process

A search was conducted in the University of Maryland University College library databases using the One Search tool. Two searches were conducted and both were limited to peer-reviewed journal articles published from 2005-2017. The first search included the key words "case study" and "university" and "communication" with no subject field selected; and technology or electronic communication with no subject field selected; and adoption or diffusion or innovation with no subject field selected. The search resulted in 682 after duplicates were removed. Fifteen articles were selected based upon reviewing the abstracts to determine relevancy to the topic, and the remaining articles were excluded for lack of relevancy. The second search included the key words "case study" and "university" and "communication" with no subject field selected; and "e-learning" or "e-teaching" or "online learning" with no field selected. This search produced 771 articles after duplicates were removed. Based on a review of the abstracts, five articles were selected, and the remaining articles were excluded because they were deemed not as relevant. A total of 20 articles from the two searches were further examined to determine if communication barriers were discussed. Eight articles were selected to review from the two searches and two articles that were obtained for a previous project were reviewed and assessed for quality.

Quality Assessment

The quality of each of the 10 articles was based on the Weight of Evidence (WOE) Framework (see Appendix B). The framework includes three dimensions to assess the quality of articles for a research study: (a) soundness of studies, (b) appropriateness of study design for answering the review question, and (c) relevance of the study focus to the review (Gough et al., 2012, p. 160-162). The overall appraisal for each article is calculated in the last column. Each of the 10 studies was appraised at a value over 50 percent, which was the cutoff value for inclusion in the synthesis.

RESULTS

Each of the articles reviewed for this study was analyzed using the diffusion of innovations model and Moore's chasm. The framework was used to determine the communication barriers that were found to hinder adoption of innovation or that may have contributed to hindering the adoption. The elements of the diffusion process that were evident in the studies included the following: (a) innovations (strategic planning initiative, a crisis, and technology to support online teaching); (b) communication (email, email policies, early adopters' video presentations, face-to-face meetings, world wide web, informal communication); (c) time (ranged from one month to five years); and (d) social process (the university environment which included faculty and students or faculty, students and staff).

Strategic Planning Initiative

The distribution of messages via electronic communication was examined during a strategic planning initiative at a southern four-year university, which lasted about two years, (Hill, 2007). The author found that the distribution of more than 1,300 emails to update the university community about the initiative resulted in information overload, and, thus, was deemed not effective (p. 10). Stakeholders described as "core participants" read the emails, those "not as strongly committed" read some of the messages while many "non-participants" never read any of the messages (p. 13). These findings suggest a chasm between those who were interested in the communication, the innovators and early adopters, and those who could be characterized as the early majority and later adopters. The distribution of so many emails to the entire university community resulted in a communication barrier because many stakeholders ignored the information. The findings in this study were based on observations during strategic planning meetings and interviews with the committee chairman, planning leaders, administrators, faculty, staff, and students (p. 10).

Email Policy

Employee attitudes about what was important as it related to email policies was the focus of a study (Hacker, Townley, & Horton, 1998) at a university library in the southwestern part of the United States. Library administrators planned to use the study findings to determine whether to develop a policy for email use (p. 431). The study encompassed focus groups, interviews and a questionnaire to gather data from 80 library employees (pp. 430-432). The authors concluded the employees preferred guidelines and not restrictive policies that would inhibit their communication and perceived the following as problems with email: (a) lack of knowledge or training concerning the technology; (b) lack of certainty about privacy of their email communication; (c) their right to use email for personal communication; and (d) lack of full endorsement by the administration in terms of "training, access to facilities, and freedom of use" (pp. 444-445). There was no chasm in this case because the innovation, which was the email policy, had not been implemented. However, Moore's updated theory for what organizations should do after crossing the chasm seems to be happening in reverse in this. Rather than implementing the email policy and risking a chasm, the administrators engaged in learning about the librarians' needs first. Therefore, the administrators could address the problems communicated by the respondents which suggest communication barriers that could hinder the use of email. If employees lack knowledge or training on the technology, they may lack the ability and motivation to use the technology to its fullest capability. A lack of certainty about email privacy could cause employees to be hesitant about using the technology or deter them from using it. Employees could lack motivation for learning to use its full features if they perceive administrators do not communicate their support by providing training, and for access and employees' freedom to use the technology. Similarly, restrictive policies could hinder employees.

Crisis Information

In a study (Egnoto, Svetieva, Vishwanath, & Ortega, 2013) that examined diffusion of information during a crisis (confirmed later as a false alarm) lasting approximately four hours, the authors found that about 75 percent of the sample (202 students) learned about the information via text message or another

person, nearly 95 percent of students spread the information, and early knowers (20 percent) of the information were more trusting of a variety of channels/sources, and more trusting of interpersonal channels "phones, text messaging, face-to-face and direct email" than late knowers (25 percent) (p. 9). Further, students who learned about the event from the university rated the credibility much higher than those who received the information from "friends or mass media" (p. 9). Since diffusing information as quickly as possible is critical during crises, it is in the best interest of a university faced with this situation to seek ways to close the gap between early knowers and late knowers. In order to close the gap, the individual/s managing the process must first recognize the communication barriers in this situation. The findings suggest communication barriers exist for late knowers because distrust of information sources can hinder the spreading of the information, and thereby limit diffusion of crisis information. Information on the distribution rates of the adopters suggest a chasm did not take place.

ICTs for Teaching and Learning

Challenges involving the diffusion of e-teaching in Sahmyook University in Seoul, Korea, was the focus of another study (Kim & Lee, 2008). The university launched a plan to promote e-teaching within the institution in 2005 supported by a two million-dollar five-year government grant (p. 4). The authors found that two years after the promotional campaign was launched, less than 10 percent of faculty practiced e-teaching despite early adopters doing video presentations, an incentive for an e-learning course and "user friendly" software for teaching via the internet (p. 4). Thus, Kim and Lee concluded that the diffusion process resulted in a chasm between the early adopters and the early majority (p. 10). The findings were concluded from a statistical analysis of survey responses resulting from a sample of 77 faculty (p. 6). These findings suggest the communication that was diffused during the process was not effective. Therefore, using the diffusion of innovation framework, it could be argued that interpersonal communication was not likely diffused in a manner to influence the early majority and later adopters to adopt e-teaching. Likewise, those who acted as potential influencers (adopters doing video presentations) were not effective.

A study examining the use of blogs for pedagogy focused on the University of New England (UNE) in Australia, where blogs were introduced in late 2006 (Muwanga-Zake, Parkes, & Gregory, 2010). The University had an open policy, which means no guidelines for using blogs, and according to the authors, this policy encouraged the use of personal blogs and discouraged the use of serious academic blogs (p. 11). The UNE blog use was surveyed from March 2007-2008, and the blog use of nine other universities was surveyed from February-March 2008 (p. 5). Of the 10 universities, only three blogged; UNE had no pedagogical blogs and 59 percent were personal; the other two universities had some course-related blogs with a smaller percentage of personal blogs (p. 8). These findings suggest the communication of an open policy versus specific guidelines for the blogs served as a communication barrier that discouraged faculty adopters of blogs. Or, on the other hand, one might view the open policy as lacking communication necessary to motivate faculty to adopt pedagogical blogs. Both views characterize a communication barrier in action. Since UNE had no pedagogical blogs, there was no chasm.

A distance learning university in Indonesia encouraged its faculty and students in its graduate studies program to use online communication for thesis advising to improve efficiency and effectiveness (Suciati, 2011, p. 216). Established in 1984, the university enrolled graduate students since 2003. After examining responses from a sample of 30 students concerning their perceptions of thesis advising in the program, the author concluded that the students were influenced by the faculty, most of who chose to advise students via less mediated channels (instant messaging, telephone, email) (p. 216). Most faculty also preferred thesis corrections delivered via postal mail (p. 222). Although slightly more than 50 percent of the students preferred corrections via postal mail, 65 percent of them contacted their advisers via the internet (p. 223-224). Even the students who sent thesis drafts electronically were not necessarily indicating that they preferred electronic editing (p. 225). The diffusion of online communication for thesis advising seemed to be hindered because most of the faculty chose not to become adopters and therefore, they did not encourage students to do so despite the urging of the university. Therefore, they hindered student adoption. There was not sufficient information to determine whether there was a chasm.

A study (Hodgkinson-Williams & Mostert, 2005) conducted from May to June 2000 focused on student perspectives about an online debating course. It was based on the premise that despite the benefits of online communication technologies, students do not always utilize them to their fullest potential (p. 94). The authors concluded that the lack of clarity about the procedures for online debating was a hindrance for students although they valued the course potential for immediate responses and discussion with others of different opinions (p. 102). Using email to communicate throughout the course, the students' responses to a questionnaire were that procedures pertaining to the goals of the debate and deadlines hindered their participation in the exercise (p. 100). The findings that there was a lack of clarity about procedures was a communication barrier which limited participation in the exercise. Sufficient information was not available to determine whether there was a chasm.

Student perceptions of the introduction of a virtual learning environment technology was the focus of a study (Osgerby, 2013) conducted at the University of Winchester in the United Kingdom. Referred to as a blended approach, the technology was implemented in 2008, the same year of the study which was conducted for one year. The author studied the use of the technology in three financial management and accounting modules made available to undergraduate and post graduate students (p. 88). Findings that revealed communication problems included (a) students were reluctant to use the technology to participate in group work, and instead used social media, the mobile phone and email (p. 94-95); and (b) students believed the subject matter would require "considerable face-to-face instruction" because they viewed it as difficult (p. 90). Based on data collected from a focus group of 29 students, these findings suggest the communication barrier for the students was the inability of the technology to facilitate interpersonal communication and more direct or less mediated communication technology for group work. There was insufficient information to determine whether there was a chasm.

An examination of faculty adoption of Horizon Wimba technology for online learning was conducted by surveying faculty at Southeastern University (Martin, Parker, & Allred, 2013). The technology had been in place for five years (p. 128) prior to the study but only five percent of the faculty (602 full time, 288 part time) used it in their courses (p. 128). Of the 28 faculty who completed the surveys, approximately 21 percent were characterized as the late majority; 34 percent as early adopters; and 39 percent as innovators (p. 131). In response to follow-up interviews, conducted with six faculty about their perceptions and use of the technology, one instructor cited the difficulty in recognizing when students are confused as a disadvantage to virtual classrooms (p. 133). This communication barrier was not a major finding of Martin et al. study but it is noteworthy for this study. And, since only five percent of the university's entire faculty used the technology, using the lens of Rogers' and Moore's model, the low adoption rate actually suggests a chasm had not formed between the early adopters and early majority.

The University of Botswana adopted e-learning technology in 2001. It was the setting for a study that examined problems associated with e-learning for two humanities courses from 2005 to 2009 (Ikpe, 2011). The researcher found the humanities department was a lead adopter among other departments but by 2009, more faculty in the department abandoned their courses after experimenting with the technology than faculty in other departments (p. 91). Also, among the 1,655 courses adopted by the university including the humanities department, nearly 80 percent were abandoned by 2009. E-learning was part of a blended approach to instruction which combined face-to-face, online learning, and other technologies associated with e-learning (p. 85). Data collected from the classes and the student evaluations of slightly more than 3,500 students showed a (a) "consistent demand by students" for discussion outside of the online platform; (b) the use of abbreviated language such as that used via text messages and other non-formal language; (c) a lack of motivation to seek external sources for research; and (d) the absence of argumentative rigor (pp. 94-99). The author's findings suggest a chasm among the academic departments during the university's adoption process of the e-learning technology. There is not enough information to determine whether there was a chasm in the academic departments or among students.

The reason some faculty adopted and then abandoned the technology could be related to student responses. Their responses suggest communication barriers that hinder adoption for both students and faculty. The students limited participation in online discussions and their desire for discussion outside of the online platform suggests a preference for interpersonal communication or less mediated forms of

communication. The students' use of informal language online also suggests a preference for interpersonal communication and/or less mediated forms of communication. However, both instances serve as communication barriers for faculty who aim to enhance their learning and students who need to feel comfortable interacting with the platform, the teacher and their peers.

DISCUSSION

This study included a review of 10 case studies that were synthesized using Rogers' diffusion of innovations model and Moore's chasm between early adopters and the early majority. The findings helped to answer the research question, what are communication problems that act as barriers to hinder innovation diffusion in universities? The findings also provide support for the three claims argued in this study: (1) Managers need to identify potential communication problems to innovation; (2) A chasm jeopardizes implementation of an innovation for an organization; and (3) Managers in universities should seek to better understand the needs of students, faculty and staff before the adoption of an innovation begins in an effort to avoid communication barriers that hinder adoption. Below is a discussion of the conceptual framework used to answer the question, an explanation of the findings, and how the research addresses the claims which were made in the introduction.

FIGURE 1
CONCEPTUAL FRAMEWORK OF ROGERS' DIFFUSION OF COMMUNICATION PROCESS LEADING TO COMMUNICATION BARRIERS
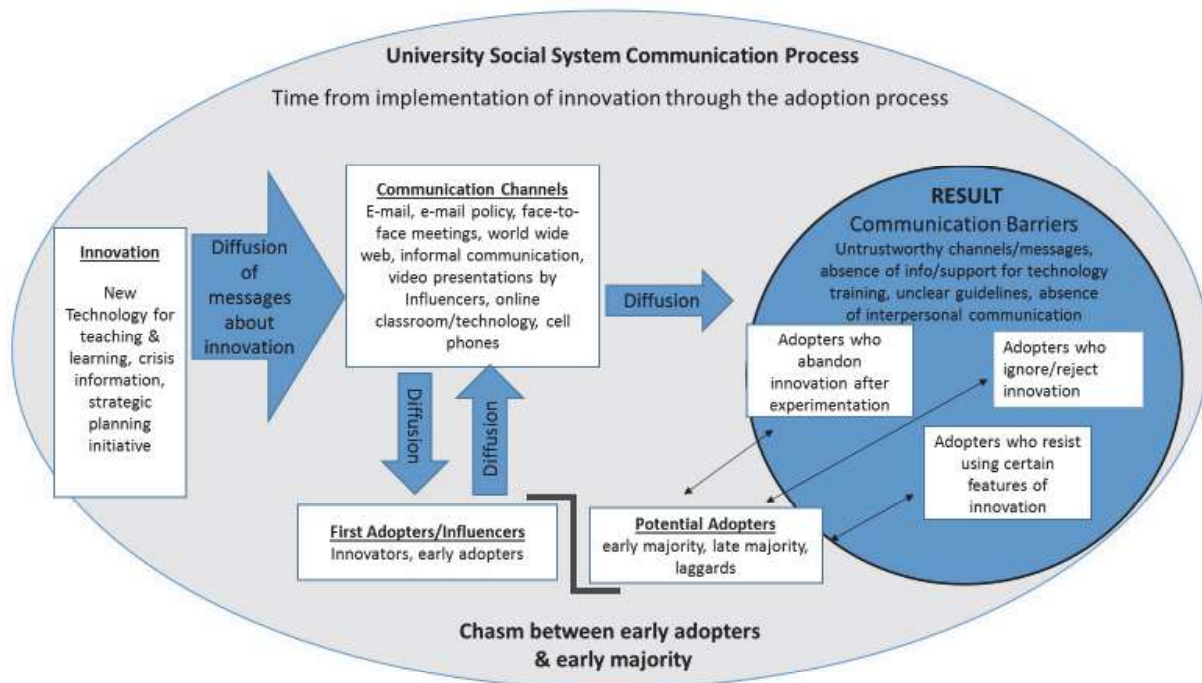
Conceptual Framework

The conceptual framework (Figure 1) displays the elements of Rogers' diffusion of innovations during the communication process of the university social system. Specifically, the conceptual map provides a view of the communication process that leads to communication barriers which hinder the adoption of innovations discussed in 10 case studies reviewed for this study. Diffusion happens throughout a period of time from implementation of the innovation throughout the adoption process. The innovation is diffused through communication channels throughout the university social system and the

first group of adopters (innovators and early adopters) adopt the innovation. Some of them may act as influencers by communicating about the innovation through communication channels to encourage later adopters to adopt. Sometimes when the innovation is communicated through channels that are perceived as ineffective, the communication acts as a barrier for potential adopters. These potential adopters may ignore or explicitly reject the innovation. In some cases, they may have to adopt or use the innovation because it has been incorporated in their teaching or learning process. These adopters may later decide to abandon the innovation, reject some of the features or hesitate to use them as with e-technology, or information about crisis or strategic initiatives.

Narrative

Each of the 10 studies contributed to the analysis and synthesis of this study for answering the research question. However, for the purpose of transparency, table C1 (see Appendix C) provides the framework for how each study contributed to answering the research question. Also, a total percentage value was assigned to each article. Six of the articles (Egnoto et al., 2013; Hacker et al., 1998; Hill, 2007; Kim & Lee, 2008; Martin et al., 2013; Muwanga-Zake, 2010) were assigned a value of 100 percent, and the remaining four articles (Hodgkinson-Williams & Mostert, 2005; Ikbe, 2011; Suciati, 2011) were assigned a value of 75 percent.

A synthesis of the studies revealed four themes of communication barriers that hinder the adoption of innovation: a) channels or messages perceived as untrustworthy; (b) the absence of information or support for technology training; (c) unclear guidelines; and (d) absence of interpersonal communication. The communication problems found to support the first theme were a lack of trust for information sources (Egnoto et al., 2013) and uncertainty about email privacy (Hacker et al., 1998). Supporting the second theme were the communication problems concerning a lack of administrator support for training (Hacker et al.), difficulty with self education and evaluation (Kim & Lee, 2008), and an inability to handle technical difficulties (Martin et al., 2013). The communication problems supporting the third theme were a lack of rules or requirements (Muwanga-Zake & Gregory, 2010), and a lack of clarity about deadlines and procedures (Hodgkinson-Williams & Mostert, 2005). The fourth theme was supported by the communication problems related to a desire for discussion outside of the online classroom and repeated use of informal language in the online environment (Ikbe, 2011), reports of insufficient interactions, unsatisfactory emotional exchanges (Kim & Lee), reports of instructor difficulty recognizing student confusion (Martin et al.), expressed expectation for face-to-face and reluctance to use e-technology for group work (Osgersby, 2013), and students' preference for face-to-face over e-technology for online thesis advising (Suciati, 2011). The findings provide evidence for the following claims.

Claims

Claim 1

Managers need to identify potential communication problems to innovation diffusion. The findings demonstrate that diffusion of innovations in universities can result in communication problems. When a university's communication about an innovation is not effective for influencing staff, faculty and/or students to adopt an innovation, the communication plays a role in hindering their adoption. Managers must seek to identify communication problems and act to prevent them. One way to do this is to survey or hold forums with those who will be impacted to determine their expectations and needs as it relates to the innovation.

Claim 2

Since the idea of diffusion is to keep the process moving through each stage of adoption, when a chasm occurs, it jeopardizes implementation of the innovation for an organization. There is some support for this claim although most of the studies did not provide evidence for a chasm between the early adopters and the early majority during the adoption process. However, in the instances where a chasm occurred, the findings (Hill, 2007; Kim & Lee, 2008) suggested that it jeopardized the process because many adopters ignored the innovation. In a university, as with any organization where an innovation has

been implemented, managers need to manage and monitor the process, so they are alert to when a chasm occurs. To address communication problems that cause a chasm, managers should recognize that the early majority group needs suitable references and communication that the innovation will help them to improve how they carry out their responsibilities in the organization. Finding solutions to address this problem will help to overcome the chasm, so the innovation continues to diffuse through the process.

Claim 3

Managers in universities should seek to better understand the needs of students, faculty and staff before the adoption of an innovation begins in an effort to avoid or overcome communication barriers that hinder adoption. There was support for this claim because the communication problems identified in this study were the concerns of potential adopters or those who had already adopted the innovation. It is reasonable to expect that managers in the university were not aware of these concerns related to the innovation prior to implementation. However, in one case (Hacker et al., 1998), a survey was conducted prior to implementation to determine the views of those who would be impacted. This action is partially supported by Moore's crossing the chasm theory because, in this study, it can be applied before implementation of an innovation. The theory suggests universities can learn from their mistakes to be more successful at diffusing innovations through their organizations.

CONCLUSION

This study included a review of 10 case studies which were synthesized to answer the question, what are communication problems that act as barriers to hinder innovation diffusion in universities? The findings from the synthesis revealed four themes of communication barriers. They are channels or messages perceived as untrustworthy, the absence of information or support for technology training, unclear guidelines, and the absence of interpersonal communication. Half of the studies included at least one communication problem related to the theme of the absence of interpersonal communication. This finding correlates with Rogers' (1983) model in that interpersonal communication is more appropriate than mass communication for influencing the adoption decision of a potential adopter. Most importantly, the findings provide scholarly evidence for managers responsible for managing innovation diffusion in universities.

Limitations

There are limitations to this research as with all research. One limitation is that REAs are less rigorous and substantive than systematic studies which would allow for a more comprehensive study and an examination of numerous studies. Also, the small sample of 10 articles which were reviewed limits generalizability. Another limitation is the study focused only on the university setting.

Management Implications

Managers in universities should recognize that how their organizations communicate an innovation can influence the adoption decision of potential adopters. They should be alert to potential communication barriers that can hinder an adoption of an innovation. Communication barriers may be perceived by potential adopters as ineffective and/or inappropriate because of the channels that are used during the diffusion, the messages about the innovation, and/or the source of the communication. Managers who are pro-active will help to ensure that their organizations continuously innovate to enhance teaching and learning.

Implications

This study fills the void in scholarly research on communication problems that hinder adoption of innovations and particularly in the context of universities. An examination of the issue through the lens of Rogers' diffusion of innovations and Moore's chasm provides a unique perspective about innovation and the adoption process.

Future Research

Suggestions for future research could include an examination of communication barriers to innovation in different settings. An examination could also include a comparison of the communication barriers in several different settings, such as government, nonprofit, and business. Research may also include an examination of other types of barriers that hinder the adoption of innovations.

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APPENDIX

TABLE A
QUALITY AND RELEVANCE APPRAISAL

Article	WoE A = 30% Soundness of Studies	WoE B = 30% Appropriateness of study design for answering the review	WoE C = 40% Relevance of the study focus to the review	WoE D (A+B+C): OVERALL APPRAISAL
Egnoto et al. (2013)	HIGH: Explicit, detailed methods, results sections for data collection & analysis	HIGH: Case study, framework, & findings provide evidence for synthesis	MEDIUM: Sample population & context related to university diffusion, adopters of an innovation; purpose of study was not to identify communication problems	80%
Hacker (1998)	HIGH: Explicit, detailed methods, results sections for data collection & analysis	MEDIUM: Case study, framework, & findings partially provide evidence for synthesis	MEDIUM: Sample population & context related to adopters & innovation (not yet diffused) in a university; purpose of study was not to identify communication problems	65%
Hill (2007)	HIGH: Explicit, detailed methods & results sections for data collection and analysis	HIGH: Case study, framework, and findings provide evidence for synthesis	MEDIUM: Sample population & context related to university diffusion, adopters of an innovation; primary purpose of study was not to identify communication problems	80%
Hodgkinson-Williams & Mostert (2005)	HIGH: Explicit, detailed methods & results sections for data collection and analysis	MEDIUM: Case study, framework, & findings provide partial evidence for synthesis	MEDIUM: Sample population & context related to university diffusion, adopters of an innovation; primary purpose of study was not to identify communication problems	65%

Article	WoE A = 30% Soundness of Studies	WoE B = 30% Appropriateness of study design for answering the review	WoE C = 40% Relevance of the study focus to the review	WoE D (A+B+C): OVERALL APPRAISAL
Ikpe (2011)	HIGH: Explicit, detailed methods & results sections for data collection and analysis	MEDIUM: Case study, framework, & findings provide partial evidence for synthesis	MEDIUM: Sample population & context related to university diffusion, adopters of an innovation; primary purpose of study not to identify communication problems	65%
Kim & Lee (2008)	HIGH: Explicit, detailed methods, results sections for data collection & analysis	HIGH: Case study, framework, & findings provide evidence for synthesis	MEDIUM: Sample population & context related to university diffusion, adopters of an innovation; primary purpose of study was not to identify communication problems	80%
Martin & et al. (2013)	HIGH: Explicit, detailed methods, results sections for data collection & analysis	HIGH: Case study, framework, & findings provide evidence for synthesis	MEDIUM: Sample population & context related to university diffusion, adopters of an innovation; primary purpose of study was not to identify communication problems	80%
Muwanga-Zake & Gregory (2010)	HIGH: Explicit, detailed methods, results sections for data collection & analysis	MEDIUM: Case study, framework, findings provide partial evidence for synthesis	MEDIUM: Sample population and context related to university diffusion and adopters of an innovation; primary purpose of study was not to identify communication problems	65%

Article	WoE A = 30% Soundness of Studies	WoE B = 30% Appropriateness of study design for answering the review	WoE C = 40% Relevance of the study focus to the review	WoE D (A+B+C): OVERALL APPRAISAL
Osgersby (2013)	HIGH: Explicit, detailed methods, results sections for data collection & analysis	MEDIUM: Case study, framework, findings provide partial evidence for synthesis	MEDIUM: Sample population and context related to university diffusion and adopters of an innovation and communication; primary purpose of study was not to identify communication problems	65%
Suciati (2011)	HIGH: Explicit, detailed methods, results sections for data collection and analysis	MEDIUM: Case study, framework, findings provide partial evidence for synthesis	MEDIUM: Sample population & context related to university diffusion and adopters of an innovation; primary purpose of study was not to identify communication problems	65%

Note: This chart provides a weighted quality and relevance appraisal for each study used for synthesis. A rating of "low" carries no value, a rating of "medium" carries half value, and a rating of "high" carries the full value. Maximum weight is 100 percent and all studies are above the cutoff value of 50 percent. Adapted from "Quality and Relevance Appraisal," by A. Harden and D. Gough, in D. Gough, S. Oliver, and J. Thomas, *An Introduction to Systematic Reviews* (pp. 161-162), 2012, Thousand Oaks, CA: Sage. Copyright 2012 by Sage. Adapted with permission.

TABLE B
TABLE OF ANALYSIS AMD SYNTHESIS OF ARTICLES

Note: The diffusion element of time is based on when the university implemented the innovation for studies with the primary focus on faculty, and for studies primarily focused on students taking a class, the time is based on the length of the study. The number of asterisks assigned to a communication barrier indicates what theme it contributed to. For example, a barrier that received one asterisk contributed to the theme on untrustworthy channels and messages. Each of the four categories (columns 2-4) is assigned the weight of 25 percent for a total of 100 percent contribution to the synthesis. If an article included sufficient information for each category, then the contribution for that article to the synthesis is 100 percent. However, if the article included sufficient information in three out of four of the categories, the contribution is 75 percent.

Study	Rogers' Diffusion of Innovations Elements Time/Innovation/ Communication/Social Process (25%)	Moore's Chasm (25%)	Communication Barriers (25%)	Synthesis Themes (25%)	Total Contri- bution to Synthesis = 100%
Egnoto et al. (2013)	4 hrs/crisis/phones, text messaging, face-to-face & direct email/students in university	No	*Not trusting of information sources	*Communication barriers are channels or messages perceived as untrustworthy.	100%
Hill (2007)	2 yrs/emails about strategic planning process/emails, world wide web, informal communication, meetings/planning committee, faculty, staff, students in university	Yes	Too many emails (information overload), ****information distributed to mass group of people does not pertain to "me"		100%
Hacker (1998)	Not applicable/email policy/not applicable/library employees in university	No	**Lack of administrator enforcement, support for training & knowledge, *uncertain about email privacy, concern about restrictive email policy	**Communication barriers are the absence of information or support for technology training. ***Communication barriers are unclear guidelines.	100%
Hodgkinson -Williams & Mostert (2005)	1 month/online debating course/emails, listserv/students, faculty in university	Insuffi- cient info	***Lack of clarity about deadlines & procedures		75%
Ikbe (2011)	4-8 yrs/e-learning/online classroom/students, faculty in university	Insuffi- cient info	****Desired discussion offline; students used abbreviated informal language	****Communication barriers are the absence of interpersonal communication.	75%

Study	Rogers' Diffusion of Innovations Elements Time/Innovation/ Communication/Social Process (25%)	Moore's Chasm (25%)	Communication Barriers (25%)	Synthesis Themes (25%)	Total Contri-bution to Synthesis = 100%
Kim & Lee (2008)	2 yrs./e-teaching/promotional plan, early adopters' videos/faculty, students in university	Yes	****Insufficient inter-actions, unsatisfactory emotional exchanges, **difficulty w/self-education and evaluation	**Communication barriers are the absence of information or support for technology training.	100%
Martin et al. (2013)	5 years/online teaching/online technology/students, faculty in university	No	****Instruct-or difficulty recognizing student confusion, **don't know how to handle technical difficulties	***Communica-tion barriers are unclear guidelines.	100%
Muwanga-Zake & Gregory (2010)	1-2 yrs/academic blogs/open policy, IT support group blogs/faculty, students in university	No	Open policy (***no rules, requirements *training,)	****Communication barriers are the absence of interpersonal communication.	100%
Osgersby (2013)	1 year/virtual learning technology/course modules supported by technology/students in university	Insuffi-cient info	****Expected difficult course to be face-to-face; reluctant to use technology for group work	****Communication barriers are the absence of interpersonal communication.	75%

Note: The diffusion element of time is based on when the university implemented the innovation for studies with the primary focus on faculty, and for studies primarily focused on students taking a class, the time is based on the length of the study. The number of asterisks assigned to a communication barrier indicates what theme it contributed to. For example, a barrier that received one asterisk contributed to the theme on untrustworthy channels and messages. Each of the four categories (columns 2-4) is assigned the weight of 25 percent for a total of 100 percent contribution to the synthesis. If an article included sufficient information for each category, then the contribution for that article to the synthesis is 100 percent. However, if the article included sufficient information in three out of four of the categories, the contribution is 75 percent.