EFFECTS OF MULTIMEDIA STAFF DEVELOPMENT PRESENTATIONS ON FACULTY'S CONCEPTUAL UNDERSTANDING AND COMPUTER ANXIETY

by

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The purpose of this mixed-methods study was threefold: (a) to identify the historical antecedents to the current technology status of a community college, (b) to provide a snapshot of a cohort of faculty involved in deciding upon whether to include technical innovations into their classrooms, and (c) to determine the effects of two approaches to staff development on the content learning and anxiety of faculty from these several discipline areas.

The historical antecedents were investigated using a case study approach involving review of archival records and stakeholder interviews. This background was used to identify the community college's place in the innovation diffusion process.

The quantitative component of the study consisted of a series of technology training sessions, one on a software product (PowerPoint), one on a hardware product (SmartBoard from Smart Technologies, Incorporated), and one dealing with the integration of the two. One group received the training in a traditional (face-to-face) manner the second group was presented with the identical content in the form of a streaming media file.

Pre- and posttests on both content and anxiety were administered to the participants. Additionally, survey instruments were administered to collect demographic information and to determine the participants' reaction to the training sessions.

Mean values indicated that both groups increased their content knowledge and decreased their level of anxiety. An analysis of covariance was performed on both content and anxiety scores. These results indicated that the Face-to-face Group exhibited significant ($p < .05$) improvement on the content exams. There was no significant difference ($p > .05$) between the groups in terms of their anxiety scores.

Acknowledgments

The completion of this dissertation represents the end of a very long and often winding road. While pursuing this degree I changed professional positions (and states) three times. Each time meant a period of acclimation where getting used to the new job took priority over degree work, but the completion of the degree always came back to the forefront.

I am much indebted to Dr. Charles Ansorge who, in the many starts and stops, continued to believe in my ability to complete the process. It has been quite a ride. Joining us on that ride were my committee members Dr. David Brooks, Dr. David Fowler, and Dr. Sheldon Stick. I appreciate their willingness to sometimes use technology to bridge the distance for committee meetings.

I also owe a debt of gratitude to Dr. Michael Vitale, former suitemate from East Carolina University, who provided continuing motivation and the occasional statistical clarification. Even while he was operating projects in two states he had the time to review my work.

And, finally, to my boys Benjamin, Shane, Dustin, and Scot who often had to be understanding of their dad going off to the library to do homework. I hope they realize that this effort was really all for them. May they take the example to heart and keep up with their homework as well.

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INTRODUCTION

Colleges and universities have been slow in integrating technologies into their classrooms despite repeated warnings from a variety of sources (e.g. Commission on Technology and Adult Learning, 2001; U.S. Congress, 1988) regarding the need for students to have these skills in order to be successful in the information-based economy that has developed.

Rogers (1995) has proposed a classification scheme dealing with adopters of change based on their receptivity. Yet it is a variety of factors that determine the timeline for technology implementation and faculty acceptance at an individual institution. This study focuses on a particular phase of classroom technology development at a small midwestern community college. The timing of this study allows both a glimpse at faculty attitudes as the community college moved into a new phase of technology acceptance and an investigation of whether an innovative form of staff development would help resolve some issues that have held the institution's progress in technology implementation back until now. The use of a mixed-method investigation provided the opportunity to gain a historical perspective, provided a snapshot of the faculty who represent this next stage of implementation's attitudes, and determined whether a new approach to staff development was viable as a means of familiarizing this group of faculty with new technologies and decreasing computer anxiety.

The historical perspective was addressed by reviewing how the community college arrived at its current stage of technology acceptance. This was done by reviewing the historic record and identifying pre-study technology activities of the faculty as a whole. The snapshot provided perspective on content and anxiety measures as the participating faculty proceed through a technology training series. And, finally, the comparison between face-to-face and multi-media based staff development in terms of both content mastery and effect on computer anxiety was accomplished through comparison between groups of content and anxiety scores as well as through surveying attitudes.

Statement of Problem

Nationally and at every educational level, faculty need to identify, secure, and implement appropriate technology for use in their classrooms (Scrogan, 1989; U.S. Congress, Office of Technology Assessment,1995). There are a variety of factors that are involved in this effort, some financial, and others sociological. Consideration must be given to these factors to assist in this implementation effort, but much of the research presents fragmented views that may not apply to a particular setting.

Purpose of Study

The purpose of this mixed-methods study was threefold: (a) to identify the historical antecedents to the current technology status of the community college, (b) to provide a snapshot of a cohort of faculty involved in deciding upon whether to include technical innovations into their classrooms, and (c) to determine the effects of two approaches to staff development on the content learning and anxiety of faculty from these several discipline areas.

Significance of Study

Case studies provide an opportunity to better understand significant events. Once an understanding is achieved, parallels can be drawn to similar situation. By examining this institution's progress towards technology implementation lessons may be learned that could assist another institution in achieving their goals more effectively. Further, through investigation of alternative methods of staff development, this study could offer a new approach to meeting a growing training need.

Research Questions

The following are the research questions addressed in this study:

1. What were the landmark events that brought the community college to its current level of technology implementation?

2. What are the characteristics of the faculty who are currently pursuing implementation of technology into their classrooms?

3. Are there significant differences between traditional (face-to-face) staff development presentations and technology- (multimedia) based sessions in terms of learning content and anxiety level?

Research Hypotheses

The following research hypotheses were tested in this study:

1. There is no difference in the mastery of content attained between face-to-face training participants who have been assigned to on-line training; and,

2. There is no difference between the anxiety levels of training participants in face-to-face and on-line training conditions.

Assumptions of Study

Since the faculty involved in this study did not have access to technology equipment in their classrooms, it was assumed that all were at the same basic point in their understanding of its operation and potential use in a classroom environment. Pre-tests for the various content areas were used to substantiate this assumption.

This study recognized that there is no conclusive answer regarding gender effects on computer anxiety. The majority of potential study participants were, in fact, female and no attempt was made to balance the sample group based on gender or address this issue.

A certain level of motivation was anticipated with the modification of numerous classrooms into Smart Classrooms. These modifications included the installation of an LCD video projector, instructor computer station, a VCR/DVD unit and a SmartBoard system that provides both whiteboard and computer touch-screen functions.

Limitations of Study

Although results from this study seem promising, certain factors must be considered that preclude development of broad generalizations.

Results from the faculty from the participating discipline areas may not be applicable to the faculty body as a whole. Faculty in Allied Health and Nursing may have similarities to their colleagues in the physical sciences but may not be applicable to engineering technology areas. The same may be said of the social scientists.

There may also be differences in faculty's classroom operation (e.g. amount of lecture, student board work) that would have an impact on instructors' perceived value of these new training tools. Research informs us that faculty will only embrace those technologies that they feel apply to their setting (Elmore, 1996; Kerr, 1991; Wolski, 1999) so this might have an impact on both their desire to learn and level of anxiety.

Since these types of differences can exist between disciplines and between instructors within a discipline, there was no way to control for the influence of this condition.

In any self-reporting instrument studying anxiety, questions are subject to interpretation by the individual completing the instrument. Caution must be used when attempting to draw conclusions on the basis of subjective data.

Faculty who were not scheduled into one of the modified classrooms may have less motivation to learn the materials, but the likelihood of their having this technology in their particular classrooms was not revealed until after the training was completed.

Definitions of Terms

Allied Health. Allied Health faculty represent the discipline areas of Occupational Therapy, Pharmacology, Radiology, and Sonography.

Computer Anxiety. The uncomfortable feeling individuals may experience when using various forms of technology.

Computer on Wheels (COW). Multimedia cart with a computer, VCR and/or DVD, and LCD projection system.

Fields. This represents an organizational structure that includes multiple departments or discipline areas.

Instructional Technology Center. Established at the community college in 1997 as part of a Title III grant, this area provides staff development and support in technology for all faculty and staff of the community college.

Local Experts. Faculty who had previously participated in training experiences dealing with one of the instructional tools of the study. These experts were called upon to validate the study's content evaluation instruments and the central questions used in both the focus group sessions and the exit survey.

Nursing. Faculty in this area represent both Associate Degree Nursing and Licensed Practical Nursing levels.

SmartBoard™. A whiteboard input device that provides the ability to annotate presentations and capture these revised presentations either as a series of images (JPG), a web page (HTML), or a video with annotations and voice narration (AVI) for later review.

Smart Labs. Smart labs consist of an instructor computer station, a SmartBoard, LCD projection device, student stations, classroom management software (SynchronEyes), and may include video capabilities such as a VCR, DVD, and/or presentation station (document camera).

Smart Classrooms. Smart classrooms consist of a SmartBoard, and LCD projection device. Faculty are provided with an instructor computer station or a docking station that allows them to use their own laptop computer.

Social Sciences. Faculty in this area represent the disciplines of Geography, History, Human Services, Psychology, and Sociology.

Chapter II
REVIEW OF LITERATURE

Introduction

The purpose of this chapter is to outline the theoretical framework and relevant research that shapes this study. The study is grounded in the diffusion of innovation theory first proposed by Everett Rogers (1995) in 1962 and his concept of adopter categories. This study builds from Rogers' generalized theory to the current state of technology adoption at the community college where this study is based. Several factors can influence the adoption of an innovation. Two factors that are considered by this study are computer anxiety and availability of training opportunities. This chapter identifies relevant studies regarding computer anxiety as well as those discussing research on innovative staff development delivery practices to broaden the availability of training for faculty.

Diffusion of Innovation Theory

Chin (1993) stated that new tools and techniques could not resolve the problems in education today. He reports "…it is more and more obvious that the job cannot be done without them." Numerous authors (Garland, 1991; Heinich, 1991; Latham, 1988; Leggett, 1996; and, Saettler, 1968) point to various innovations that promised change in the classroom and wonder what happened to that change.

In 1962 Everett Rogers (1995) proposed a theory of diffusion of innovation. His work was focused not on changes in educational technology but in settings as varied as the failure of an effort to have rural Peruvian villagers boil their drinking water to the adoption of hybrid corn crops by farmers in 1930s Iowa. His is a theory of communication and how communication can influence decisions regarding adoption of innovation. He defines diffusion as the process through which "an innovation is communicated through certain channels over time among the members of a social system." The innovation diffusion process consists of the following steps: (a) knowledge, (b) persuasion, (c) decision, (d) implementation, and (e) confirmation. Rogers further states the importance of a change agent in the process.

Knowledge is the point when an individual or group first becomes aware of the existence of an innovation and begins to learn about it. Persuasion occurs when the individual or group forms an opinion regarding the innovation (positive or negative). Decision involves activities that lead to a choice to adopt or reject the innovation. Implementation is when the innovation is initially put to use. And finally, confirmation involves the individual or group seeking reinforcement for their decision or reversal of the decision to implement the innovation if the implementation has been found to go against cultural codes.

Adopter Categories

Rogers (1995) presents the concept of categories of innovativeness. He states that progress of the acceptance of an innovation within a population can be characterized in the distribution curve seen in Figure 1. He has coined terms for each of five categories: (a) innovators, (b) early adopters, (c) early majority, (d) late majority and (e) laggards. Innovators are the first to adopt a new technology. They can be found from the far left of the curve to a point minus two standard deviations from the mean. Early adopters are the next to adopt and are from minus two standard deviations from the mean to minus one standard deviation. The early majority can be found from the mean date of acceptance of the innovation to minus one standard deviation. Late majority goes from the mean date to plus one standard deviation, and the laggards are in the area greater than one standard deviation above the mean.

Diffusion Process

Rogers (1995) also represents adoption of the innovation in term of an S-shaped cumulative curve in addition to the bell-shaped frequency curve. The S-shaped curve represents a slow start to acceptance, with a rapid climb reaching its maximum rate of increase when one-half of the group accepts the innovation, then tapering off when the innovation is almost fully accepted. Elmore (1996) views this type of growth as being a result of an accelerating loop, where information exchange begins slowly but then "snowballs into a cumulative force." This is in contrast to Latham's (1988) view of instructional innovations that represents a four-year cycle of death. Latham's observation

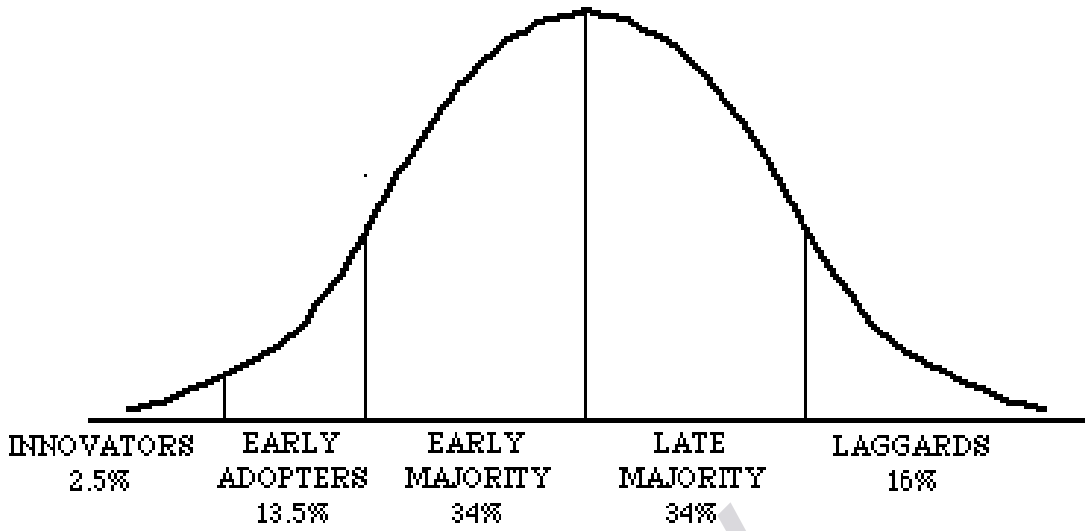

Figure 1. Categories of individual innovativeness

is that most innovations hit their peak of interest at around a year and a one-half. At that point there is a precipitous drop in enthusiasm, usually coinciding with the arrival of a new innovation just when the previous one has begun to come down from its high point.

Several models exist that enumerate influences on adoption. Rogers (1983) theory of perceived attributes used the acronym STORC to describe influencing factors. STORC stands for (a) Simplicity, (b) Trialability, (c) Observability, (d) Relative Advantage, (e) Compatibility. Simplicity and conversely complexity looks at how easily understood the concept is. Trialability speaks to whether the innovation can be experienced without having to make an irreversible commitment. Observability is the extent to which the effects of the innovation can be detected. Relative Advantage measures the value of the innovation against what has been used in the past. Compatibility looks at whether the innovation is consistent with the value structure of a system.

To this list Sherry (2000) added "S" for support. By support, Sherry was referring to whether or not there is enough commitment of time and resources to be sure the innovation will be successful within a system. This would include administrative and political support for the innovation in terms of initial resources (whether funds are available to provide the innovation for those who want it), training resources (to assist those wanting the innovation to know how to best use the new resource), and maintenance (commitment to continuing service and support once the initial implementation is finished). Other researchers have come to similar conclusions.

Stockdill (1992) sees the critical factors as the technology having a proven track record, relative advantage, compatibility, useability, trialability, and observability. Wolski (1999) views the influences as simply perceived usefulness and perceived ease of use.

Wilson (1998) feels that less attention should be spent discussing theories, and more time should be focused on using these theories to aid in needs assessment, planning, and implementation of change within organizations. Surry (1997) believes the study of diffusion theory could result in a "systematic, prescriptive model of adoption and diffusion."

To all of these approaches authors such as Bailey (1998), Dalton (1989), and Kelty (2002) add the need for staff development activities which focus on activities that are directly applicable to the instructors' classroom. They point to the human need being greater than the technological. Kelty wants the teacher to return to his or her class "bursting with ideas" on how to implement the skills they were presented. But lack of staff development is not the only reason diffusions fail.

Reasons Diffusion Fail

In order to plan for success, it is also necessary to investigate possible reasons for failure of a technology to be implemented. The barriers to the use of technology have changed somewhat since the publication of the 1988 Office of Technology Assessment's (OTA) report. This report (U.S. Congress, 1988) suggested that the barriers included "lack of equipment, inadequate or inappropriate training, and, for some, anxiety about new technology." Leggett and Persichitte (1998) indicated five top obstacles they identified in their review of 40 years of research. The obstacles, referred to through the acronym TEARS consisted of a lack of (a) time, (b) expertise, (c) access, (d) resources, and (e) support.

Rogers (1995) also considers the loci of control over the diffusion-adoption process. He identified three potential sources of innovation: (a) an individual adopter, (b) a collection of individuals, or (c) a central authority figure. The individual adopter makes a decision with a "take it or leave it" approach. The collection of individuals could be a faculty development group or collective bargaining unit. In that situation there either needs to be consensus within the group or at least an acceptance that some members of the group could experiment with a technology. And, finally, the central authority could be a local administration, pressure from community groups (e.g., PTA) or some state or federal mandate. Tenner (1996) echoes this point when he questions whether institutions have the money and the will to deploy technology. He writes, "The question is whether some combination of employer self-interest, collective bargaining, and legislation can require using what is already there." Sherry (2000), however, values the mutual roles of the individual and the community in the adoption process. Before individuals can value an innovation they must not fear it.