A correlational study of adoption of instructional technology by higher education faculty and their social communications network

Amy Huff Berryhill

Follow this and additional works at: https://scholarsjunction.msstate.edu/td

Recommended Citation
Berryhill, Amy Huff, "A correlational study of adoption of instructional technology by higher education faculty and their social communications network" (2007). Theses and Dissertations. 89. https://scholarsjunction.msstate.edu/td/89
A CORRELATIONAL STUDY OF ADOPTION OF INSTRUCTIONAL TECHNOLOGY BY HIGHER EDUCATION FACULTY AND THEIR SOCIAL COMMUNICATIONS NETWORK

By

Amy Huff Berryhill

A Dissertation
Submitted to the Faculty of Mississippi State University
In Partial Fulfillment of the Requirements For the Degree of Doctor of Philosophy in Instructional Systems, Leadership, and Workforce Development in the College of Education

Mississippi State, Mississippi

September 2007
A CORRELATIONAL STUDY OF ADOPTION OF INSTRUCTIONAL TECHNOLOGY BY HIGHER EDUCATION FACULTY AND THEIR SOCIAL COMMUNICATIONS NETWORK

By

Amy Huff Berryhill

Approved:

Vance A. Durrington
Associate Professor of Instructional Systems, Leadership, and Workforce Development (Director of Dissertation)

Mark A. Goodman
Associate Professor of Communications (Committee Member)

Sue S. Minchew
Associate Dean of Education and Professor of Curriculum and Instruction (Committee Member)

James H. Adams
Associate Professor of Instructional Systems, Leadership, and Workforce Development (Committee Member)

Anastasia C. Elder
Assistant Professor of Counseling, Educational Psychology, and Special Education (Committee Member)

Linda F. Cornelious
Professor & Interim Head of Instructional Systems, Leadership, and Workforce Development (Committee Member)

Jerry Mathews
Associate Professor of Instructional Systems, Leadership, and Workforce Development (Graduate Coordinator)

Richard L. Blackbourn
Dean, College of Education
Name: Amy Huff Berryhill

Date of Degree: December 2007

Institution: Mississippi State University

Major Field: Instructional Systems, Leadership and Workforce Development

Major Professor: Dr. Vance A. Durrington

Minor Field: Communication

Minor Professor: Dr. Mark A. Goodman

Title of Study: A CORRELATIONAL STUDY OF ADOPTION OF INSTRUCTIONAL TECHNOLOGY BY HIGHER EDUCATION FACULTY AND THEIR SOCIAL COMMUNICATIONS NETWORK

Pages in Study: 117

Candidate for degree of Doctor of Philosophy

Colleges and universities continue to make huge financial investments in instructional technology for the classroom. Mississippi State University faculty, assigned to teach in technology enhanced classrooms, are expected by administration, as well as students, to incorporate the technology into their instruction. This study examines whether faculty consider themselves adopters or non-adopters of the instructional technology provided in the Technology Classrooms and if relationships exist between this adoption status and demographics, personal social network, and training source. The data was gathered from faculty assigned to teach in the Technology Classrooms at Mississippi State University using an online survey.

Demographic data was compared with the adoption/non-adoption status to determine if relationships existed. The demographic characteristics used were gender, race/ethnicity, age, and years teaching. A Chi Square and Point Biserial Correlation
Coefficient were to analyze the data to determine if demographic characteristics related to adoption/non-adoption status of the instructional technology in the Technology Classrooms.

Using Rogers’ Diffusion of Innovations theory, along with Social Network Communication Analysis, this study determined if relationships existed between higher education faculty and their ego social communication network of who talks to whom data provided by the respondents. A matrix of the communication network was analyzed with UCINET software. The data provided by the UCINET software was analyzed with SPSS using a Point Biserial Correlation Coefficient to determine if relationships exist between the adoption/non-adoption status and social communication networks of faculty.

Methods of instructional technology training and adoption/non-adoption status were analyzed to determine if relationships existed by using descriptive statistics and a point biserial correlation coefficient.

While no relationships existed between the adoption/non-adoption status of faculty and the variables of age, race/ethnicity, gender, years teaching, and social communication networks, low to moderate relationships were shown to exist between instructional technology training and adoption/non-adoption status. It was determined that 90 percent of respondents considered themselves adopters of the instructional technology provided in the Technology Classrooms. This data suggests that the addition of more Technology Classrooms on campus and the expansion of instructional technology training available to faculty should be explored.
DEDICATION

I dedicate this work to my parents, Max and Jane Huff. They both set wonderful examples of how to get satisfaction from hard work. They also both helped me realize that being a small town farm girl has been the best preparation for what life has to offer; and that Lake St. John will always be the place I call home no matter where I may choose to live.

In addition, I dedicate this work to my family, Ray, Cody, and Carolina. They made sacrifices for me through the entire process. I could not have done it without their help and support.
ACKNOWLEDGEMENTS

I sincerely thank my dissertation chair, Dr. Vance A. Durrington. His guidance and support, on and off the soccer field, was uplifting. Even when he moved away, he was there when I needed his advice. To my committee, Dr. James Adams, Dr. Anastasia Elder, Dr. Mark Goodman, Dr. Sue Minchew, and Dr. Linda Cornelious – a unique group with strong and varied opinions.

To my family and friends who were able to keep me on the path, even though they had no idea what I was doing or why I was doing it. I really appreciate how you could smile, nod, and appear engaged, as I explained it all to you. Ray, Cody, and Carolina also sacrificed evenings and weekends so I could do the work. They were all understanding and supportive throughout. I especially want to acknowledge my true and loyal friend, Hope Young. Thank you for the encouragement when I needed it, holding my hand as we said goodbye to our friend Tracey (she lived life on her own terms), and always being on my side no matter what. I am blessed to have you as my friend.

To my comrades in the classroom and those who gave words of encouragement, allowed for the odd phone calls, and were willing to meet me on the weekends. All I can do is laugh and shake my head. It has all been such an amazing, life changing experience. Thank you for being part of it.
TABLE OF CONTENTS

DEDICATION ........................................................................................................ ii
ACKNOWLEDGEMENTS .................................................................................... iii
LIST OF TABLES .................................................................................................. vii
LIST OF FIGURES ............................................................................................... ix

CHAPTER

I. INTRODUCTION ................................................................................................................................. 1
   Background of the Study .................................................................................................................... 1
   History of the Use of Instructional Technology ............................................................................ 2
   Student Mindset ............................................................................................................................. 3
   Faculty Use of Instructional Technology ...................................................................................... 5
   Diffusion of Innovations ................................................................................................................. 7
   Statement of the Problem .............................................................................................................. 8
   Need for the Study ........................................................................................................................... 9
   Purpose of the Study ....................................................................................................................... 10
   Description of the Study Site ........................................................................................................ 10
   Research Questions ....................................................................................................................... 13
   Justifications of the Study ............................................................................................................. 13
   Definition of Terms ........................................................................................................................ 14

II. REVIEW OF LITERATURE .............................................................................................................. 17
   Evolution of Instructional Technology .......................................................................................... 17
   Students Today ............................................................................................................................... 21
   Technology Use by Students ........................................................................................................ 23
   Instructional Technology Investments .......................................................................................... 25
   Faculty Use of Instructional Technology ..................................................................................... 28
   Diffusion of Innovations ............................................................................................................... 32
   Social Network Analysis .............................................................................................................. 39
   Diffusion of Innovations and Social Network Analysis ................................................................. 43
   Summary .......................................................................................................................................... 44
E. CORRELATIONS BETWEEN ADOPTER/NON-ADOPTER
STATUS, ACADEMIC COLLEGE, AND ACADEMIC
RANK OF FACULTY ....................................................................... 111

F. DESCRIPTIVE STATISTICS OF LEVELS OF KNOWLEDGE
AND USE OF LECTERN HARDWARE IN THE
TECHNOLOGY CLASSROOMS........................................................ 113

G. DESCRIPTIVE STATISTICS OF LEVELS OF KNOWLEDGE
AND USE OF LECTERN SOFTWARE IN THE
TECHNOLOGY CLASSROOMS.......................................................... 115
<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Descriptive Statistics for Response (n=188) vs. Non-Response (n=10)</td>
<td>62</td>
</tr>
<tr>
<td>2</td>
<td>Academic Rank (n=188)</td>
<td>63</td>
</tr>
<tr>
<td>3</td>
<td>Academic College (n=188)</td>
<td>64</td>
</tr>
<tr>
<td>4</td>
<td>Gender (n=188)</td>
<td>65</td>
</tr>
<tr>
<td>5</td>
<td>Race/Ethnicity (n=188)</td>
<td>66</td>
</tr>
<tr>
<td>6</td>
<td>Gender and Adoption/Non-Adoption</td>
<td>68</td>
</tr>
<tr>
<td>7</td>
<td>Race/Ethnicity and Adoption/Non-Adoption</td>
<td>68</td>
</tr>
<tr>
<td>8</td>
<td>Instructional Technology Training (n=188)</td>
<td>70</td>
</tr>
<tr>
<td>9</td>
<td>Correlations Between Adopter/Non-Adopter Status of Faculty and Instructional Technology Training</td>
<td>71</td>
</tr>
<tr>
<td>10</td>
<td>Strength of Relationships of Correlation Coefficients</td>
<td>71</td>
</tr>
<tr>
<td>11</td>
<td>Correlations Between Adopter/Non-Adopter Status of Faculty and Levels of Use of Technology Classroom Equipment</td>
<td>73</td>
</tr>
<tr>
<td>12</td>
<td>Correlations Between Adopter/Non-Adopter Status of Faculty and Levels of Knowledge of Technology Classroom Equipment</td>
<td>74</td>
</tr>
<tr>
<td>13</td>
<td>Correlations Between Adopter/Non-Adopter Status, Academic College, and Academic Rank of Faculty</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>14</td>
<td>Descriptive Statistics for Levels of Knowledge of Technology</td>
<td>114</td>
</tr>
<tr>
<td></td>
<td>Classroom Lectern Equipment</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Descriptive Statistics for Levels of Use of Technology</td>
<td>114</td>
</tr>
<tr>
<td></td>
<td>Classroom Lectern Equipment</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Descriptive Statistics for Levels of Knowledge of Technology</td>
<td>116</td>
</tr>
<tr>
<td></td>
<td>Classroom Lectern Software</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Descriptive Statistics for Levels of Use of Technology</td>
<td>117</td>
</tr>
<tr>
<td></td>
<td>Classroom Lectern Software</td>
<td></td>
</tr>
</tbody>
</table>
LIST OF FIGURES

1. Distribution of Adopters ........................................................................... 35
2. The “Chasm” ............................................................................................ 37
3. Example of a social network analysis matrix where “1” represents a nomination and “0” represents no nomination ...................................... 59
4. Example of a sociogram of who talks to whom contacts from Figure 3 .................................................................................. 59
5. Page One of the Online Survey ............................................................... 106
6. Page Two of the Online Survey ............................................................... 107
7. Page Three of the Online Survey ............................................................. 108
8. Page Four of the Online Survey ............................................................... 109
9. Page Five of the Online Survey ............................................................... 110
CHAPTER 1
INTRODUCTION

Background of the Study

Colleges and universities are making huge financial investments in instructional technology. The use of instructional technology for improving teaching and learning in higher education has been the focus for many years. In a 1996 speech aimed at addressing recent advances in educational technology, Rudenstine (2001), former president of Harvard University, said,

In purely economic terms, we expect to spend something in the range of $75 to $100 million over the next two to three years on academic-related information technology – above and beyond the substantial investments already made since the early 1990s. The last time universities experienced such far-reaching change in information processing, along with exponential expenditure growth, was during the last quarter of the nineteenth century and the first quarter of the twentieth century. (p. 117)

In the past, new technologies have been touted as the next big thing to change the face of higher education. According to Leider (1998), keeping pace with new technologies and integrating them is a financial problem facing colleges and universities.
Challenges associated with technology will continue as integration of technology into higher education continues to progress. These challenges can range from funding issues to faculty use. In addition, higher education also faces an environment where the use of instructional technology is emerging as an expected method of teaching. Roberts (2005) stated that students in colleges and universities “have significant expectations regarding the use of technology to support learning. However, those expectations appear tied to faculty members and their ability to use technology correctly” (p. 3.6).

Academic institutions cannot rely on traditional instructional methods to survive, much less prosper (Katz, 1999). Dunderstat (1999) wrote “As knowledge-driven organizations, it is not surprising that colleges and universities should be greatly affected by the rapid advances in technology – in computers, telecommunications, and networks” (p. 5). Indeed, instructional technology has and will continue to have a profound impact on the future of higher education teaching and learning activities.

**History of the Use of Instructional Technology**

Instructional technology for the purposes of this research is defined as the analysis, design, development, implementation, evaluation, and management of technology used in the instructional process, either in the classroom or online. The term *instructional technology* is often used interchangeably with the term *educational technology*. However, instructional technology often places more emphasis on the use of technology to support learning while educational technology focuses more on the craft of using technology in an educational setting.
The idea of using instructional technology is not a new concept; it has been ongoing in colleges and universities for over fifty years. As early as 1948, audio-visual aids (e.g., motion pictures, slide films, slides, record players, and recorders) in instruction and learning were used to aid instruction. At that time, universities were making instructional technology courses required for certain degrees (Wayne State University, 1998).

In the 1950s, television education was considered the modern instructional technology of the time. In 1963, “The Era of Instructional Technology” began with a shift from the audiovisual concept of assisting teachers to teach and towards the idea of technologies being used by students without direct teacher intervention. In 1972, universities were offering courses in technology foundations that primarily addressed computer use in education. Then in the 1980s, the instructional technology boom hit college and university campuses with the increased use of computers, two-way interactive video, and audio technologies. The 1990s saw a steady increase in the use of personal computers, which developed and evolved into smaller, faster, more affordable, and more user-friendly systems (Wayne State University, 1998).

Student Mindset

Another reason for emphasis on instructional technology in higher education can be directed toward the type of students currently enrolled in colleges and universities. The current generation of traditional college age students has grown up with computers and the Internet. As members of the Net Generation (Oblinger & Oblinger, 2005), these
students expect technology to be used in the classroom, and they expect a proficient level of technology use by the instructor. The use of instructional technology in higher education classrooms is reported annually by The Campus Computing Report published by The Campus Computing Project. The Campus Computing Project, which started in 1990, is the largest continuing study of the role of information technology in American colleges and universities. Each year, the project conducts a national study with around 600 two- and four-year public and private colleges and universities participating. The qualitative and quantitative data collected is compiled and published annually (Green, 2005). In The Campus Computing Report, Green (1995) stated, “Growing numbers of college students expect a technology component in their courses; across all disciplines, growing numbers of faculty are utilizing technology resources to enhance the curriculum” (p. 3). In the following year, Green (1996) stated that “colleges confront growing expectations from students across all disciplines that technology will be part of the learning and instructional experience” (p. 5). McNeely (2005) wrote that “traditional lectures are not fulfilling the learning potential of typical students today. As technology in the classroom progresses, more and more students are going to demand it be included.” (p. 4.7) Research by Draude and Brace (1999) found that students believed their learning was significantly enhanced when faculty demonstrate acceptance and adoption of instructional technology.

Every year since 1996, The Campus Computing Report has continued to show that the single most important technology issue of all institutions (public and private universities, public and private four-year colleges, and community colleges) has been
integrating technology into instruction (Green, 2005). Many of the faculty at these institutions are what Prensky (2001) describes as Digital Immigrants. This is in comparison to the college students of today which he refers to as Digital Natives. The difference between the two is that the students of today, Digital Natives are “native speakers of the digital language of computers, video games and the Internet” (Prensky, p. 2). These students have been interacting with computers their entire lives (Oblinger & Oblinger, 2005) whereas Digital Immigrants are “not born into the digital world but have, at some point, become fascinated by and adopted many or most aspects of the new technology” (Prensky, p.1). The distinguishing difference between the two groups is that while Digital Immigrants have to learn this new “language,” Digital Natives see it as a way of life (Prensky). What was once thought of as a novel innovation - using instructional technology in the classroom - has become ubiquitous and expected by students (Green, 1996).

Faculty Use of Instructional Technology

The use of instructional technology is not a new idea being pushed on unwilling faculty. Over the past 50 years, higher education has seen the evolution of instructional technology through its use by faculty for classroom instruction. The integration and use of instructional technology in the classroom by faculty have not been reported on a consistent basis. There is evidence that the use and integration of instructional technology by faculty have seen a major surge only since 1999 (Draude & Brace, 1999). A number of reasons for this increase can be attributed to governmental initiatives regarding
instructional technology and the Internet reflected in the *Goals 2000: Educate America Act* (H. Res. 1804, 1994) and the *No Child Left Behind Act of 2001* (H. Res. 1, 2002). The influence of these acts has been reflected in the realignment of college and university mission statements incorporating the use of technology in higher education (Miss. Cons. Art. VIII, 2002). These governmental initiatives made it necessary to implement the use of instructional technology into higher education curriculum. By integrating more instructional technology into the curriculum and classroom, faculty provided students in teacher education with the knowledge to implement these initiatives. In addition, accreditation and higher education governing boards, such as the National Council for Accreditation of Teacher Education (NCATE) and Southern Association of Colleges and Schools (SACS), adopted technology standards. An example of recent changes within NCATE is stated in 5.3 Enhancement 21 of the *Professional Standards for the Accreditation of Schools, Colleges, and Departments of Education*, “General use classrooms must be upgraded to support new technologies” (National Council for Accreditation of Teacher Education, 2002; Mississippi State University, 2003). As organizations such as NCATE and SACS adopt technology standards, technology in the classroom becomes a priority throughout educational institutions.

Past research related to faculty use of instructional technology has been based on factors such as gender, tenured/non-tenured status, and age. The research indicates that technology use among women and men is about equal, tenured faculty use it more than non-tenured faculty, and the average age of faculty using instructional technology is around 50 (Gabriner & Mery, 1998; Lucas, 2003; Poindexter & Ferrarini, 2004).
five-year study on faculty adoption of instructional technology, Poindexter and Ferrarini reported a higher percentage of faculty were using instructional technology, the education and science colleges represented the majority of users, and there had been little change over the past five years in the mean age of 50 for higher education faculty identified as users of instructional technology.

Diffusion of Innovations

The use of instructional technology in the classroom is an innovation that has been continually evolving for many years. Studies about the adoption process of an innovation have been the focus of research for decades. Rogers (1995) wrote that “An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (p. 11). The method by which a particular innovation is communicated through channels to members of a social system is diffusion. This communication network is the avenue through which the information and a common understanding of that information are achieved. Within the social system of faculty, there is a diverse group of individuals who act and react differently (Yates, 2001). Therefore, social structure is necessary within the system to provide regularity and stability and to be able to predict others’ behavior with some degree of accuracy (Rogers).

Communication structure is also an important part of a social system. While not all members of a social system communicate equally with each other, members who are most alike typically tend to communicate with each other (Yates, 2001). As a pattern of communication develops, it becomes easier to predict individual behaviors, including
when an innovation will be adopted (Rogers, 1995). Yates illustrated this with the example that teachers within a school tend to communicate with each other more often than they do with administrators. Therefore, when a teacher adopts a new idea, it is more likely other teachers will adopt the idea because they are of like mind (Yates). Rogers (1995) wrote that a homophily, the degree to which individuals who communicate with each other are similar, can be a barrier to the flow of innovations within a system:

Homophily can act as an invisible barrier to the flow of innovations within a system. New ideas usually enter a system through higher status and more innovative members. A high degree of homophily means that these elite individuals interact mainly with each other, and thus the innovation does not “trickle down” to non-elites. Homophilous diffusion patterns cause new ideas to spread horizontally, rather than vertically, within a system. Homophily therefore can act to slow down the rate of diffusion in a system. (p. 288)

During the adoption or non-adoption process, social network analysis can be used to identify who talks to whom about an innovation or to whom to go to for advice. Valente (1995) wrote that “network models of diffusion of innovations demonstrates how social structure – who communicates with whom – determines the spread of influence, ideas, and products” (p. 1).

**Statement of the Problem**

In times of budget constraints, college and university investments in instructional technology need to produce desired outcomes. One such desired outcome is the adoption
of instructional technology by faculty. To whom faculty talk about instructional technology is an important aspect evaluating this outcome. In the 1996 *Campus Computing Report*, Green (1996) notes that faculty monitored the experience of their colleagues who were *early adopters*.

Colleges and universities have geared up to meet the needs of students in the Net Generation by infusing technology into classrooms and purchasing enterprise level applications to accommodate online and hybrid courses. As colleges and universities make huge investments in the instructional technology found in electronic classrooms, the assumption is that the faculty assigned to teach in the Technology Classrooms are, to some degree, using the instructional technology. There is a need to determine if, and to what extent, the Technology Classrooms are being used.

**Need for the Study**

Institutions have made substantial financial investments in instructional technology and determining how often and to what extent it is being used. Such information could influence future investments. As more technology is made available in the form of wireless networks, portals, and more technology-driven courses designed for the Net Generation/Digital Native student, faculty are expected to keep pace with the technology placed in the classrooms. However, there is no process in place to monitor or track the extent of instructional technology use by faculty assigned to the Technology Classrooms. By determining if faculty are using the provided instructional technology, how they are using it, and to what extent they are using it, this study can aid higher
education administrators when considering if additional technology expenditures and training are warranted.

**Purpose of the Study**

The purpose of this study is to determine whether faculty classify themselves as either adopters or non-adopters of the instructional technology provided in Technology Classrooms and to determine if there is a correlation between this classification and the faculty member’s demographics, social communication network, and training. The results will provide insight to methods of identifying who is using the instructional technology, who is influencing use, and training as related to use of faculty.

**Description of the Study Site**

In November 2002, an ad hoc committee was appointed by the president of a land grant southeastern university and was “charged with the responsibility of reviewing the state of the institution in terms of classroom technology and provide recommendations on minimum classroom connectivity, technology standards, accommodating “high end” classroom technology needs, and management and support issues” (Pearson & Brook, 2002, p. 2). The committee determined that a classroom classification system was needed. The result was a practical classroom classification system that was used to classify existing classrooms on campus. Classrooms on the campus were divided into two general operational categories and then classified into five technology-related categories. The two general operational categories were general use classrooms and department
specific classrooms. General use classrooms were operated by the university in general and scheduled by the registrar’s office, while department-specific classrooms were controlled by individual academic departments, scheduled and supported by these specific academic departments (Pearson & Brook). The five technology levels include Level 1 to Level 5 with Level 5 being the most technologically advanced classroom. The report stated:

Level 1 classrooms are considered basic classrooms with chalkboards and very limited AV aids such as a pull down screens and a data port. Level 2 classrooms have some limited form or forms of modern instructional technology installed and/or accessible on a limited basis. Level 3 classrooms have adequate environments and instructional technologies to support effective technology enriched educational experiences. Level 4 classrooms are considered to be equipped with more advanced and elaborate instructional technologies including interactive video conferencing capabilities to support two-way interactive distance learning. Level 5 classrooms include up-to-date personal computers with appropriate software in addition to interactive video conferencing for distance learning.” (p. 4)

As a result of Pearson and Brook’s report, two classrooms were equipped with identical instructional technologies and pilot tested in the fall 2003 semester. As new classrooms were added, all existing classrooms were upgraded. Additional classrooms were added in the spring 2004 and spring 2005 semesters. Several departments used the technology classroom specifications to upgrade additional classrooms with their own
funding. These classroom specifications matched identically with the other classrooms.

At the end of the fall 2005 semester, a total of 49 technology classrooms populated the campus. The 49 classrooms on the campus were recognized as “Level 2+” classrooms. In a classroom recognized as Level 2+, the equipment and software include:

- Lectern Computer
- Document Camera
- VCR
- DVD Player
- Lectern Microphone
- Laptop Connection
- Optional Equipment: Remote Point Navigator
- Optional Equipment: Wireless Microphone
- Optional Equipment: Flash Drive
- Optional Equipment: Video Camera
- AutoCAD 2005
- Auto Desk Inventor 8
- Internet Explorer 6
- MathCAD 11
- MatLab 7
- Microsoft Access XP
- Microsoft Excel XP
- Microsoft PowerPoint XP
- Microsoft Word XP
- Microsoft FrontPage
- Microsoft PhotoEditor
- Mechanical Desktop 2004 DX
- SAS
- Mathematica 5
- S-Plus 6.1 Professional
- SPSS 12 for Windows
- SSH Secure Shell
- WS-FTP
- X-Win 32
- QuickTime Player
- RealOne Player
- Windows Media Player
- Unigraphics NX
- Adobe Reader
• Outlook Express
• Novell GroupWise

There were no data available to determine if the faculty assigned to teach in these classrooms actually integrated the provided technology into their instruction and if so, to what extent.

Research Questions

1. Is there a relationship between the demographic characteristics and the adoption/non-adoption status of faculty teaching in technology classrooms?

2. Is there a relationship between the adoption/non-adoption status and the social communication network of faculty teaching in technology classrooms?

3. Is there a relationship between instructional technology training and the adoption/non-adoption status of faculty teaching in technology classrooms?

Justifications of the Study

The large institutional investments in projects such as the Classroom Technology Project (Pearson & Brook, 2002) require ongoing funds to provide maintenance and upkeep on the equipment. Upkeep and maintenance allocations are extensive when everyday use and normal wear and tear occur in the equipment. The investment is not a one time allocation; it is continual.

The information gleaned from this study may provide means for determining if the technology-equipped classrooms are being used adequately and promote an understanding of how the social communication networks and demographics of faculty
influence adoption. Identifying potential factors that impact the technology classroom usage by faculty, including demographics, categorization of faculty as adopters or non-adopters of instructional technology, and the influence of their social communication network on their adoption may provide needed information to administration, program/center directors, and academic departments regarding financial investments and additional support based on the utilization of existing instructional technology.

**Definition of Terms**

**Adopters/Non-Adopters** is the self-reported status of the surveyed population referring to use and knowledge of equipment and software in the Technology Classrooms.

**Density** is a term used in social network analysis meaning how many people I know, also know one another. It is a sparse versus dense network represented by a number 0 to 100 (Borgatti & Molina, 2005).

**Digital Curriculum** is a learning environment that integrates educational videos, still images, encyclopedia concepts, teacher guides, lesson plans, and assessments into a learning tool for teachers and students (Green, 1995).

**Digital Immigrants** are those who were not born into the digital world, but use and have adopted most aspects of the new technology (Prensky, 2001).

**Digital Natives** are students of today who use the digital language of computers, video games and the Internet to receive information fast that they use to parallel process and multi-task (Prensky, 2001).
Enterprise Level is computer software designed for large scale use by businesses and educational institutions.

A Hybrid Course is a course that uses face to face instruction with students, but also supplements the course with information available on the Internet (Kaleta, Garnham & Aycock, 2002).

The Net Generation has grown up with technology. These students were born around the time the growth of the personal computer became affordable for in homes. They grew up with home digital media use, such as the computer, games, and the Internet (Oblinger & Oblinger, 2005).

Normalized Broker is a term used in social network analysis meaning the number of pairs (people that are not directly connected to each other) divided by the number of pairs in the network. It is represented by a number 0.00 to 1.00 (Borgatti & Molina, 2005).

Normalized Ego Betweenness is a term used in social network analysis meaning the number of people who a person is connected to indirectly through their direct links and is represented by a number 0 to 100 (Borgatti & Molina, 2005).

Reach is a term used in social network analysis meaning the number of nodes, which are groups and people in the network, that are within two links (or two degrees of separation) from a person and is represented by a number 0 to 100 (Borgatti & Molina, 2005).

Technology Classroom consists of a variety of equipment and software technology in classroom environments that enable the user to present information to learners (Pearson & Brook, 2002).
Weakness is a term used in social network analysis meaning the number of people I know who do not know anyone or very few of the other people I know, divided by the size of the network and represented by a number 0 to 100 (Borgatti & Molina, 2005).
CHAPTER 2
REVIEW OF LITERATURE

Colleges and universities strive to keep instructional technology current and in line with the student population by making huge investments in classroom instructional technology. Due to these huge investments, higher education institutions are concerned whether faculty are adopting the provided technology into their instruction. This chapter presents a review of literature on issues related to a historical perspective of technology in higher education, a description of the current students enrolled in colleges and universities and how technology relates to their learning, the technology investments of higher education, issues related to faculty’s use of the technology in instruction, the diffusion of innovations theory, and social network analysis as related to faculty use of instructional technology.

Evolution of Instructional Technology

Baker and Baker (2004) wrote that almost as long as formal education has existed, there has been controversy over the use of technology in the classroom. Adding to the combined years of accumulated instructional technology, the latest addition of technology in the classroom is the computer and the Internet. As with other classroom
technologies that came before and failed to gain wide integration, the public’s perception of these new instructional technologies is that they will gain wide integration because they are innately different from prior technologies. These new instructional technologies challenge the role of teachers by providing new ways to teach while enhancing student learning skills through its ability to address different learning styles (Baker & Baker, 2004).

According to Baker and Baker (2004), higher educational environments have historically been strongholds of incorporating new technologies into the classroom. Over the years, instructional technology has become more complex and sophisticated as learning environments have moved from the use of slates to multimedia classrooms. The use of instructional technology in the classroom has been viewed as the panacea for improving poor teaching practice. Baker and Baker contradict themselves by writing that while the use of instructional technology has been viewed as a panacea for improving poor teaching, it has also been viewed as the cause of poor teaching. The perceived shortcomings of instructional technology occur because faculty believe that just because instructional technology is available, it must be used. Knowledge of effective teaching and learning methods that integrate instructional technology are not always explored by faculty. Instructional technology should be viewed as a teaching and learning tool. Nevertheless, emphasis has usually been placed on finding a purpose for the tool rather than understanding why and how the tool should be used (Baker & Baker). Baker and Baker wrote that raising the learning bar by integrating instructional technology into the classroom will not necessarily result in improved learning outcomes if good clinical practices are not observed.
As far back as the innovation of the simple lecture centuries ago, reformers have sought more efficient ways of teaching (Cuban, 1986). Teaching through film, radio, and television contributed to the technology advancements in higher education, but did not revolutionize instruction, even though each new technology was promoted as a way to revolutionize education. During the 1980s, promotion of desktop computers for every student was the rage. This promotional push demonstrated how each new instructional technology product or idea was characterized as the next big teaching aid. Film, radio, television, VCRs, and desktop computers as instructional technologies were each characterized as something that would make a positive change in teaching and learning. The desktop computer was the only one that made the jump into mainstream teaching (Cuban). Cuban, even as a harsh critic of instructional technology recognized the contributions desktop computers have made to higher education instruction, which includes the ability to address different learning styles. Cuban also reported that faculty incorporated desktop computers into student-centered practices such as cooperative learning and differentiation of instruction, a majority of students benefited because they were able to address different learning styles and abilities. In addition, Stöttinger and Schlegelmilch (2002) reported that students perceive instructional technologies to be advantageous based on their perceptions of the course and career-related benefits of using the technology and the amount of exposure the students have had to the technology. The use of instructional technologies has the potential to more actively involve and motivate students, thereby enhancing student-learning outcomes (Stöttinger & Schlegelmilch).

A 50-year historical account traces the evolution of the use of instructional technology in education on the campus at Wayne State University. The account focused
on two eras of instructional technology on the campus beginning with The Era of Audiovisual Education, 1948 – 1963, and The Era of Instructional Technology, 1963 – 1998. According to Wayne State University (1998), the first era was identified with an early introduction of instructional technology followed by descriptions of an audiovisual curriculum during this period in the College of Education. It was noted in the document (Wayne State University, 1998) that with the introduction of each new instructional technology, the curriculum was adapted for its use only to be replaced as soon as the next new technology introduction. In the second era, the implications of the change to instructional technology were briefly examined, followed by descriptions and enhancements of courses in the 1963 curriculum that included instructional technology. Continued curricular innovations and a review of instructional technology impressions in the 1970s were identified. An account of how each failed to remain prominent after each newer technology was introduced (e.g. film, radio, and television) demonstrated how quickly technologies would rise and fall within higher education. The focus of the account moves to more recent years in the 1980s which described how the College of Education reorganized and prioritized the focus on instructional technology. The account notes that the importance of using instructional technology was demonstrated by the College of Education’s requirement for faculty to integrate technology into their course. The 1990s brought on rebuilding instructional technology facilities and improving equipment as well as curriculum enhancements that reflected additional changes (Wayne State University, 1998). The move to the use of personal computers for instructional technology has seen the longest running and most widespread curriculum integration to date. This account maintains that the personal computer has made extensive contributions
in terms of addressing multiple learning styles, more so than any of the prior instructional
technologies, such as radio, film, and television (Wayne State University, 1998).

According to Baker and Baker (2004), the use of instructional technology has the
ability to shape how people live and work, and how children are educated. As long as
formal education has existed in the United States, there has been some controversy
regarding the use of instructional technology in the classroom. This controversy exists
when faculty become resistant to change instructional delivery method citing that their
administration emphasizes the use of the instructional technology rather than providing
an understanding of why the instructional technology should be used. The use of
instructional technology in the classroom is more than a desktop computer with all the
peripherals, but an integration of teaching and learning styles as identified by the
individual instructor. Baker and Baker praise what instructional technology has allowed
faculty and students to do and allowed them to achieve in the context of teaching and
learning. The new instructional technologies that have been incorporated into higher
education classrooms are innately different from the type of instructional technology that
appeared before when considering how the use is integrated into the instruction. The
current instructional technologies not only challenge the role of the instructor, but
simultaneously, enhance the student learning environment (Baker & Baker, 2005).

**Students Today**

In recent years, students have been another factor contributing to the emphasis
colleges and universities have placed on faculty to integrate technology into their
instruction. As a member of the Net Generation (Oblinger & Oblinger, 2005), college and
university students expect technology to be used in the classroom and they expect faculty to be proficient in using the technology. Ten years ago, *The Campus Computing Report* (Green, 1996) stated that

Growing numbers of college students expect a technology component in their courses; across all disciplines, growing numbers of faculty are utilizing technology resources to enhance the curriculum. (p. 2)

Having some “digital curriculum” in the classroom enhanced student learning (Green, 1996). Green stated that “colleges confront growing expectations from students across all disciplines that technology will be part of the learning and instructional experience (p. 3).” McNeely (2005) wrote that “traditional lectures are not fulfilling the learning potential of typical students today. As technology in the classroom progresses, more and more students are going to demand it be included” (p. 4.7). Research by Draude and Brace (1999) found that students indicated that their learning was significantly enhanced when faculty demonstrated acceptance and adoption of instructional technology.

According to a study by Oblinger and Oblinger (2005), Net Generation college students have grown up with technology. They were born around the time computers began entering homes and schools, and an estimated 20 percent were using computers between the ages of five and eight. In addition, by the age of 16 to 18 years old, virtually all of the Net Generation was using computers (Oblinger & Oblinger, 2005). Reports indicate (Grunwald, 2003; Grunwald, 2004; Kaiser Family Foundation, 2003) that through age groups beginning at four and going up to 17 years old, home digital media use has approached the amount of time spent watching television.
Technology Use by Students

Oblinger and Oblinger (2005), as well as McNeely (2005) wrote that access to the latest technology is important to the Net Generation. Home computers and the Internet have become almost as prevalent as the telephone (Oblinger & Oblinger, 2005). With this prevalence, the use of instant messaging has emerged as a common form of communication as well as a social mechanism (Oblinger & Oblinger). According to the research by the Pew Internet and American Life Project (Lenhart, Simon & Graziano, 2001), 70% of teenagers use instant messaging to keep in contact with friends and family. This is slightly less than the 8% who use email for the same purpose. In a separate study conducted by NetDay, 74% of the teenagers surveyed indicated that they used instant messaging as a major communication tool. Once in college, many students use instant messaging to stay in touch with people back home, often on a daily basis. Of these students, 41% indicated they planned to use email and instant messaging to contact professors and classmates regarding assignments (Lenhart, Simon & Graziano, 2001). The NetDay (2004) study found that students knew more screen names than home phone numbers, indicating the importance of instant access to this generation.

Howe and Strauss (2000) characterized traditional college students as individuals who gravitate toward group activity, identify with parents’ values and feel close to their parents, believe it's cool to be smart, like new technologies, focus their attention on grades while participating in extracurricular activities, and are racially and ethnically diverse. Prensky (2001) wrote, “Our students have changed radically. Today’s students are no longer the people our educational system was designed to teach” (p. 1). The students of today, kindergarten through college, are the first generation to be born into and grow up
completely surrounded by technology. Prensky noted that this group has spent their lives surrounded by computers, video games, digital music, video cameras and cell phones, along with whatever is the latest toy of the digital age. According to Prensky (2001), the average college graduate has spent less than 5,000 hours of their lives reading, but over 10,000 hours playing video games with the computer, using email, the Internet, cell phones, and instant messaging. All of this has been interwoven into their everyday lives (Prensky, 2001).

Because of the constant interaction, Prensky (2001) indicated that the students of today think and process information fundamentally differently than the previous generation. He identifies these students as Digital Natives because they are native speakers of the digital language, which includes computers, video games, and the Internet. In contrast to Digital Natives are the Digital Immigrants.

Digital Immigrants are those not born into the digital world but have, at some point in their lives, become interested in and adopted new technologies. The distinction between Digital Immigrants and Digital Natives is compared to immigrants adapting to a new country. Digital Immigrants adapt to the new technologies; however, their “accent” is their foot in the past. Prensky (2001) illustrated how the accent of the Digital Immigrants could be seen in such ways as printing out emails (or having the secretary do it), bringing people physically into the office to see a Web site rather than sending them the URL, and making a phone call to ask someone if they received an email.

This accent of Digital Immigrant faculty is obvious to the Digital Natives in the educational setting because Digital Natives view current faculty as heavily accented, unintelligible foreigners lecturing to them. Often, the Digital Natives cannot understand
what the Digital Immigrants are saying and ask questions such as “What does ‘dial’ a number mean?” (Prensky, 2001, p. 2). The characteristics of Digital Natives offered by Prensky (2001) are similar to the description offered by Howe and Strauss (2000) pertaining to the current traditional college student. In his description, Prensky described Digital Natives as being accustomed to obtaining information extremely fast, preferring to parallel process and multi-task, and preferring to see graphics than read the text. In addition, Digital Natives function better when networked, thrive on instant gratification/rewards, and prefer games to any type of serious work.

Oblinger and Oblinger (2005) and Prensky (2001) both contend that students of today are different types of learners than in the past because student of today are wired to a constant stream of digital information with the availability of wireless networks and cell phones. Ten years ago, students were not as digitally connected. Teaching the students of today is challenging, but not impossible when one considers that, “there is no reason that a generation that can memorize over 100 Pokemon characters with all their characteristics, history, and evolution can’t learn the names, populations, capitals and relationships of all 101 nations in the world. It just depends on how it is presented” (Prensky, p. 5).

**Instructional Technology Investments**

Colleges and universities have always been information-intensive institutions committed to providing and forming the evolving future qualifications needed for a thriving workforce and productive society. Providing students with these qualifications begins at the faculty level (Bates 1999). Institutional investments in instructional
technology allow faculty to provide the students with diverse learning opportunities by providing access to the tools necessary for contribution to the student’s education (Bates, 1999). Katz (1999) wrote that while higher educational institutions provide information which prepares the future workforce and society, the increasing and sometimes overwhelming position higher education administration faces is not one of if the instructional technology should be used on campus, but rather, how it will be funded. The need for acquiring advanced instructional technology continues to increase as does the financial responsibility of its maintenance (Katz). Institutions failing to keep up with instructional technology advancements and trends provide a disservice to the students. Estimates from the past ten years indicate American colleges and universities invested billions of dollars annually to meet instructional technology needs for faculty (Katz).

Colleges and universities have increased spending on instructional technology dramatically. Colleges and universities continue to be held accountable for the large sums of money invested into instructional technology (Bull, Dalinga-Hunter, Epolboin, Frackmann, & Jennings, 1994). A study of the investment in instructional technology by higher education showed evidence of a correlation between the instructional technology investment dollars to higher faculty productivity and an increase in the efficiency of the teaching-learning process (Jacobsen, 2000).

Given the size of investment in instructional technology in higher education, the increased demand for distance education in the future, and the demonstrated effectiveness with some educational outcomes, it seems reasonable to investigate why the integration of technology for teaching and learning is so appealing to some faculty and not to others. (Jacobsen, 1998, p. 1)
In addition, Jacobsen (1998) stated that a growing number of faculty are enthusiastic about adopting technology, however, there was still a large number of faculty whom seemed hesitant or reluctant to integrate instructional technology into their teaching.

Britten and Cassady (2005) indicated that with the continual growth in the importance of technology in schools, as well as the sizable allocations of budgets directed toward technology purchases, it seems imperative that a better understanding be established to identify how teachers are using the technology in the classroom to enhance student learning. Technology in the classroom has typically been acknowledged as a positive shift in the betterment of students’ post-school skills, but the act of placing technology in the classroom is not enough (Burke, 2000). Cuban (2001) argued that access to technology does not translate into the use of that technology by classroom teachers. Dockstader (1999) stated that to effectively measure technology integration, evaluators should focus on how the technology is being implemented in the classroom, not just what resources are available for use. According to Britten and Cassady (2005), school administrators need sound evaluative tools in order to make such an internal assessment process reliable. Standards required for evaluative purposes are currently not in place, but are being studied by the International Society for Technology in Education (NETS Project, 2003).

Grasha and Yangarber-Hicks (2000) wrote that college faculty have had a variety of options which enabled them to integrate instructional technology into their teaching. The inherent problem of providing faculty with the latest and greatest available instructional technology resources is an expensive proposition that many colleges and universities face during times of budgetary constraints (Grasha & Yangarber-Hicks,
Cuban (2001) wrote that more than two decades after the introduction of personal computers in the nation, with more and more schools being wired, and billions of dollars being spent, less than two of every ten teachers use computers in their classroom, while only three to four were occasional users. The remainder never use computers for instruction. When the use of these instructional technologies was examined, the results indicated computers were being used most often for word processing and low end applications in classrooms in ways that maintained rather than altered existing teaching practices. After investing so much in instructional technology for the classroom, the results pertaining to use were unfortunate (Cuban, 2001).

**Faculty Use of Instructional Technology**

Many educators understand that the integration of technology into teaching has the ability to enhance students’ education. As long as formal education has existed in the United States, there has been some controversy regarding the use of technology in the classroom (Baker & Baker, 2005). Classrooms in colleges and universities today contain sophisticated technology that is innately different from what was available in the past. The difference in the classroom technology of today is that it challenges the role of teachers and enhances student learning simultaneously (Baker & Baker, 2005).

Spotts (1999) interviewed faculty members at a U.S. Midwestern university about their use of instructional technology in their teaching. Fewer than 40% of the faculty population self reported that they had good to expert knowledge of or experiences with instructional technologies. Spotts (1999) stated that while faculty members had become more comfortable with using computers, the instructional use of computers remained
minimal. Even with attempts to introduce instructional technology into the higher education infrastructure, little change in the basic acts of classroom teaching had occurred. With technology and computers an integral part of everyday life, higher education classrooms do not appear to reflect this occurrence (Spotts, 1999).

Wentworth, Earl, and Connell (2004) identified two elements that they believe stand out as major challenges to increasing the rate at which technology is applied towards the improvement of teaching and learning: (a) finding the time necessary to take full advantage of the opportunities that are presented; and (b) working with brains that came of age with typewriters and ditto machines rather than PowerPoint and Photoshop. Although there have been occasional glimpses of the transforming power of technology, today’s faculty find that they must repeatedly orient—and reorient—their thinking to focus on the potential that the technology has in helping accomplish their teaching goals. Wentworth, Earl, and Connell (2004) believe that this time in a faculty member’s career could be truly exciting, one in which continuing to negotiate the steep learning curve offers the promise of enabling faculty to become more effective teachers and learners through the integration of technology.

Reinhardt (1999) reported that faculty willing to experiment with technology in the classroom determined that using the instructional technology alone was not enough. The importance in using instructional technology as a tool for delivering instruction was to add value to the teaching and learning process. Emphasis should be placed on understanding how using instructional technology results in improved learning (Baker & Baker, 2004).
A study by Draude and Brace (1999) of college faculty at a middle southern university assessed the impact of instructional technology on teaching and learning. At the same university the following year, students were assessed to measure perceptions about instructional technology and the impact of it on learning (Draude & Brace, 1999). The results indicated that the use of instructional technology positively affected student learning as well as increased student interest and satisfaction. Further results indicated that the role of faculty and their ability to use instructional technology were major factors in student learning. The ability of faculty to use more advanced instructional technology techniques better facilitated learning activities. Students agreed that instructional technology was an integral part of the learning environment (Draude & Brace).

Providing technology for faculty that can be used for instructional purposes has become a priority in higher education. Every year since 1996, *The Campus Computing Report* (Green, 2005) has shown that the single most important technology issue of all institutions (public and private universities, public and private 4-year colleges, and community colleges) has been integrating technology into instruction. Having the facilities and resources available for use was reported as an important issue as well. Eighty-five percent of the respondents at 600 colleges and universities believed technology had improved instruction on their campus (Green, 2005). Even though the use of instructional technology has been reported as important and improving (Green, 2005), a shortage of equipment, facilities, and institutional support has had a role in hindering the use of instructional technology; Geoghegan (1994) argued that the most important reason for limited use was in the human realm.
Geoghegan (1994), who wrote about instructional technology use, devised a model of innovation and change that indicated a normal distribution when the number of new adopters were plotted against time. Along this continuum, Geoghegan (1994), as well as Rogers (1995) identified five categories of adopters: innovators, early adopters, early majority, late majority, and laggards. However, Geoghegan (1994) pointed out that when a "chasm" exists between early adopters and the early majority, the innovation might not be adopted by the mainstream (Geoghegan, 1994). In the case of faculty and use of instructional technology, Geoghegan (1994) contrasted early adopters, who are risk takers, more willing to experiment, generally self-sufficient, and interested in the technology itself with early majority faculty, who were more concerned about the teaching and learning problem being addressed than the technology used to address it, viewed ease of use as critical, and wanted proven applications with low risk of failure.

A survey carried out at Western Michigan University (Spotts & Bowman, 1993) lends credibility to Geoghegan's ideas. When asked to identify factors that influence their use of instructional technology, more than half of the faculty responses identified: availability of equipment, promise of improved student learning, funds to purchase materials, compatibility with subject matter, advantages over traditional methods, increased student interest, ease of use, information on materials in their discipline, compatibility with existing course materials, university training in technology use, time to learn the technology, and comfort level with technology.
Diffusion of Innovations

Brace and Roberts (1996) wrote that a campus-wide approach to instructional technology integration based on Rogers’ (1995) stages of adoption targeted mainstream faculty’s perceived needs. Innovations were more likely to gain acceptance if users believed it had a somewhat high relative advantage or that it was better than the idea that came before (Rogers, 1995). Innovations that had a higher compatibility with existing values, past experiences, and the needs of the adopters also had a higher likelihood of being adopted. Individuals proceed from (1) knowledge of an innovation, (2) to persuasion, (3) to a decision to adopt or reject, (4) to implementation, and finally (5) to confirmation of the decision (Rogers 1995).

Jacobsen (1997) examined the characteristics of early adopters and faculty’s use of instructional technology using Rogers’ (1995) diffusion of innovations theory. He focused on what differentiated early adopters of instructional technology from mainstream faculty. The results indicated that early adopters self-reported good to excellent computer skills while the later adopting mainstream faculty self-reported poor to fair computer skills. Jacobsen’s research pointed to early adopters being more self-sufficient and more willing to experiment with technology than mainstream faculty. Both mainstream and early adopters believed that a lack of training was an obstacle to widespread computer use, thus limiting its adoption by mainstream faculty. In addition, it was speculated that early adopters would continue to flourish in a status quo model because of their interpersonal networks. The field is constantly evolving because of technological advancements and developments that present challenges. Studies focusing
on early adopters would assist institutions in moving forward in supporting classroom
technology (Jacobsen, 1997).

When approaching the integration of technology into instruction, Kearsley (1996)
proposed that excellent teaching should be the first priority citing that the adoption of
technology would not improve poor teaching skills. He further stated that if cases were
found where faculty were documented as both early adopters of instructional technology
and demonstrated excellent teaching skills, profiling this expertise would prove beneficial
to other higher education faculty who aspire to develop both their instructional
technology and teaching skills (Kearsley, 1996).

Surry and Farquhar (1997) explained that disciplines ranging from agriculture to
marketing to medicine have used the diffusion of innovations theory to aid in the increase
of adoption of innovative products and ideas. The research focused on how instructional
technologists were using diffusion of innovations theory to increase implementation and
utilization of innovative instructional practices and products. Diffusion of innovations
theory was also useful for examining how media literacy proponents could apply the
theory to determine if there was an increase in adoption (Surry & Farquhar).

Jacobsen’s (1998) survey of faculty found that adoption patterns varied across
disciplines. Despite findings that technology was being used by more faculty, the
diffusion of technological innovations for teaching and learning was not widespread and
instructional technology had not become integrated into the curriculum.

Faseyitan and Hirshbuhl (1992) described how the effects of personal attributes,
organizational factors, and attitudinal factors were examined in regard to the adoption of
computers for instruction by university faculty. The results indicated that the
technological orientation of the faculty’s discipline, computer self-efficacy, computer utility beliefs, and attitudes toward computer were predictors of adoption.

Geoghegan (1994) wrote about the technology adoption life cycle in relationship with Everett Rogers Diffusion of Innovations Theory (1995). Geoghegan focused on the innovation of incorporating informational technology into the instructional process. The diffusion process took place in a social context with variables being the knowledge and beliefs of the academic culture, the structure of the social networks, and communication patterns. The diffusion took place over a period of time, following the same distribution of adopters as the normal adopters distribution (Rogers, 1995). In the adoption process, individuals who adopt an innovation at different points in the diffusion process differ in terms of social and psychological characteristics. These characteristics brought about their willingness to accept and adapt to changes influenced by the innovation. Such characteristics also determined attitudes towards earlier adopters and factored into their ability to influence any followers (Geoghegan). In Rogers’ (1995) Diffusion of Innovations Theory, he denotes five distinct categories of adopters as shown in Figure 1. What Rogers considered a successful innovation was one that achieved critical mass, thus the rate of adoption became self-sustaining. He stated

    The concept of critical mass is so fundamental to an understanding of such a wide range of human behavior because individual’s actions often depend on how many other individuals around them are behaving in a particular way. (p. 318)
Geoghegan (1994) illustrated how the Diffusion of Innovations Theory may apply to faculty use of instructional technology. In his illustration, one or more faculty in the department were innovators. They became aware of new technology, such as multimedia, and experimented with it and perhaps used it in the classroom or in a lab setting. These trials may or may not have been considered successful, but by trying something new, it might have caught the attention of the early adopters. If the early adopters viewed this new technology as having the potential to make improvements in their instruction, they might have experimented with the technology as well. If these early adopters deemed the application successful and displayed a noticeable improvement in an important area of teaching or student learning, and if the improvement was highly visible and seemed attractive to the early adopter’s mainstream peers, then the instructional technology innovation would have a chance of being adopted into the mainstream population. This,
according to Geoghegan (1994), would occur within the mainstream when the costs of adoption, such as time, money, and routine disruption were deemed less significant than the potential positive benefits of adoption. Geoghegan pointed out that as instructional technology use continued, it matured, became simpler and was worked into the teaching routine. This use by the early majority would influence adoption by the late majority to possibly adopt its use (Geoghegan).

Geoghegan (1994) asserted that along the continuum, each transition held many opportunities as well as many obstacles which could stall progress at almost any point. Change agents play a significant role in the diffusion process by serving as influencing factors in transitions through the adoption or non-adoption process (Rogers, 1997). Moore (1991) stated that the most critical transition is from the early adopters to the early majority because this is where the most significant potential for failure lies and refers to the transition point as the “Chasm” (Figure 2). The Chasm presents a challenge for change agents within the academic community who encourage the adoption of instructional technology by faculty.
If the innovation fails to cross the Chasm, then it will never succeed at reaching more than about 15% of the population (Moore, 1991). This lack of diffusion can be attributed to the significant differences between early adopters and early majority. Early adopters consist of technology enthusiasts and visionaries, those who like innovation and enjoy trying new technologies. Early adopters will spend the time necessary to get new untried products to work. They have the insight to recognize emerging technologies and how they can be applied to their particular area of expertise. Early majority adopters include pragmatists and conservatives whose goal is to use technology to make a measurable improvement in productivity. This group is confident in their ability to handle technology, but prefers a thoroughly thought-out solution to a known problem rather than
the latest and greatest innovation, consequently, service and support are also critical to this group of users (Moore, 1991).

The differences between the two groups (early adopters versus early majority) are key to the diffusion process and the potential changes that could alter the teaching and learning process. Geoghegan (1994) characterized early adopters as favoring revolutionary change, are visionaries, project oriented, risk takers, are willing to experiment, generally self sufficient and horizontally connected. He described the early majority as favoring evolutionary change, pragmatic, process oriented, averse to risk, wanting proven applications, needing significant support, and vertically connected.

The appeal of instructional technology to the early adopter will be very different from its appeal to a member of the early majority, despite the fact that both may recognize its potential benefits to teaching and learning; and the two are likely to have very different criteria for deciding whether or not to adopt a technology based innovation when it becomes feasible to do so. (p. 6)

From a marketing standpoint, the two groups require completely different approaches in order to transition through the Chasm. According to Geoghegan (1994), the Chasm is so significant in regards to instructional technology that it has hindered practically all efforts to bridge it. This situation, in which early adopters have approached saturation in relationship to instructional technology as an innovation and that early majority adopters have not fully embraced it, has dramatically affected the perpetuation of the Chasm. Geoghegan (1994) identified four reasons behind the adoption process stalling and consequently preventing diffusion beyond the Chasm and into the early majority: (a) ignorance of the existence of the Chasm, (b) too hard of a push to induce change, (c)
alienation of the mainstream, and (d) lack of compelling reasoning for the mainstream to adopt instructional technology. The recognition of these reasons and making efforts to correct the situation can get the adoption process moving forward again (Geoghegan 1994).

In a study by Hamilton and Thompson (1992), Rogers’ diffusion theory was used as the theoretical base to study early adopters of instructional technology through the use of an electronic communication network for teachers. This electronic communication network established a link between student teachers, graduate students, and the education faculty in a college setting through email and discussion boards. This link provided a convenient method for the exchange of ideas and questions regarding the use of instructional technology across different groups of teachers. The early adopters in this study had shared commonalities such as education, social status, social participation, cosmopolitan outlook, interpersonal communication networks, a high degree of innovation information seeking, and positive attitudes about risk and change. Hamilton and Thompson (1992) suggested that early adopters played an important role in the diffusion process because of their visibility to the early majority, which influenced their ultimate adoption. Hamilton and Thompson (1992) also suggested that communication network developers would benefit from seeking out early adopters because they could augment the diffusion process.

**Social Network Analysis**

Diffusion of innovations theory explains how new ideas and practices spread in and between communities. The theory has roots embedded in anthropology and sociology
as well as epidemiology. Empirical research confirms that the spread of new ideas and practices occur through interpersonal communications (Beal & Bohlen, 1955; Hägerstrand, 1967; Rogers, 1995). Network analysis is a technique used, according to Valente (1995), “to analyze the pattern of interpersonal communication in a social system by determining who talks to whom (Valente, 1995, p. 2).”

The diffusion of innovations occurs among individuals in a social system, and the pattern of communication among these individuals is a social network. The network of communication determines how quickly innovations diffuse and the timing for each individual’s adoption. (p. xi)

In the process of studying patterns of communication, threshold and critical mass models of diffusion can provide insight on how patterns evolve. Valente (1995) explained that threshold models focus on individuals while critical mass models describe social systems. Both threshold and critical mass models, in the context of network models of diffusion, offer a complete depiction of how social systems determine the social change for both societies and individuals (Valente, 1995).

Valente and Davis (1999) suggest that interpersonal contacts are important in diffusion of innovations studies. Researchers have relied on formal methods of measuring who talks to whom in a community. Network analysis is a method that allows researchers to locate the individuals who are considered central to the community, which means they are possibly more influential. The basic diffusion network model uses these individuals (opinion leaders), to initiate the diffusion of a new idea or practice. These opinion leaders serve as the champion for the new idea and thus, accelerate the diffusion process (Valente & Davis, 1999). Valente and Davis used the example of how an assistant professor may
be influenced by other faculty with whom he or she talks regardless of rank. This is referred to as the cohesion model of influence. In addition, the assistant professor may be influenced by other faculty who are of his or her rank, irrespective of whether or not he or she talks to them. This is what Valente and Davis refer to as structural equivalence.

Scott (2001) wrote that social network concepts are mainly concerned with the particular patterns of direct or indirect contact that agents are able to maintain. Structural equivalence, according to Scott (2001), involves general types of social relations that are maintained by particular categories of agents. Two people may have direct connections to totally different individuals, yet the type of relationship they have with other people may be similar.

Two fathers, for example, will have different sets of children to whom they relate, but they might be expected to behave, in certain respects, in similar ‘fatherly’ ways towards them. The two men, that is to say are ‘structurally equivalent’ to one another. They occupy the same social position – that of ‘father’ – and so are interchangeable so far as the sociological analysis of fathers is concerned. The idea behind structural equivalence, therefore, is that of identifying those uniformities of action that define social positions. Once the positions have been identified, the networks of relations that exist between the positions can be explored. (Scott, p.123)

By identifying structurally equivalent agents, emergent roles can be pin pointed and targeted (Scott). Scott wrote that social network analysis has emerged as a set of methods for the analysis of social structures, methods which are specifically geared towards an
investigation of the relational aspects of these structures. The use of these methods is
dependent upon the availability of relational rather than attribute data.

Wasserman and Faust (1994) described social network analysis as being based on
the assumption of the importance of relationships among certain interacting units. The
social network perspective, according to Wasserman and Faust, encompasses theories,
models, and applications that are articulated in terms of relational concepts and processes.
In addition to relational concepts, Wasserman and Faust note the importance that actors
and their actions can be viewed as interdependent, rather than independent, autonomous
units. Linkages or relational ties between actors are considered channels for the transfer
or flow of resources (Wasserman & Faust). According to Wasserman and Faust, the unit
of analysis in network analysis is not the individual, but rather an entity consisting of a
collection of individuals as well as the linkages among them.

Gretzel (2001) wrote that social network analysis focuses on uncovering the
patterns of people’s interaction. Network analysis is based on the intuitive notion that the
uncovered patterns play an important role in the lives of the individuals who display
them. According to Gretzel, network analysts believe that how an individual lives
depends on how that individual is tied into the larger web of social connections. Gretzel
stated that many believe that the success or failure of societies and organizations often
depend on the patterning of their internal structure.
Diffusion of Innovations and Social Network Analysis

Valente (1995) wrote that the combination of both diffusion of innovations theory and social network analysis provides deeper insight and reasoning to determine adoption decisions.

Diffusion of innovations and network analysis have complemented one another for over 30 years. Diffusion of innovations research has been greatly enhanced by network analysis because it permits more exact specification of who influences whom during the diffusion process. Network analysis has benefited from diffusion research by providing real-world application to compare and clarify network models. (p. 2)

Relational diffusion networks speculate that the direct contact between individuals may influence the spread of an innovation. According to Valente, there are four types of relational models: opinion leadership, group membership, personal and network density, and personal network exposure. These relational models assert that innovativeness is influenced by the direct ties sent or received by an individual. Moreover, if an individual receives many ties, adoption of the innovation is early because the individual is perceived by the group as an opinion leader. Valente summarized:

Relational models primarily analyze how an individual’s direct contacts determine his or her adoption behavior. In contrast, structural models go beyond the set of direct nominations and consider the pattern of nominations in the whole network. Thus, the network influence on adoption for any individual cannot be determined by his or her nominations alone but must be considered in light of who everyone else in the network nominated. (p. 47)
According to Valente, this is a false dichotomy in that the relation and the structure are unavoidably entwined.

Taking into consideration both the diffusion of innovations theory and social network analysis, Moersch (2002) developed an instrument to measure teachers’ use of technology in the classroom, the Level of Technology Implementation Framework (LoTi). This framework consisted of eight stages of developmental growth with technology use and attempts to quantify instructional computing practices in the classroom setting.

**Summary**

The literature shows evidence of the huge investments made by higher education administration to provide instructional technology resources for faculty. Research evidence indicates that a new type of student is populating the campuses and with these students comes an expected integration of technology by faculty into their teaching and learning. Colleges and universities are seeing a shift in not only how students are learning, but how they should be taught. Faculty are expected to use the available technology in their instruction, but in many cases, the extent of use is not known or measured. Using Rogers’ (1995) diffusion of innovations theory in conjunction with social network communication analysis will create an understanding of the application and use of instructional technology by faculty in a university setting. Identifying and recognizing the connection between a relational model of network communication and the adoption of the use of instructional technology by faculty is an area that has not been fully investigated. Studying the pattern of who-talks-to-whom relationships and personal
characteristics of adopters and non-adopters allows the research to identify the structure of communication and the adoption behavior of the population.
CHAPTER III

METHODOLOGY

In the previous chapter, a review of the literature was conducted discussing the instructional technology investments of higher education and instructional technology use by faculty and students, along with diffusion of innovations theory and social network analysis. The purpose of this study was to determine whether faculty classify themselves as adopters or non-adopters of instructional technology provided in technology classrooms on a university campus and to determine if this classification correlates with their social communication network. Identifying and recognizing the connection between a relational model of network communication and the adoption of the use of instructional technology by faculty is an area that has not been fully investigated. Studying the pattern of who-talks-to-whom relationships and personal characteristics of adopters and non-adopters allows the researcher to identify the structure of communication and the adoption behavior of the population. Further analysis of a combination of network communication patterns and demographic variables may serve as predictors of determining the characteristics of faculty members who are adoptors or non-adoptors of instructional technology.
The purpose of this study was to determine whether relationships exist between demographic variables, network communication patterns, and adoption/non-adoption of instructional technology by higher education faculty. Research questions were developed to address these relationships. The research questions were:

1. Is there a relationship between the demographic characteristics and the adoption/non-adoption status of faculty teaching in technology classrooms?
2. Is there a relationship between the adoption/non-adoption status and the social communication network of faculty teaching in technology classrooms?
3. Is there a relationship between instructional technology training and the adoption/non-adoption status of faculty teaching in technology classrooms?

This chapter presents the research methodology used in conducting this study which was designed to gather information in order to answer the research questions.

**Limitations of the Study**

The limitations of this study were that the population continued to change. Some faculty that had previously taught in the classrooms may not have been affiliated with the institution at the time of the study. These limitations were addressed in the methodology of the study.

**Design**

This study used a descriptive ex post facto correlational research design. An extensive review of the literature failed to reveal a data-gathering instrument that could be used for the study; therefore, an instrument was designed based on Rogers’ (1995)
diffusion of innovations framework and adopter/non-adopter categorization. The social communications network portion of the survey contained questions which revealed relational data as described by Scott (2001). According to Gravetter and Wallnau (2000), a correlational research design observes two variables to determine if there is a relationship. Correlational studies investigate the possibility of a relationship between two or more variables without the attempt of influence to any variable (Gravetter & Wallnau).

This study was classified as quantitative research and used analysis of numerical data to explore correlations between faculty’s adoption or non-adoption of instructional technology in the Technology Classrooms on a university campus and their social communications networks, to determine whether use was related to who talks to whom and whether communication networks and demographics can serve as predictors of adoption/non-adoption.

The research was conducted with a three-part survey. The first part collected data on frequency and levels of use of the equipment and software in the Technology Classrooms at Mississippi State University. The second part collected the names and rank/title of people whom the respondent asked or talked with about instructional technology. This information was used as the basis of the social communication network analysis determining who talks to whom about instructional technology. The third section collected the demographic information.

The survey design was adapted through other surveys by the University of Wisconsin-Madison (Christoph, 2004), the University of Tennessee (The Innovative Technology Center, 2003), and Michigan State University (Frank, 2005).
Research Questions

The research questions in this study determined relationships between characteristics of faculty and their status as either an adopter or non-adopter of instructional technology. Also, this study determined the relationship between adopter and non-adopters and the social communication network of faculty assigned to the Technology Classrooms at a southeastern land grant university, used as the study site, and determined the social communications network of who talks to whom about instructional technology on campus. Finally, this study determined if relationships existed between instructional technology training and adoption/nonadoption status of the faculty. Specifically, the research questions were:

1. Is there a relationship between the demographic characteristics and the adoption/non-adoption status of faculty teaching in technology classrooms?
2. Is there a relationship between the adoption/non-adoption status and the social communication network of faculty teaching in technology classrooms?
3. Is there a relationship between instructional technology training and the adoption/non-adoption status of faculty teaching in technology classrooms?

Population

The population consisted of university faculty members (N = 615) who were currently employed at a southeastern land grant university and were assigned to teach in one or more of the 49 technology classrooms on campus from the fall 2003 through spring 2006 semesters. The data described self-reported frequency and levels of use of the equipment and software located in the Technology Classrooms and demographic
information (i.e. years teaching, training, home computer use). The social communications network data provided by the respondents listed whom they talk to about instructional technology which identified the actors (social entities) with actions (talks to) as described by Gretzel (2001).

**Procedures**

From the faculty who had been assigned to teach in the Technology Classrooms from the Fall 2003 through Spring 2006 semesters, a census was conducted. A complete listing of the faculty was obtained from the institution’s Information Technology Services. Faculty no longer employed at the institution were identified, contacted, and used to pilot test the survey. The remaining active faculty on the list comprised the study population. An email describing the intent of the voluntary study and an invitation to participate was sent to the identified active faculty, along with the Web link to the survey. In the email, faculty were asked to respond to the email if they have never taught in the Technology Classrooms so they can be removed from the population. An incentive was offered for participation consisted of a random drawing of one respondent for an iPod Nano with a value of around $300. The iPod Nano was purchased by the researcher. The rationale of using an online survey was that every person on campus, which included faculty, staff, and students, have been assigned an official university email address. Email is widely used as a form of communication by the administration. After approval from the Institutional Review Board, the survey was posted on the Internet and housed via SurveyMonkey, an online survey software Web site that the researcher subscribed to for the purpose of housing and collecting the data. A follow up email was sent to non-
respondents after two weeks and again after three weeks. Based on Dillman’s (1978) Total Design Method, a follow-up sequence was used to collect the data. According to Bailey (1994), to reach the maximum percentage of returns, a planned follow-up is essential. Bailey (1994) produced evidence in his research that the response rate may increase as much as 20 – 30% when appropriate follow-up procedures are used.

**Instrumentation**

A preliminary draft of the survey was examined by an expert panel to determine validity. The survey was also pilot tested with a group of faculty who had taught in the Technology Classrooms, but were no longer employed at the institution study site. This pilot test of the instrument was used to determine validity and reliability when the final instrument was constructed. Nine (41%) responded by completing the survey. The data was analyzed using SPSS and calculated the reliability statistic which produced an Cronbach’s Alpha of .94.

The survey consisted of three parts. Data collected from faculty consisted of quantitative methodology used to determine if correlations exist between faculty as adopters or non-adopters, demographic data, and the social communication network.

The first part of the survey contained a list of 56 specific pieces of equipment and software found on all the lecterns in the Technology Classrooms. This section of the questionnaire was modeled after survey instruments designed by University of Wisconsin-Madison (Christoph, 2004), the University of Tennessee (The Innovative Technology Center, 2003), and Michigan State University (Frank, 2005). These studies investigated instructional technology use and teaching with technology practices. The
The respondent was asked to rate his or her average frequency and levels of use in a semester. There were four frequency of use categories which included 1) Never Use, 2) Use 5 times or less a semester, 3) Use 6-10 times a semester, and 4) Use 11 times or more a semester. There were four levels of use categories which included 1) Unfamiliar or have little knowledge about the equipment/software, 2) Need help using the equipment, 3) Knowledgeable and fluent with this particular equipment/software, and 4) Very knowledgeable and able to teach others about this particular equipment/software. At the end of the first section, there was a question which asked if overall, do they feel that they have adopted the instructional technology in the Technology Classrooms into their teaching.

The second part contained questions designed to identify the colleagues the participants communicated with regarding instructional technology. The four questions asked for the first name, last name, and rank or title of colleagues that the respondents talked to about teaching, instructional technology, and if the respondent believed the colleague to be an adopter or non-adopter. These questions were modeled after the network concepts of Wasserman and Faust (1994), Valente (1995), and Scott (2001) and the egocentric network approach as described by Borgatti and Molina (2005). The four questions asked respondents to list their closest colleagues at the institution, whom they turn to when they need information/advice about teaching, whom they turn to when they need information/advice about using instructional technology, and who comes to them for information/advice about using instructional technology. There was a repeated reassurance that the information would be used to determine social network structures of communication, that all information was strictly confidential, the persons listed would
not be contacted in any way, no identifiable information would be released, and all
persons, including themselves, would be coded for statistical and confidentiality
purposes.

The third section contained 13 questions designed to gather nominal and ordinal
demographic data. The 13 questions included semesters taught in the technology
classrooms, if they requested or were assigned to teach in the technology classrooms,
gender, age, ethnicity, years of college level teaching, years teaching at the institution of
study, first use of a personal computer for teaching purposes, instructional technology
training, if they have a personal computer at home, if they have children who use a
personal computer at home, what, if anything, their children taught them to do on the
computer, and if they would be willing to participate in a personal interview regarding
their instructional technology use (Appendix A).

Non-Response
According to Ary, Jacobs, and Razavieh (2002), non-response is a serious problem in
survey research. Researchers cannot ignore non-respondents if the survey is to have
validity, while only using information from those who choose to respond can introduce
error. Ary, Jacobs, and Razavieh (2002), stated that error occurs because the respondents
represent a self-selected group that may not represent the views of the entire sample or
population. To address non-response, a comparison was made between the respondents
and non-respondents by a systematic approach which will includes contacting a small
random sample of 10 of the non-respondents by telephone. This sample of non-
respondents, drawn for comparison purposes, is referred to as a “double-dipped sample”
by Miller and Smith (1983). The researcher gathered responses from the random sample of non-respondents. The mean responses were statistically compared to those of the respondents to determine if the two groups differ significantly. If no significant differences were found between the respondent and the non-respondent sample, the researcher could reasonably assume that the respondents represent an unbiased sample of all who participated in the survey (Miller & Smith).

When four weeks had passed after the initial email request to take the survey, 10 non-respondents were randomly chosen, contacted via telephone, and asked to take the survey over the telephone while the researcher asked the questions and filled out the information on the survey for the participant. The researcher emphasized confidentiality of the responses stating that all information is strictly confidential and the persons listed will not be contacted in any way. In addition, no identifiable information would be released and respondents would be coded for statistical purposes.

Analysis of Data

The first question was addressed using an ex-post facto correlational design using a form of Pearson’s r, point biserial correlation. This question attempted to determine if a relationship exists between certain demographic characteristics of faculty and whether they classify themselves as adopters or non-adopters of instructional technology. This relationship was determined using correlational analysis. Correlation is a measure of the relation between two or more variables. Correlation coefficients can range from -1.00 to +1.00. The value of -1.00 represents a perfect negative correlation while a value of +1.00 represents a perfect positive correlation. A value of 0.00 represents a lack of correlation.
The most widely used type of correlation coefficient is Pearson r, also called linear or product moment correlation. Pearson’s r correlation assumes that the two variables are measured on at least interval scales and it determines the extent to which values of the two variables are proportional to each other. A form of Pearson’s r, the point biserial correlation, was used because one variable was on the interval/ratio level and the other was a dichotomy (adoption/non-adoption). The value of correlation does not depend on the specific measurement units used; for example, the correlation between height and weight will be identical regardless of whether inches and pounds, or centimeters and kilograms are used as measurement units. Proportional means linearly related; that is, the correlation is high if it can be summarized by a straight line (sloped upwards or downwards). The correlation coefficient (r) represents the linear relationship between two variables. If the correlation coefficient is squared, then the resulting value will represent the proportion of common variation, also known as the strength, in the two variables. In order to evaluate the correlation between variables, it is important to know the strength as well as the significance of the correlation. Gay and Airasian (2003) wrote that statistical significance refers to whether the obtained coefficient is really different from zero and reflects a true relationship, not a chance relationship. No matter how significant a coefficient is, a low coefficient represents a low relationship. A correlation coefficient much below .50 is not generally useful for either group prediction or individual prediction. However, using a combination of correlations below .50 may yield useful prediction. Coefficients in the .60s and .70s are usually considered adequate for group prediction purposes, and coefficients in the .80s and above are adequate for individual prediction purposes. When interpreting any correlation coefficient, according to Gay and
Airasian (2003), the correlation refers to the relationship only, not a cause-effect relationship. A point biserial correlation was used to describe the relationship of demographic characteristics and adoption/non-adoption status of faculty assigned to the 49 technology classrooms at institution of study from the fall 2003 semester through the spring 2006 semester. This analysis addressed the first research question.

Using UCINET Software for Social Network Analysis (Borgatti, Everett & Freeman, 1999), communication relationship patterns were expressed through network nomination data gathered from the survey questions of who talks to whom. The egocentric network approach is about people rather than groups and is comprised by the people that a person knows. A nomination is when a person lists another when answering a question or questions about who talks to whom. This nomination data was analyzed in a matrix (Figure 3) which identified the communication partner or partners of the faculty member. A network structure was built through this social communication network data. To visualize the social communication network, a sociogram was used to identify the communication relationships (Figure 4). Each coded shape, also referred to as a node, represents an individual from the study and the arrows, known as links, represent unidirectional nominations with the individuals receiving the most nominations being located near the center. This graphic representation produced by the UCINET software was used to describe the social communications network from the data gathered in the second section of the survey. According to Steve Borgatti (personal communication, March 14, 2006), centrality measures may be run on the network data to produce a set of new variables which can be used in other statistical analysis requiring nominal data. Centrality in social network analysis “measures the distances from all other nodes, where
the distance from a node to another is defined as the length (in links) of the shortest path from one to the other (Borgatti, 2005, p. 59).” Centrality also “measures as the share of times that a node $i$ needs a node $k$ (whose centrality is being measured) in order to reach a node $j$ via the shortest path (Borgatti, 2005, p. 60).” Centrality measures were run on the network which produced a set of new variables that had values for each person in the network. The measures of density, weakness, reach, normalized broker, and normalized betweenness of the social network were used to address the second research question. A point biserial correlation coefficient, as in research question one, was used because of the variable was a dichotomy (adoption/non-adoption).

In the third research question, a point biserial correlation coefficient and descriptive statistics were used to describe the relationship of instructional technology training and adoption/non-adoption status of faculty assigned to the 49 technology classrooms at institution of study from the fall 2003 semester through the spring 2006 semester. This analysis addressed the third research question.
Figure 3

Example of a social network analysis matrix where “1” represents a nomination and “0” represents no nomination.

```
<table>
<thead>
<tr>
<th></th>
<th>JB</th>
<th>TB</th>
<th>MC</th>
<th>CC</th>
<th>ED</th>
<th>TD</th>
<th>PD</th>
<th>JD</th>
<th>KG</th>
<th>SM</th>
<th>BS</th>
<th>AS</th>
<th>JT</th>
<th>PW</th>
<th>CW</th>
<th>TW</th>
</tr>
</thead>
<tbody>
<tr>
<td>JB</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>TB</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>MC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>CC</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ED</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>TD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>JD</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>KG</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>SM</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>BS</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>AS</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>JT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PW</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>CW</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>TW</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
```

Figure 4

Example of a sociogram of who talks to whom contacts from Figure 3.
CHAPTER IV
RESULTS

The purpose of this study was to determine if relationships existed between the adoption/non-adoption status of faculty who taught in the Technology Classrooms on the campus of MSU, their social communications network, and their instructional technology training. This chapter presents the results of the statistical analysis of data collected from responses to an online survey sent to faculty who had taught in one or more of the Technology Classrooms at MSU from the fall 2003 semester through the spring 2006 semester.

In the spring 2006 semester, a list of instructors who had used the Technology Classrooms through the fall 2005 semester were examined to determine which faculty were or were not currently associated with Mississippi State University. From this list, faculty who were not employed at Mississippi State University was comprised. This group was obtained for the pilot study because they had taught in the Technology Classroom at MSU, but was not currently associated with the university, and consequently would not be included in the research population. From that list, 22 current email addresses were located for these former instructors as potential participants. The potential participants were sent an email containing the survey link, along with a request to complete the survey for the pilot test. Nine (41%) responded by completing the survey.
The pilot data was analyzed using SPSS and calculating the reliability statistic producing a Cronbach’s Alpha of .94.

In the fall 2006 semester, a list of the instructors of record was compiled for the Technology Classrooms beginning with the pilot phase in the fall 2003 semester through the spring 2006 semester with a total of 615 unique instructors. After determining whether each individual instructor was currently teaching at MSU, the list narrowed to 513. On November 14, 2006, a cover letter containing the link to an online survey (Appendix A) was emailed to this population (n = 513).

The survey opened with the consent form, then followed with three sections of questions. The first section asked the participant’s name, academic college, and academic rank. Following the identification were questions relating to use of the equipment and software in the Technology Classroom and whether the participant considered himself an adopter or non-adopter of the instructional technology. The second section contained four social network analysis questions asking respondents to name at least three people whom they considered their closest colleagues, to whom they went for advice about teaching, to whom they went for advice about instructional technology, and who came to them for advice about instructional technology. The third section contained demographic questions.

Out of the 513 instructors who were sent the request for participation email, 190 completed the survey. Of those, two were discarded because of duplication for a total of 188, yielding a 37% return rate. To control non-response bias, a double-dip random sample of 10 non-respondents was randomly selected and given the survey via telephone of the first and third sections of the survey. The means were compared to determine if
the two groups differed significantly. Comparisons did not reveal any significant differences between the two groups among the three questions analyzed (Table 1).

Table 1

Descriptive Statistics for Response (n = 188) vs. Non-Response (n = 10)

<table>
<thead>
<tr>
<th></th>
<th>Response (n = 188)</th>
<th>Non-Response (n = 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>46.25</td>
<td>47.90</td>
</tr>
<tr>
<td>SD</td>
<td>10.21</td>
<td>11.75</td>
</tr>
<tr>
<td>Years Teaching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>14.49</td>
<td>12.00</td>
</tr>
<tr>
<td>SD</td>
<td>9.41</td>
<td>10.03</td>
</tr>
<tr>
<td>Years Teaching at MSU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>10.59</td>
<td>9.50</td>
</tr>
<tr>
<td>SD</td>
<td>8.14</td>
<td>8.93</td>
</tr>
</tbody>
</table>
Demographics

The demographics of the survey respondents are represented as a percent value.

*Academic Rank*

The respondents reported their current academic rank. The largest percentage was Instructor/Lecturer ($n = 57$ or 30.0%), followed closely by Professor ($n = 45$ or 23.9%). Details of academic rank are reported in Table 2.

Table 2

<table>
<thead>
<tr>
<th>Academic Rank</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant Professor</td>
<td>31</td>
<td>16.5</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>42</td>
<td>22.3</td>
</tr>
<tr>
<td>Professor</td>
<td>45</td>
<td>23.9</td>
</tr>
<tr>
<td>Instructor/Lecturer</td>
<td>57</td>
<td>30.3</td>
</tr>
<tr>
<td>Other</td>
<td>13</td>
<td>6.9</td>
</tr>
<tr>
<td>Total</td>
<td>188</td>
<td>100.0</td>
</tr>
</tbody>
</table>
**Academic College**

A majority of the respondents were in the College of Arts and Sciences (n = 48 or 25.5%), followed closely by the College of Business and Industry (n = 37 or 19.7%), the College of Ag and Life Sciences (n = 32 or 17.0%), and the College of Education (n = 32 or 17.0%). Details of the breakdown by academic college are displayed in Table 3.

<table>
<thead>
<tr>
<th>Academic College</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>College of Ag &amp; Life Sciences</td>
<td>32</td>
<td>17.0</td>
</tr>
<tr>
<td>College of Arch, Art &amp; Design</td>
<td>6</td>
<td>3.2</td>
</tr>
<tr>
<td>College of Arts &amp; Sciences</td>
<td>48</td>
<td>25.5</td>
</tr>
<tr>
<td>College of Business &amp; Industry</td>
<td>37</td>
<td>19.7</td>
</tr>
<tr>
<td>College of Education</td>
<td>32</td>
<td>17.0</td>
</tr>
<tr>
<td>College of Engineering</td>
<td>20</td>
<td>10.6</td>
</tr>
<tr>
<td>College of Forest Resources</td>
<td>10</td>
<td>5.3</td>
</tr>
<tr>
<td>College of Vet Med</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>188</td>
<td>100.0</td>
</tr>
</tbody>
</table>


**Gender**

In the gender category, results reported more males (n = 116 or 61.7%) than females (n = 72 or 38.3%), as shown in Table 4. Of the total university faculty (n = 1220) in fall 2005 (MSU Office of Institutional Research, 2005), 66% were male (n = 801) and 34% (n = 419) were female. This indicated that the gender breakdown of survey respondents was similar to gender breakdown of all faculty at MSU.

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>116</td>
<td>61.7</td>
</tr>
<tr>
<td>Female</td>
<td>72</td>
<td>38.3</td>
</tr>
<tr>
<td>Total</td>
<td>188</td>
<td>100.0</td>
</tr>
<tr>
<td>Missing System</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>191</td>
<td></td>
</tr>
</tbody>
</table>
**Race/Ethnicity**

A majority of the respondents (n = 165 or 87.8%) indicated their race/ethnicity as Caucasian/White, followed by African American (4.3%), Asian (3.2%), Other (3.2%), and Hispanic (1.6%) as seen in Table 5.

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>African/Black</td>
<td>8</td>
<td>4.3</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td>Caucasian/White</td>
<td>165</td>
<td>87.8</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>6</td>
<td>3.2</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>3.2</td>
</tr>
<tr>
<td>Total</td>
<td>188</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Adopter/Non-Adopter**

The adopter/non-adopter status was self-reported in the survey. The respondents were asked in the survey whether they considered themselves an adopter or non-adopter of the instructional technology in the Technology Classrooms. From the total number of responses for this question (n=144), a majority of the respondents, 91% (n = 131), self-reported as adopters of instructional technology in the Technology Classrooms followed by 9% (n. = 13) of the respondents indicating they were non-adopters.
Research Question One

To answer the first research question regarding relationships between demographic characteristics and the adoption/non adoption status of faculty, the survey data between adoption/non-adoption status, gender, and race was analyzed in SPSS using a non-parametric test of statistical significance for bivariate tabular analysis, chi square, to determine if relationships existed between these demographic characteristics and the adoption/non adoption status of the faculty teaching in the Technology Classrooms at Mississippi State University. The analysis between the adoption/non-adoption status and gender yielded no significance, $\chi^2(1, N=188) = 0.66, p > 0.05$. The results reported there was no significant relationship between a person’s gender and their adoption/non-adoption status (Table 6). The analysis between the adoption/non-adoption status and ethnicity (white/other) yielded no significance, $\chi^2(1, N = 188) = 0.002, p > 0.05$. The results reported there was no significant relationship between a person’s race and their adoption/non-adoption status (Table 7). A point biserial correlation coefficient was performed with the adoption/non-adoption status and years teaching. The analysis reported no significant correlation, $r (186) = -0.048, p > .05$, between the two variables. A point biserial correlation coefficient was performed with the adoption/non-adoption status and age. The analysis reported no significant correlation, $r (186) = -0.085, p > .05$, between the two variables. The results of the analysis reported no correlations between demographic characteristics of the population and their adoption/non-adoption status. The adoption/non-adoption variable was coded 1 = adoption and 0 = non-adoption. These results indicated that whether someone considered themselves an adopter or non-adopter...
of the instructional technology in the Technology Classrooms was not related to their gender, race, years teaching, or age.

Table 6

<table>
<thead>
<tr>
<th>Gender and Adoption/Non-Adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Male               Female</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Non-Adopter</td>
</tr>
<tr>
<td>Adopter</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Table 7

<table>
<thead>
<tr>
<th>Race/Ethnicity and Adoption/Non-Adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race/Ethnicity</td>
</tr>
<tr>
<td>African American/Black</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
</tr>
<tr>
<td>Caucasian/White</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>Non-Adopter</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Adopter</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>8</td>
</tr>
</tbody>
</table>

Research Question Two

To answer the second research question, the social network analysis portion of the survey which asked who talks to whom regarding advice about instructional technology, was entered into a matrix. This matrix was imported into the social network analysis.
software, UCINET. From this matrix, UCINET produced density, weakness, reach, normalized broker, and normalized ego betweenness measures. These measures were entered into SPSS, along with the adoption/non adoption status of the respondents. A point biserial correlation coefficient was used to analyze the variables of adoption/non-adoption status and the centrality measures of density, weakness, reach, normalized broker, and normalized betweenness of the social network analysis data. The results of the analysis reported no significant correlations for all measures ($p > .05$). These results indicated that whether participants considered themselves an adopter or non-adopter of the instructional technology in the Technology Classrooms was not related to the four examined social communication networks: a) whom they consider their closest colleagues at MSU, b) who they talk to regarding advice about teaching, c) advice about instructional technology, and d) who comes to them about advice about instructional technology.

**Research Question Three**

To answer the third research question, descriptive statistics and a point biserial correlation coefficient were used to determine if relationships existed between the adoption/non-adoption status of faculty and self reported instructional technology training, with some respondents having received training from more than one source. The descriptive statistics reported percentages of respondents who had instructional technology training and the source of training they received (Table 8). Respondents indicated they received the most training from ITS (55.5%), followed by Self Tutorial (34.6%), and the Internet (24.1%).
A point biserial correlation coefficient was conducted to determine if relationships existed between the adoption/non-adoption status of faculty and the source of instructional technology training they received. The results indicated relationships between faculty adoption status and those who got training from: a) ITS, b) CTL, c) self taught, and d) training from the Web (Table 9).
Table 9

Correlations Between Adopter/Non-Adopter Status of Faculty and Instructional Technology Training

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adopt/Non-Adopt</td>
<td>.274**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training – ITS</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training – CTL</td>
<td>.149**</td>
<td>.327**</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Training – Self Tutorial</td>
<td>.148*</td>
<td>.422**</td>
<td>.225**</td>
<td>1</td>
</tr>
<tr>
<td>Training - Web</td>
<td>.181*</td>
<td>.351**</td>
<td>.310**</td>
<td>.541**</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The correlations represented low to moderate relationships between adopter/non-adopter status and self reported instructional technology training scores. The strength of the relationships (Table 10) was determined as a low to moderate association as described by Davis (1971).

Table 10

Strength of Relationships of Correlation Coefficients

<table>
<thead>
<tr>
<th>Value</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>.70 or higher</td>
<td>Very strong association</td>
</tr>
<tr>
<td>.50 to .69</td>
<td>Substantial association</td>
</tr>
<tr>
<td>.30 to .49</td>
<td>Moderate association</td>
</tr>
<tr>
<td>.10 to .29</td>
<td>Low association</td>
</tr>
<tr>
<td>.01 to .09</td>
<td>Negligible association</td>
</tr>
</tbody>
</table>
A point biserial correlation was performed to determine if relationships existed between the adoption/non-adoption status and the academic rank of faculty as well as adoption/non-adoption status and the academic college of faculty. The results of the analysis reported no significant correlations for all measures \((p > .05)\). These results indicated that whether someone considers themselves an adopter or non-adopter of the instructional technology in the Technology Classrooms is not related to their academic rank or academic college.

A point biserial correlation was performed to determine if relationships existed between the adoption/non-adoption status of faculty and their level of use of the equipment in the Technology Classrooms. The results of the analysis reported significant correlations between the adoption/non-adoption status of faculty and levels of use of: a) lectern computer, b) document camera, c) lectern microphone, d) lectern optional PowerPoint advancer/laser, and e) lectern optional flash drive (Table 11). The adoption/non-adoption variable was coded \(1 = \text{adoption}\) and \(0 = \text{non-adoption}\).
Table 11

Correlations Between Adopter/Non-Adopter Status of Faculty and Levels of Use of Technology Classroom Equipment

<table>
<thead>
<tr>
<th></th>
<th>Adopt/Non-Adopt</th>
<th>Lectern Computer</th>
<th>Doc Camera</th>
<th>Lectern Mic</th>
<th>PowerPoint Advancer</th>
<th>Flash Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adopt/Non-Adopt</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lectern Computer</td>
<td>.587**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doc Camera</td>
<td>.238**</td>
<td>.130</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lectern Mic</td>
<td>.189*</td>
<td>.105</td>
<td>.042</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PowerPoint</td>
<td>.204**</td>
<td>.174*</td>
<td>.083</td>
<td>.176*</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Advancer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash Drive</td>
<td>.297**</td>
<td>.449**</td>
<td>.091</td>
<td>.122</td>
<td>.237**</td>
<td>1</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The correlations represent a low relationship between adopter/non-adopter status and levels of use of the lectern document camera, lectern microphone, lectern PowerPoint advance/laser (optional equipment), and the flash drive (optional equipment). A substantial relationship existed between adopter/non-adopter status and levels of use of the lectern computer in the Technology Classrooms. The results indicated that the level of use of the Technology Classroom equipment was related to whether faculty reported their adoption/non-adoption status.

A point biserial correlation coefficient was performed to determine if relationships existed between the adoption/non-adoption status of faculty and their level of knowledge of the equipment in the Technology Classrooms (Table 12). The adoption/non-adoption variable was coded 1 = adoption and 0 = non-adoption. The
results of the analysis reported significant correlations between the adoption/non-adoption status of faculty and levels of knowledge of: a) lectern computer, b) document camera, c) lectern VCR, d) lectern DVD, e) lectern microphone, f) laptop connection, g) PowerPoint advancer/laser (optional equipment), h) wireless microphone (optional equipment), and i) flash drive (optional equipment).

Table 12
Correlations Between Adopter/Non-Adopter Status of Faculty and Levels of Knowledge of Technology Classroom Equipment

<table>
<thead>
<tr>
<th></th>
<th>Adopt/Non-Adopt</th>
<th>Lect Computer</th>
<th>Doc Cam</th>
<th>Lectern VCR</th>
<th>Lectern DVD</th>
<th>Lectern Mic</th>
<th>Laptop Conn</th>
<th>PP Adv</th>
<th>Wireless Mic</th>
<th>Flash Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adopt/Non-Adopt</td>
<td>1</td>
<td>.492**</td>
<td>.389**</td>
<td>.300**</td>
<td>.301**</td>
<td>.316**</td>
<td>.360**</td>
<td>.323**</td>
<td>.439**</td>
<td>.532**</td>
</tr>
<tr>
<td>Lect Computer</td>
<td>.492**</td>
<td>1</td>
<td>.545**</td>
<td>.463**</td>
<td>.418**</td>
<td>.433**</td>
<td>.486**</td>
<td>.482**</td>
<td>.573**</td>
<td>.35**</td>
</tr>
<tr>
<td>Doc Cam</td>
<td>.389**</td>
<td>.545**</td>
<td>1</td>
<td>.435**</td>
<td>.499**</td>
<td>.828**</td>
<td>.546**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lectern VCR</td>
<td>.300**</td>
<td>.463**</td>
<td>.435**</td>
<td>1</td>
<td>.499**</td>
<td>.828**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lectern DVD</td>
<td>.301**</td>
<td>.435**</td>
<td>.499**</td>
<td>.828**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lectern Mic</td>
<td>.316**</td>
<td>.360**</td>
<td>.486**</td>
<td>.546**</td>
<td>.500**</td>
<td>.567**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laptop Conn</td>
<td>.360**</td>
<td>.486**</td>
<td>.546**</td>
<td>.500**</td>
<td>.567**</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP Advancer</td>
<td>.323**</td>
<td>.482**</td>
<td>.546**</td>
<td>.500**</td>
<td>.567**</td>
<td>.579**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wireless Mic</td>
<td>.323**</td>
<td>.579**</td>
<td>.546**</td>
<td>.500**</td>
<td>.567**</td>
<td>.579**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash Drive</td>
<td>.439**</td>
<td>.573**</td>
<td>.35**</td>
<td>.35**</td>
<td>.35**</td>
<td>.35**</td>
<td>.35**</td>
<td>.35**</td>
<td>.35**</td>
<td>.35**</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The correlations represented a range of values of relationships between adopter/non-adopter status and levels of knowledge of the lectern computer, lectern document camera, lectern VCR, lectern DVD, lectern microphone, laptop connection, lectern PowerPoint advancer/laser (optional equipment), lectern wireless microphone (optional equipment), and the flash drive (optional equipment). Moderate relationships existed between adopter/non-adopter status of faculty and levels of knowledge of the lectern computer, document camera, lectern VCR, lectern DVD, lectern microphone, and the flash drive (optional equipment). Low relationships existed between adopter/non-
adopter status of faculty and levels of knowledge of the laptop connection, PowerPoint advancer, and wireless microphone. These were all optional equipment for the Technology Classroom lectern. The results indicated that there were low and moderate relationships between the levels of knowledge of lectern equipment and the adoption/non-adoption status of faculty.

The results indicated that adoption/non-adoption status of faculty was related to whether or not the respondent received training and from whom they received training. The strength of the associations of the correlations (.148 - .274) was considered low as described by Davis (1971). This revealed that relationships existed between instructional technology training faculty received and the reported adoption/non-adoption status of the respondents. There were also correlations between adopter/non-adopter status and levels of use of the equipment in the Technology Classrooms. The strength of the associations of the correlations (.189 - .587) was considered low to substantial. This showed that the level of use of the equipment by faculty in the Technology Classroom was related to the adoption/non-adoption status of the faculty respondents. Low to moderate correlations existed between level of knowledge of the equipment in the Technology Classrooms and the adoption/non-adoption status of the respondents. This revealed that the level of knowledge of the equipment by faculty in the Technology Classrooms was related to the adoption/non-adoption status of the faculty respondents.
CHAPTER V
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter summarizes the study and draws conclusions on the relationships among faculty who teach in the Technology Classrooms on the campus of MSU, their social communications network, and their adoption/non-adoption status of instructional technology. The findings, conclusions and implications, discussions, and recommendations serve as a basis for future research.

Summary

The purpose of this study was to determine if relationships existed among the social communications networks of faculty who taught in the Technology Classrooms on the campus of MSU from the fall 2003 through the spring 2006 semesters and their adoption/ non-adoption status of instructional technology. This study also attempted to analyze the personal characteristics of the faculty. Data from the online survey were collected and examined to determine answers to the three research questions stated in earlier chapters.

Relationship Between Age and Adoption

Wentworth, Earl, and Connell (2004) identified age as an element of challenge for faculty in the use of instructional technology in their teaching. Batte’s (2005) conclusions also identified age as a factor of educational technology adoption. In a study of university faculty at Doctoral I, Doctoral II, Research I, and Research II institutions, Xu and Meyers
(2007) reported that age was an important factor related to university faculty use of technology in teaching. Analysis of demographic variables in Ndahi’s research (1999) showed that age was significantly related to use of educational technology. Xu and Meyers’ (2007) findings, along with Wentworth, Earl and Connell (2004), Batte (2005), and Ndahi’s (1999) findings differed from the findings analyzed in this research. Data gathered from the population in this study indicated that age did not significantly correlate with the adoption/non-adoption status of instructional technology by faculty using the technology classrooms at Mississippi State University. Bates, Manuel, and Oppenheim (2007) also found no relationship between age and adoption in their study of higher education and innovative technology adopters. These differing findings may be due to the difference in populations. The population in this study was instructors assigned to the Technology Classrooms, meaning they had already taught in a Technology Classroom equipped with an instructional technology lectern. The population included faculty who had taught at least one semester over the course of eight semesters beginning with the pilot semester in fall 2003. The population had exposure to the instructional technology, whether they used it or not. Research indicating that age was a factor for adoption of instructional technology (Batte, 2005; Wentworth, Earl, & Connell, 2004; Xu & Meyers, 2007) used populations that may not have had prior exposure to the instructional technology as did the population in this study. This could account for the differing results.
Relationship Between Gender and Adoption

Research by Pirozzoli and Jones (1996) indicated that gender showed a significant correlation to the use of computers or adoption of computer database technology. Chapman (2003) stated that research reports differed in their conclusions on the relationship between gender and adoption with some finding males being the significant users, others indicating women being the significant users, and others showing no gender differences in using computer technology in education. In a study conducted by Lucas and Smith (2004), it was hypothesized that the use and delivery of instructional technologies would uncover a significant gender difference. The results of their study indicated no significant gender difference in the use and delivery of instructional technology by higher education faculty. Zidon and Miller (1990) stated if relationships existed between gender and the use of information technology, that those relationships were weak. Askar, Usluel, and Mumcu (2006) found that gender was not a predictor for adoption of technological innovations in teachings. These studies align with the findings in this research where no significant correlation existed between gender and adoption/non-adoption status of faculty teaching in Technology Classrooms at MSU. The results may vary depending on the population surveyed and date of the research. The population of this study, faculty at MSU teaching in Technology Classrooms, was about 60% male and 40% female. Other research supported these findings or made no definitive stance on gender significance.
Relationship Between Teaching Experience and Adoption

Chapman (2003) reported that years of teaching experience had a significant impact on educational technology adoption by faculty. Adams’ (2002) findings concluded that the number of years of teaching experience correlated significantly with instructional technology integration. Crooks, Yang, and Duemer (2003) found that faculty with more years of teaching experience and those teaching at doctoral and research institutions had the most favorable attitude toward using instructional technology. Zidon and Miller (1990) found weak relationships between years of teaching and use of information technology. The researchers concluded that this demographic (years teaching) variable should not be considered significant to the study. The results of this study found no significant correlation between the number of years the respondents reported teaching at the higher education level and their adoption/non-adoption status.

One possible explanation for the lack of a relationship could be that the population included those assigned to teach in the Technology Classrooms since the fall 2003 semester through the spring 2006 semester, therefore some respondents could have been exposed to and had been using the instructional technology for over three years. This exposure would have given the respondents with more years teaching in higher education an opportunity to become more knowledgeable over time. The respondents with fewer years teaching experience in higher education would possibly have had more exposure and had opportunities to use instructional technology during their years of matriculation.

Research (Green, 2005; Oblinger & Oblinger, 2005; Prensky, 2001) shows that students feel comfortable using the Internet and software such as PowerPoint, Excel, and Word. This type of software and the Internet are also associated with instructional technology.
and were available on the computers in the Technology Classrooms. Because the respondents used the software while in college, they would likely use it as higher education faculty.

**Relationship Between Ethnicity and Adoption**

The study by Lucas and Smith (2004) examined ethnicity as it related to the use of technology in instruction and found that no significant correlation existed. In the limited amount of research available (Monroe, 2004; Young, 2001), the focus was more on the digital divide and computer use as related to ethnicity and socioeconomics. The data in this study found that whether faculty adopt or do not adopt instructional technology is not related to their ethnicity. Other potential factors related to adoption/non-adoption of instructional technology by faculty were also gathered in this study and may show relationships between ethnicity and the type of course taught or academic college.

**Relationship Between Communication Networks and Adoption**

The second research question was related to the social networks of the participants (who talks to whom regarding advice about instructional technology). Participant’s ego network density, weakness, reach, normalized broker, and normalized ego betweenness measures were examined to determine if any of these measures were related to adoption. The results indicated that the reported adoption/non-adoption status of the instructional technology in the Technology Classrooms by faculty was not related to any of the measures of the four examined social communication networks: a) whom
they consider their closest colleagues at MSU, b) to whom they talk regarding advice about teaching, c) advice about instructional technology, and d) who comes to them about advice about instructional technology.

Marsden (2005) refers to the adoption/non-adoption decision process as a social contagion. The term social contagion was used to describe the copycat effect, an imitative behavior based on the power of suggestion and word of mouth influence (Marsden, 2005). Valente and Davis (1999) referred to the cohesion model of influence in social network analysis in regards to how an assistant professor may be influenced by other faculty. Social network vis-à-vis social relations, have the ability to influence the adoption/non-adoption status in the diffusion process (Scott, 2001; Valente and Davis, 1999). Contrary to research supporting the influence of adoption/non-adoption through a social network, this research did not find that participants’ social networks had any influence on their adoption or non-adoption status of the instructional technology in the Technology Classrooms. The difference in the findings of this research may be attributed to faculty attaining information from sources other than colleagues in their social network. Van den Bulte and Lilien (2001) questioned the influence of social contagion and cited marketing as the key to adoption in the diffusion research of Coleman, Katz, and Menzel’s (1966) tetracycline study. Marketing and promotion of instructional technology training and support on the campus of MSU, plus targeted announcements to the population may have diminished the need for the population to make inquiries within the social network of colleagues regarding instructional technology. If a faculty member knew a colleague was using the instructional technology in the Technology Classroom
and wanted more information about training and support, information was readily available from a variety of sources on campus at MSU.

**Relationship Between Training and Adoption**

The existence of a relationship between the adoption/non-adoption status of faculty and instructional technology training found in this research differed from a study conducted by Wilson (2003), which reported that faculty learn about instructional technology primarily through self-help, not university-provided sources. While some faculty reported that they did use self tutorials, self help, and the Internet to learn instructional technology, a majority of respondents listed ITS, IMC, and CTL as resources for instructional technology training. As Wilson (2003) reported, some campus resources are more useful than others. The data from this research study indicated that the instructional technology training offered by MSU to its faculty correlated positively with their adoption/non-adoption status. Along with the correlation of training and adoption/non-adoption, relationships were also found between the adoption/non-adoption status of faculty and their levels of use and levels of knowledge of instructional technology in the Technology Classrooms. The top three training and support entities on campus at MSU (ITS, CTL, IMC) targeted their marketing efforts towards the population in this study. This may not be the case at other colleges and universities which may account for the differing results.
Research Recommendations

Future research utilizing the social network data to further analyze the nominations named outside of the population will provide more in-depth reasoning as to how and why campus resource instructional technology training influences the adoption/non-adoption status of instructional technology by faculty. This study found many nominations named outside the social network of the population. Further studies linking these outside nominations would provide additional insight into the social network’s influence on faculty adoption/non-adoption of instructional technology. Findings could illustrate to university administrators possible patterns of communication and contact. By knowing and understanding who faculty turn to for advice about using instructional technology and who turns to them for the same, university administrators could take measures to enhance training and support that correspond to the identified communication patterns.

A qualitative analysis of higher education faculty could also be conducted to discover barriers and needs in which corresponding initiatives could be developed to help faculty achieve, what they consider, adoption status. Training and support units at universities could enhance offerings depending on the results found and conclusions drawn. Thus, improved implementation of training and support could improve use and knowledge of instructional technology.

Building on the results showing relationships between those respondents who received instructional technology training via a training unit on campus, more in-depth research could determine how faculty learned about the available training, how they rated the training they received, what were the preferred dates and times to offer training, and
how they found out initially, about the training on campus. By understanding how faculty learn about available training, the training and support units on campus may possibly use a more targeted announcement that could connect training and support with more faculty. The method of delivery, format, and style of training may also determine if relationships exist between instructional technology training of faculty and the subsequent adoption of the technology. Additionally, this could better prepare faculty to integrate and adopt instructional technology on their campus.

The findings in this research revealed that while demographics of the population were not a factor in whether the respondent was an adopter or non-adopter of instructional technology in the Technology Classrooms at MSU, other factors such as training and support revealed existing relationships. The social ego networks of faculty did not show relationships between adoption/non-adoption status and to whom they talk in their networks. Revealing relationships of nominations outside the population could show university administrators avenues of targeted communication which could enhance the knowledge and level of use of instructional technology by faculty. Providing training and support has shown that it plays an essential role for faculty to consider themselves as adopters of instructional technology. This research brings to light the need for university administrators to support this relationship by making training and support accessible and available to faculty when and where they need it.

**Implications**

The information provided by the data in this research shows that a large majority (91%) of faculty assigned to teach in the Technology Classrooms were self-reported as
adopters of the instructional technology provided on the classroom lecterns. The implications of this are that with such a large percentage of faculty using the instructional technology, perhaps additional training and resources should be offered providing teaching methods using instructional technology. Taking that even farther, perhaps training should be required for newly employed faculty and first time users of the Technology Classrooms. The Center for Teaching and Learning at MSU presently offers one-on-one training on how to operate the lectern equipment in the Technology Classrooms, but a more diverse curriculum should be considered.

By polling departments to find out how many faculty want to teach in a Technology Classroom, but cannot get assigned to one will provide information needed to for the administration to make decisions on how many more Technology Classrooms should be added. If more Technology Classrooms are to be added, departments should require faculty assigned to teach in them to attend training on use of the equipment and teaching techniques.

Adding more Technology Classrooms means providing more funding to purchase and install the lecterns. This would be a commitment for administration, departments, and faculty. This also opens the door for incentives and rewards for both departments and faculty which should be addressed by the Provost’s Office.
REFERENCES


Mississippi Constitution Article VIII, Section 102, 102.03 (B.T. minutes September 2002).


Wilson, W. (2003). Faculty perceptions and uses of instructional technology: A study at one university system revealed the current state of technology and some steps that could improve it. Educause Quarterly, 2, 60-62.


APPENDIX A

RESEARCH SURVEY

USE OF INSTRUCTIONAL TECHNOLOGY AND SOCIAL COMMUNICATIONS

NETWORK SURVEY
USE OF INSTRUCTIONAL TECHNOLOGY AND SOCIAL COMMUNICATIONS NETWORK SURVEY

DIRECTIONS: You have been selected to participate in this survey because you are on record as having taught in one of the 49 technology classrooms at Mississippi State University during the period of Fall 2003 through Fall 2005. **If you have not taught in a technology classroom, please reply to this email indicating such and request removal from the population.** This survey asks questions about your use of the equipment and software in the Technology Classrooms which will identify adopters and non-adopters, sources of professional knowledge which will determine who talks to whom regarding instructional technology, and demographic information. All information is strictly confidential. The persons you list in section two will not be contacted in any way. No identifiable information will be released. All persons, including yourself will be coded for statistical and confidentiality purposes.

In this survey, the term “technology classroom” refers to the classrooms fitted with specialized lecterns containing equipment and software. Below is a photo of what the lectern.

![Lectern Image]

Your Name:

Your Academic Rank:  
(pull down menu online)

Your Academic College:  
(pull down menu online)
I. Frequency and Levels of Use
Complete the following section by selecting the appropriate description corresponding to your use and proficiency level of the following equipment located in the technology classrooms.

Frequency of Use
In the Frequency of Use section on the left, please select one of the choices that best describes your average use of the technology classroom equipment and software

- Never Use
- Use 5 times or less a semester
- Use 6-10 times a semester
- Use 11 times or more a semester

Levels of Use
In the levels of use section on the right, please select one of the choices (indicating your best estimate of your skill or knowledge level) about each of the technology classroom equipment and software.

- Unfamiliar or have little knowledge about the equipment/software
- Need help using the equipment/software
- Knowledgeable and fluent with this particular equipment/software
- Very knowledgeable and able to teach others about this particular equipment/software

<table>
<thead>
<tr>
<th>Frequency of Use per Semester</th>
<th>Levels of Use</th>
<th>Equipment</th>
<th>Never</th>
<th>Need Help</th>
<th>Knowledgeable/Fluent</th>
<th>Very Knowledgeable/ Able to Teach Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 or Less</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lectern Computer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Document Camera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VCR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DVD Player</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lectern Microphone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laptop Connection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optional Equipment: Remote Point Navigator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optional Equipment: Wireless Microphone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optional Equipment: Flash Drive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optional Equipment: Video Camera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AutoCAD 2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto Desk Inventor 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet Explorer 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MathCAD 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MatLab 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microsoft Access XP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microsoft Excel XP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microsoft PowerPoint XP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Microsoft Word XP
Microsoft FrontPage
Microsoft PhotoEditor

<table>
<thead>
<tr>
<th>Frequency of Use per Semester</th>
<th>Levels of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>5 or Less</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Overall, do you feel that you have adopted the instructional technology in the Technology Classrooms into your teaching?
   ☐ Yes       ☐ No

II. Sources of Professional Knowledge

This section focuses on your professional interactions and sources of knowledge, especially with regard to your use of instructional technology. You are asked to write down the names and titles/rank of people you communicate with regarding instructional technology use. The term “instructional technology” refers to equipment and software used in teaching such as PowerPoint presentations and the computer. This information will be used to determine social network structures of communication. All information is strictly confidential. The persons you list will not be contacted in any way. No identifiable information will be released. All persons, including yourself will be coded for statistical and confidentiality purposes.

When answering, please write at least three names using the first and last name and their rank or title. (ie. John Smith, Assistant Professor or Jim Smith, Administrative Assistant)

2. Who do you consider to be your closest colleagues at Mississippi State University? (Please write first and last names, rank or title, and if you believe this person is an adopter or non-adopter of instructional technology.)

<table>
<thead>
<tr>
<th>First and Last Name</th>
<th>Rank or Title</th>
<th>Adopter/Non-Adopter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

97
3. When you need information/advice about teaching, whom do you usually turn? (Please write first and last names, rank or title and if you believe this person is an adopter or non-adopter of instructional technology.)

<table>
<thead>
<tr>
<th>First and Last Name</th>
<th>Rank or Title</th>
<th>Adopter/Non-Adopter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. When you need information/advice about using instructional technology, whom do you usually turn? (Please write first and last names, rank or title, and if you believe this person is an adopter or non-adopter of instructional technology.)

<table>
<thead>
<tr>
<th>First and Last Name</th>
<th>Rank or Title</th>
<th>Adopter/Non-Adopter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Who comes to you for information/advice about using instructional technology? (Please write first and last names, rank or title, and if you believe this person is an adopter or non-adopter of instructional technology.)

<table>
<thead>
<tr>
<th>First and Last Name</th>
<th>Rank or Title</th>
<th>Adopter/Non-Adopter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**III. Demographics**

In this section, you are asked some personal background information and characteristics that may be related to instructional technology use. (Reminder: No identifiable information will be released.) This information will be used to describe the demographics of faculty using the Technology Classrooms.

6. Indicate which semester(s) you taught in a technology classroom at Mississippi State University.
7. Did you make a request to teach in one of the technology classrooms or were you assigned to teach in one? (pulldown menu online)

☐ Requested   ☐ Assigned

8. What is your gender? (pulldown menu online)

☐ Male   ☐ Female

9. What is your age? ________

10. What is your race/ethnicity? (pulldown menu online)

☐ African American/Black   ☐ Native American   ☐ Asian/Pacific Islander
☐ Hispanic/Latino   ☐ Caucasian/White   ☐ Other:________________

11. How many years do you have of college level teaching including the current year? ________

12. How many years teaching do you have at Mississippi State University including the current year and any years as a graduate teaching assistant? ________

13. What year did you first use a personal computer in regards to your teaching? (i.e. Used it to create syllabus, handouts, tests, presentation, etc…)

_______

14. Please indicate where you have received instructional technology training since being at Mississippi State University? (pulldown menu online)

☐ ITS   ☐ IMC   ☐ MSU-ES   ☐ The Learning Center
☐ College Seminar   ☐ Outside Training (ie. Horizon Live)
☐ On-Line   ☐ Self Tutorial   ☐ Self Help Book   ☐ Web Site
☐ Other ___________________   ☐ None

99
15. Do you have a personal computer at home? (pulldown menu online)

☐ Yes ☐ No

16. Do you have children who use a personal computer at home? (If no, please skip to question #20.) (pulldown menu online)

☐ Yes ☐ No

17. My child taught me how to do __________________________ on the computer.

18. Would you be willing to participate in a personal interview regarding your instructional technology use? (pulldown menu online)

☐ Yes ☐ No

Thank you for the time and thought contributed to this survey. If you have any questions regarding this survey or would like to view the results, please contact Amy Berryhill at ahb2@msstate.edu or 325-8768.
APPENDIX B

EMAIL RECRUITMENT LETTER
EMAIL RECRUITMENT LETTER

My name is Amy H. Berryhill and I am a doctoral student in the Department of Instructional Systems and Workforce Development at Mississippi State University. I am currently conducting research toward the completion of my dissertation. You have been chosen to participate because you are listed as being assigned to teach in one or more Technology Classrooms on campus between Fall 2003 and Fall 2005 semesters.

This study investigates levels of use of instructional technology in the Technology Classrooms on campus, who talks to whom regarding instructional technology use and brief demographic information.

I would greatly appreciate your assistance in completing the survey. The information you provide will be held in strict confidence with the names listed being coded for analysis purposes. If you choose to link to the survey Website, you will be asked to acknowledge your understanding of the purposes of the study through an informed consent form. You will then be taken to the beginning of the survey which should take approximately 10 minutes to complete. If you choose to continue, realize that your participation is strictly voluntary. Upon completion and submission of the survey, your name will be entered to receive an Apple iPod chosen randomly from all participants completing and submitting the survey.

If you choose to continue, the survey can be accessed at the following URL:

http://www.surveymonkey.com/s.asp?u=280042867835

Thank you for your assistance and for the time you have expended.

Sincerely,

Amy H. Berryhill
Doctoral Candidate
662-325-8768
berryhill@its.msstate.edu
APPENDIX C

INFORMED CONSENT FORM
INFORMED CONSENT FORM

The following information is provided so that you can make an informed decision whether you wish to participate in this present study.

This study requires that you complete the survey on your levels of use of instructional technology provided in the Technology Classrooms at Mississippi State University. You will also be asked to list the names rank/titles of people you talk to about instructional technology. Finally, you will be asked to provide some brief demographic information.

For your protection and confidentiality, the identifiable information collected will be coded. Also, please note that these records will be held by a state entity and therefore are subject to disclosure if required by law. There are no expected risks associated with this survey and study.

If you should have any questions about this research project, please feel free to contact me, Amy H. Berryhill. For additional information regarding your rights as a research subject, please contact the MSU Regulatory Compliance Office at 662-325-3294.

Thank you for your participation.

Amy H. Berryhill
662-325-8768
Email: berryhill@its.msstate.edu
The following information is provided so that you can make an informed decision whether you wish to participate in this present study which is IRB approved (IRB Study #09-152).

This study requests that you complete the survey on your levels of use and knowledge of instructional technology provided in the Technology Classrooms at Mississippi State University. You will also be asked to list the names and titles of people you talk to about instructional technology. Finally, you will be asked to provide some brief demographic information.

For your protection and confidentiality, the identifiable information collected will be coded. Also, please note that these records will be held by a state entity and therefore are subject to disclosure if required by law. There are no expected risks associated with this survey and study.

If you should have any questions about this research project, please feel free to contact me, Amy H. Berryhill. For additional information regarding your rights as a research subject, please contact the MSU Regulatory Compliance Office at 662-325-3294.

Thank you for your participation.

Amy H. Berryhill
662-325-8768
Email: berryhill@its.msstate.edu
You have been selected to participate in this survey because you are on record as having taught in one of the 49 technology classrooms at Mississippi State University during the period of Fall 2003 through Spring 2006. If you have not taught in a technology classroom, please reply to this email indicating such and request removal from the population. This survey asks questions about your use of the equipment and software in the Technology Classrooms which will identify adopters and non-adopters, sources of knowledge which will determine who talks to whom regarding instructional technology, and demographic information. All information is strictly confidential. The persons you list in section two will not be contacted in any way. No identifiable information will be released. All persons, including yourself will be coded for statistical and confidentiality purposes.

In this survey, the term “technology classroom” refers to the classrooms fitted with specialized lecterns containing equipment and software. Below is a photo of the lectern.

1. Your Name

2. Your Academic Rank
   - Assistant Professor
   - Associate Professor
   - Professor
   - Instructor/Lecturer
   - Other (please specify)

3. Your Academic College
   - College of Agriculture and Life Sciences
   - College of Architecture, Art and Design
   - College of Arts and Sciences
   - College of Business and Industry
Figure 7
Page Three of the Online Survey

<table>
<thead>
<tr>
<th>Frequency of Use per Semester &amp; Levels of Knowledge of Lectern Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectern Computer</td>
</tr>
<tr>
<td>Document Camera</td>
</tr>
<tr>
<td>VCR</td>
</tr>
<tr>
<td>DVD Player</td>
</tr>
<tr>
<td>Lectern Microphone</td>
</tr>
<tr>
<td>Laptop Connection</td>
</tr>
<tr>
<td>Optional Equipment: PowerPoint Advance/Laser</td>
</tr>
<tr>
<td>Optional Equipment: Wireless Microphone</td>
</tr>
<tr>
<td>Optional Equipment: Flash Drive</td>
</tr>
<tr>
<td>Optional Equipment: Video Camera</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency of Use per Semester &amp; Levels of Knowledge of Lectern Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutoCAD 2005</td>
</tr>
<tr>
<td>Auto Desk Inventor 8</td>
</tr>
<tr>
<td>Internet Explorer 6</td>
</tr>
<tr>
<td>MathCAD 11</td>
</tr>
<tr>
<td>MatLab 7</td>
</tr>
<tr>
<td>Microsoft Access XP</td>
</tr>
</tbody>
</table>
## 4. Sources of Professional Knowledge

This section focuses on your professional interactions and sources of knowledge, especially with regard to your use of instructional technology. You are asked to write down the names and titles/rank of people you communicate with regarding instructional technology use. The term “instructional technology” refers to equipment and software used in teaching such as PowerPoint presentations and the computer. This information will be used to determine social network structures of communication. All information is strictly confidential. The persons you list will not be contacted in any way. No identifiable information will be released. All persons, including yourself will be coded for statistical and confidentiality purposes.

When answering, please write at least three names using the first and last name and their rank or title. (i.e. John Smith, Assistant Professor or Jim Smith, Administrative Assistant) Technical support groups such as ITS or IMC may be listed if used.

### * 8. Who do you consider to be your closest colleagues at Mississippi State University?*
(Please list at least three people by writing first and last names, rank or title, and if you believe this person is an adopter or non-adopter of instructional technology.)

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank or Title</th>
<th>Adopter/Non-Adopter</th>
</tr>
</thead>
</table>

### * 9. When you need information/advice about teaching, whom do you usually turn to at Mississippi State University?*
(Please list at least three people by writing first and last names, rank or title, and if you believe this person is an adopter or non-adopter of instructional technology.)

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank or Title</th>
<th>Adopter/Non-Adopter</th>
</tr>
</thead>
</table>

### * 10. When you need information/advice about using instructional technology, whom do you usually turn to at Mississippi State University?*
(Please list at least three people by writing first and last names, rank or title, and if you believe this person is an adopter or non-adopter of instructional technology.)

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank or Title</th>
<th>Adopter/Non-Adopter</th>
</tr>
</thead>
</table>

### * 11. Who comes to you for information/advice about using instructional technology at Mississippi State University?*
(Please list at least three people by writing first and last names, rank or title, and if you believe this person is an adopter or non-adopter of instructional technology.)

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank or Title</th>
<th>Adopter/Non-Adopter</th>
</tr>
</thead>
</table>
Figure 9

Page Five of the Online Survey

5. Demographics

In this section, you are asked some personal background information and characteristics that may be related to instructional technology use. (Reminder: No identifiable information will be released.) This information will be used to describe the demographics of faculty using the Technology Classrooms.

* 12. Indicate which semester(s) you taught in a technology classroom at Mississippi State University.
   - Fall 2003
   - Spring 2004
   - Summer 2004
   - Fall 2004
   - Spring 2005
   - Summer 2005
   - Fall 2005
   - Spring 2006

* 13. Did you make a request to teach in one of the technology classrooms or were you assigned to teach in one?
   - Requested
   - Assigned

* 14. What is your gender?
   - Male
   - Female

15. What is your age?

* 16. What is your race/ethnicity?
   - African American/Black
   - Hispanic/Latino
   - Native American
   - Caucasian/White
   - Asian/Pacific Islander
   - Other (please specify)

* 17. How many years do you have of college level teaching including the current year and any years as a graduate teaching assistant?
APPENDIX E

CORRELATIONS BETWEEN ADOPTER/NON-ADOPTER STATUS,
ACADEMIC COLLEGE, AND ACADEMIC RANK OF FACULTY
Table 13
Correlations Between Adopter/Non-Adopter Status, Academic College, and Academic Rank of Faculty

<table>
<thead>
<tr>
<th>Adopt/Non-Adopt</th>
<th>Academic Rank</th>
<th>Academic College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adopt/Non-Adopt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Academic Rank</td>
<td>-.033</td>
<td>1</td>
</tr>
<tr>
<td>Academic College</td>
<td>-.062</td>
<td>.181*</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed).
APPENDIX F

DESCRIPTIVE STATISTICS OF LEVELS OF KNOWLEDGE AND USE OF LECTERN HARDWARE IN TECHNOLOGY CLASSROOMS
Table 14

Descriptive Statistics for Levels of Knowledge of Technology Classroom Lectern Equipment

<table>
<thead>
<tr>
<th>Lectern Equipment</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>174</td>
<td>3.35</td>
<td>0.66</td>
</tr>
<tr>
<td>Document Camera</td>
<td>165</td>
<td>2.95</td>
<td>0.86</td>
</tr>
<tr>
<td>VCR</td>
<td>147</td>
<td>3.11</td>
<td>0.76</td>
</tr>
<tr>
<td>DVD</td>
<td>148</td>
<td>3.01</td>
<td>0.77</td>
</tr>
<tr>
<td>Microphone</td>
<td>141</td>
<td>2.68</td>
<td>1.01</td>
</tr>
<tr>
<td>Laptop Connection</td>
<td>145</td>
<td>2.73</td>
<td>1.02</td>
</tr>
<tr>
<td>Opt PowerPoint</td>
<td>141</td>
<td>2.51</td>
<td>1.18</td>
</tr>
<tr>
<td>Wireless Microphone</td>
<td>127</td>
<td>1.94</td>
<td>1.06</td>
</tr>
<tr>
<td>Flash Drive</td>
<td>156</td>
<td>3.11</td>
<td>1.01</td>
</tr>
<tr>
<td>Video Camera</td>
<td>122</td>
<td>1.84</td>
<td>0.96</td>
</tr>
</tbody>
</table>

Table 15

Descriptive Statistics for Levels of Use of Technology Classroom Lectern Equipment

<table>
<thead>
<tr>
<th>Lectern Equipment</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>177</td>
<td>3.47</td>
<td>0.93</td>
</tr>
<tr>
<td>Document Camera</td>
<td>176</td>
<td>2.3</td>
<td>1.12</td>
</tr>
<tr>
<td>VCR</td>
<td>173</td>
<td>1.64</td>
<td>0.75</td>
</tr>
<tr>
<td>DVD</td>
<td>174</td>
<td>1.67</td>
<td>0.73</td>
</tr>
<tr>
<td>Microphone</td>
<td>174</td>
<td>1.49</td>
<td>0.94</td>
</tr>
<tr>
<td>Laptop Connection</td>
<td>175</td>
<td>1.74</td>
<td>0.96</td>
</tr>
<tr>
<td>Opt PowerPoint</td>
<td>169</td>
<td>2.04</td>
<td>1.33</td>
</tr>
<tr>
<td>Wireless Microphone</td>
<td>166</td>
<td>1.34</td>
<td>0.88</td>
</tr>
<tr>
<td>Flash Drive</td>
<td>173</td>
<td>2.90</td>
<td>1.28</td>
</tr>
<tr>
<td>Video Camera</td>
<td>165</td>
<td>1.21</td>
<td>0.70</td>
</tr>
</tbody>
</table>
APPENDIX G

DESCRIPTIVE STATISTICS OF LEVELS OF KNOWLEDGE AND USE
OF LECTERN SOFTWARE IN TECHNOLOGY CLASSROOMS
Table 16

Descriptive Statistics for Levels of Knowledge of Technology Classroom Lectern Software

<table>
<thead>
<tr>
<th>Lectern Software</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutoCAD 2005</td>
<td>110</td>
<td>1.17</td>
<td>0.54</td>
</tr>
<tr>
<td>AutoDesk Inventor8</td>
<td>110</td>
<td>1.05</td>
<td>0.21</td>
</tr>
<tr>
<td>IE6</td>
<td>145</td>
<td>3.30</td>
<td>0.79</td>
</tr>
<tr>
<td>MathCAD11</td>
<td>109</td>
<td>1.17</td>
<td>0.48</td>
</tr>
<tr>
<td>MatLab7</td>
<td>109</td>
<td>1.17</td>
<td>0.54</td>
</tr>
<tr>
<td>Access XP</td>
<td>114</td>
<td>1.93</td>
<td>0.98</td>
</tr>
<tr>
<td>Excel XP</td>
<td>133</td>
<td>3.09</td>
<td>0.90</td>
</tr>
<tr>
<td>PowerPoint XP</td>
<td>153</td>
<td>3.42</td>
<td>0.70</td>
</tr>
<tr>
<td>Word XP</td>
<td>132</td>
<td>3.41</td>
<td>0.72</td>
</tr>
<tr>
<td>FrontPage</td>
<td>113</td>
<td>1.66</td>
<td>0.89</td>
</tr>
<tr>
<td>PhotoEditor</td>
<td>112</td>
<td>1.87</td>
<td>0.96</td>
</tr>
<tr>
<td>MechDesktop 2004</td>
<td>108</td>
<td>1.08</td>
<td>0.31</td>
</tr>
<tr>
<td>SAS</td>
<td>116</td>
<td>1.81</td>
<td>0.98</td>
</tr>
<tr>
<td>Mathematica5</td>
<td>111</td>
<td>1.18</td>
<td>0.51</td>
</tr>
<tr>
<td>SPlusPro</td>
<td>110</td>
<td>1.11</td>
<td>0.40</td>
</tr>
<tr>
<td>SPSS</td>
<td>115</td>
<td>1.88</td>
<td>1.04</td>
</tr>
<tr>
<td>SSH</td>
<td>113</td>
<td>1.25</td>
<td>0.71</td>
</tr>
<tr>
<td>WSFTP</td>
<td>120</td>
<td>1.66</td>
<td>1.04</td>
</tr>
<tr>
<td>XWin32</td>
<td>113</td>
<td>1.34</td>
<td>0.75</td>
</tr>
<tr>
<td>QuickTime Player</td>
<td>125</td>
<td>2.50</td>
<td>0.92</td>
</tr>
<tr>
<td>RealOne Player</td>
<td>122</td>
<td>2.47</td>
<td>0.92</td>
</tr>
<tr>
<td>MediaPlayer</td>
<td>129</td>
<td>2.62</td>
<td>0.92</td>
</tr>
<tr>
<td>Unigraphics</td>
<td>108</td>
<td>1.17</td>
<td>0.56</td>
</tr>
<tr>
<td>Acrobat Reader</td>
<td>132</td>
<td>3.00</td>
<td>0.87</td>
</tr>
<tr>
<td>Outlook Express</td>
<td>111</td>
<td>2.18</td>
<td>1.06</td>
</tr>
<tr>
<td>Novell GroupWise</td>
<td>121</td>
<td>2.57</td>
<td>1.11</td>
</tr>
</tbody>
</table>
Table 17

Descriptive Statistics for Levels of Use of Technology Classroom Lectern Software

<table>
<thead>
<tr>
<th>Lectern Software</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutoCAD 2005</td>
<td>161</td>
<td>1.04</td>
<td>0.27</td>
</tr>
<tr>
<td>AutoDesk Inventor8</td>
<td>161</td>
<td>1.01</td>
<td>0.08</td>
</tr>
<tr>
<td>IE6</td>
<td>172</td>
<td>2.27</td>
<td>1.12</td>
</tr>
<tr>
<td>MathCAD11</td>
<td>161</td>
<td>1.06</td>
<td>0.38</td>
</tr>
<tr>
<td>MatLab7</td>
<td>162</td>
<td>1.06</td>
<td>0.34</td>
</tr>
<tr>
<td>Access XP</td>
<td>162</td>
<td>1.20</td>
<td>0.64</td>
</tr>
<tr>
<td>Excel XP</td>
<td>166</td>
<td>2.00</td>
<td>1.11</td>
</tr>
<tr>
<td>PowerPoint XP</td>
<td>175</td>
<td>3.41</td>
<td>1.02</td>
</tr>
<tr>
<td>Word XP</td>
<td>165</td>
<td>2.36</td>
<td>1.22</td>
</tr>
<tr>
<td>FrontPage</td>
<td>160</td>
<td>1.06</td>
<td>0.34</td>
</tr>
<tr>
<td>PhotoEditor</td>
<td>160</td>
<td>1.18</td>
<td>0.56</td>
</tr>
<tr>
<td>MechDesktop 2004</td>
<td>160</td>
<td>1.03</td>
<td>0.25</td>
</tr>
<tr>
<td>SAS</td>
<td>160</td>
<td>1.17</td>
<td>0.56</td>
</tr>
<tr>
<td>Mathematica5</td>
<td>162</td>
<td>1.04</td>
<td>0.32</td>
</tr>
<tr>
<td>SPlusPro</td>
<td>160</td>
<td>1.01</td>
<td>0.12</td>
</tr>
<tr>
<td>SPSS</td>
<td>161</td>
<td>1.37</td>
<td>0.85</td>
</tr>
<tr>
<td>SSH</td>
<td>159</td>
<td>1.09</td>
<td>0.38</td>
</tr>
<tr>
<td>WSFTP</td>
<td>160</td>
<td>1.24</td>
<td>0.67</td>
</tr>
<tr>
<td>XWin32</td>
<td>160</td>
<td>1.09</td>
<td>0.45</td>
</tr>
<tr>
<td>QuickTime Player</td>
<td>161</td>
<td>1.75</td>
<td>0.94</td>
</tr>
<tr>
<td>RealOne Player</td>
<td>161</td>
<td>1.53</td>
<td>0.85</td>
</tr>
<tr>
<td>MediaPlayer</td>
<td>160</td>
<td>1.83</td>
<td>0.99</td>
</tr>
<tr>
<td>Unigraphics</td>
<td>159</td>
<td>1.05</td>
<td>0.37</td>
</tr>
<tr>
<td>Acrobat Reader</td>
<td>161</td>
<td>2.35</td>
<td>1.24</td>
</tr>
<tr>
<td>Outlook Express</td>
<td>151</td>
<td>1.07</td>
<td>0.26</td>
</tr>
<tr>
<td>Novell GroupWise</td>
<td>162</td>
<td>2.03</td>
<td>1.28</td>
</tr>
</tbody>
</table>