FACTORS INFLUENCING DECISIONS TO ADOPT WEB-BASED TRAINING BY COMMUNITY COLLEGE STAFF

A Thesis in
Workforce Education and Development

by
Karen Marie Peters

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The thesis of Karen Marie Peters was reviewed and approved* by the following:

David L. Passmore  
Professor of Education  
Thesis Advisor  
Chair of Committee

Judith A. Kolb  
Associate Professor of Education

William J. Rothwell  
Professor of Education  
In Charge of Graduate Programs in  
Workforce Education and Development

John T. Harwood  
Associate Professor of Information Sciences and Technology  
Associate Professor of English

*Signatures are on file in the Graduate School.
ABSTRACT

This study investigated factors influencing the decision to use or not to use web-based training. The participants of this study are staff employed at 16 community colleges. The community colleges studied are a part of a 28 college collaborative called the MCCVLC, Michigan Community College Virtual Learning Collaborative. The factors investigated in this study were: current technology use; culture of learning; peer support; managerial or supervisory support; training logistics; type of training event; marketing and promotion; degree completed; socioeconomic status; gender; and campus location. All participants completed the same survey designed to measure the effect of the independent variables on the binary dependent variable, to adopt (use) or not adopt (not to use) web-based training.

The results of this study are consistent with the literature review on adoption of innovation suggesting that the independent variables described are all predictors of innovation. The findings suggest that the logistics of the web-based training was the strongest predictor of adoption. The constructs of marketing and promotion and type of training event were strong predictors of the decision to adopt web-based training. Peer support and managerial support were not as strong predictors in this study, however clearly influenced the adoption of web-based training. The highest degree attained by an individual was also a strong predictor. Respondents with four year degrees or higher were more likely to adopt web-based training. Other variables need to be explored in future studies. Implications from the findings and areas for future research are included in the discussion.
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Chapter 1

Introduction

Historical Perspectives

In the last 40 years, economic and technological forces have transformed the US economy from a production based economy to a service based economy (Urdan & Weggen, 2000). The information revolution during the second half of the 20th century added Information Technology (IT) to the equation (T. Davenport 1996, 1998). Hence, total quality management (TQM), just-in-time (JIT) deliveries, and automatic process control emerged. People’s roles changed from physical work to deskwork (T. Davenport 1996, 1998; P. Davenport, 1997). The role of workers changed from being a replaceable commodity to being a fundamental capability behind the company’s existence and the source of long-term profitability. This role change is one factor that led to a knowledge-based economy.

In a knowledge-based economy, building intellects is as critical as building factories (Hibbard, 1998). Over the past few years much attention has been given to human resource development in a knowledge-based economy. Particular attention has been paid to information technology (IT) skills. University and college staff are affected by this new economy and the nascent IT skills one needs to operate more efficiently and effectively. Technology has changed the way we live, work, think and learn. University and college training managers are faced with delivering knowledge and skills more rapidly and efficiently across faculty, staff and students. In the age of just-in-time learning, just-in-time training is critical to an individual’s and an organization or
institutions’s success. Universities are looking to web-based training as a potential solution to this challenge.

Originally conceptualized with the sole purpose of making research findings and scientific materials available to the academic and scientific community, the Internet has become an important communication medium for both corporations and individuals (Lau, 2000). Lately, the Internet has become an innovative instructional and distance learning tool for academic institutions. Not only is this innovation affecting the classroom, the Internet and emerging technologies are placing rigorous training demands on support staff in academic institutions. New skills are needed by all members of the institution. Professional development departments traditionally offering face-to-face training are looking for new and efficient ways to train staff.

Access to on-line training is critical to the new knowledge economy in which companies must compete in fast changing markets, turn out products in record time and keep employees trained in a learning-on-demand fashion. Knowledge is a source of competitive advantage and must be continuous (Berry, 2000). Students are expecting the same response from prospective universities and colleges.

Interest in the Internet or World Wide Web as a medium to train academic support staff has dramatically grown. Today, much of web-based training is dedicated to training IT. The need for continuous learning and on-line learning are a good match (Quan, 2000). Web-based training's expected surge over the next few years is its connection to the belief that knowledge is the strategic weapon of the future (Dullich, 2000). The renewed promise of web-based or distance education rests on a confluence of economic and technological progress and developments that are setting the context for the 21st century
In a weak economy the training budget is usually the hardest hit. Companies will not invest money in new technologies. Companies will work with what they have in place. A strong economy and constant improvement on communication technologies will make the choice of distance education a low risk decision for training managers.

Resolving core-training issues involves more than just technology. Accountability, job responsibility and learning outcomes are fundamental issues (Raths, 2000). Computer based courses have not quite reached a level of specialization to specific job tasks. There is, however, a movement in that direction.

Research suggests a growing concern that academic support staff treat web-based training more casually and fail to acquire the skills as quickly as classroom training (Hunter, 2000). Computer based courses seem to appeal mainly to those pressed for time. Online training requires the same consideration as traditional classroom-based training: employees have to balance their workloads, justify the need for additional training to managers, and provide some evidence that they have learned and retained the information (Raths, 2000). In spite of all the efforts made by organizations on new technology and the rapid increase in Internet use, the adoption of web-based training has not yet reached a level of use to justify the costs (van Braak, 2001). Although the utilization of computers in other areas of business is increasing, only a small portion of companies perceive web-based training as an indispensable part of their core training (Masie, 2000). As technology changes, the need to adapt to these changes increases (O’Quinn & Corry, 2002). The pressing need for workers with IT related skills has fueled
an increasing enrollment of adult students across the country that are returning to college
to update their skills and knowledge base (Drucker, 1998).

MacDonald, Stodel, Farres, Breithaupt and Gabriel (2001) point out that universities
and colleges are no longer a community of academic staff but an organization with an
equal if not greater proportion of non-academic elements. Distance education courses are
evolving to meet and create new market demand. The web offers the possibility of
providing a stimulating learning environment to engage learners in meaningful learning
through reflection, application and interaction (MacDonald et al., 2001).

There is little research to support the value of web-based training as a viable
method of professional development. If universities and colleges are going to investigate
delivering training right to the desktop, there needs to be clear understanding of learner
use and acceptance of learning technologies.

Purpose

The state of Michigan spent a significant amount of its education budget on
purchasing a web-based training product to be used for professional development for
faculty, support staff and students at any Michigan based educational institution. The
Michigan Community Colleges’ Virtual Learning Collaborative (MCCVLC) reported
little use of the product at the 2002 end of year board meeting. Severe budget cuts in
education have caused concern especially with the community colleges in Michigan
receiving substantial support from the state. It was determined that in order to justify the
continuance of this resource, formal research should be conducted in the area of adoption
of innovation.
The purpose of this study was to investigate factors influencing the adoption of web-based training by staff in the 28 Community Colleges that make up the Michigan Community Colleges’ Virtual Learning Collaborative. The factors investigated in this study were: current technology use; culture of learning; peer support; managerial or supervisory support; type of training event; training logistics; marketing and promotion; degree completed; socioeconomic status; gender; and campus location.

The Problem

Getting a new idea or process adopted, even when it is obvious there are advantages, is often very difficult (Rogers, 1995). Technology keeps changing at a rapid pace. The convergence of multiple technologies in the workplace requires upgraded skills (Schafer, 2000). This is especially true with the onset of enterprise wide information systems in higher education. Web-based training is one of the most prevalent in the discussion of professional and staff development (Benson, 1999). E-education offers significant cost savings and a variety of topics for development. Web-based training developers like NetG have reorganized to now support the higher education market. Courses offered through NetG include both hard and soft skills training relating to IT and support of organizational functions. The main hurdles to web-based training such as (a) lack of interactivity, (b) content availability; (c) technology standards and (d) bandwidth are being addressed on an ongoing basis (Urdan & Weggen, 2000). However, in the community college setting, web-based training is not widely used or accepted as a viable training method for support staff.

Research by Raths (2000) found the following issues regarding web-based training that dampen enthusiasm: (a) technology issues; (b) boring content; (c) failure of web-
based training to meet expectations; (d) streaming technologies are not ready for prime
time yet; (e) web-based tutorials do not have engaging, interactive content and (f) the
user does not take into account the setting in which web-based training will be used.

A study at the University of Tennessee in 1999 indicated the following factors
affecting technology use and training (Groves & Zemel, 2000): (a) equipment
availability; (b) insufficient evidence the course offered improved student learning; (c)
insufficient evidence there was increased student interest; (d) unclear advantages over
traditional methods of teaching; (e) ease of use of the delivery system; (f) time needed to
learn; (g) lack of adequate training available on how to use the delivery system; and (h)
the users’ personal comfort with technology. Administrative support was also an
important factor in the decision. Frequency of use by department colleagues influenced
the decision to use, but not as much as the other factors.

A study by Rowe (1999) revealed the following obstacles to web-based training:
(a) the technology is not dependable; (b) the ability to get training anytime/anywhere is
not developed; (c) there is not equal access; (d) there is a lack of management conviction;
and (e) there is a lack of human interaction.

A majority of the research regarding the decision to use or not to use web-based
training was focused on the obstacles (Berge & Collins, 2001; Berge & Muilenburg,
2001; Bank, 2000; Cross, 1981; Cunningham, 2001; Ghoshal & Bartlett, 1988; Hayes,
1999). The question at hand is, what are the factors that support adoption of web-based
training?
Significance of the Study

Millions of dollars are invested in the delivery and support of web-based training with little research on the conditions under which end users will accept this method as a valued method of learning and professional development.

By establishing a relationship between factors such as (a) current technology use, (b) learning culture, (c) peer support, (d) perceived managerial support, (e) the type of training event, (f) training logistics, (g) marketing and promotion and (h) demographics and adoption versus non-adoption, universities and colleges may be better able to predict the success of a proposed technology adoption.

Research Questions

1. To what extent does current technology use influence the adoption of web-based training?

2. To what extent does the culture of learning influence the adoption of web-based training?

3. To what extent does peer support influence the adoption of web-based training?

4. To what extent does managerial or supervisory support influence the adoption of web-based training?

5. To what extent does the type of training event influence the adoption of web-based training?

6. To what extent does training logistics influence the adoption of web-based training?
7. To what extent does marketing and promotion influence the adoption of web-based training?

8. To what extent does (a) highest degree completed, (b) socioeconomic status (salary range), (c) city, (d) gender, (e) computer ownership and (f) Internet access influence the adoption of web-based training?

Theoretical Foundation Supporting the Research

The theoretical foundation for this study is Rogers’ diffusion of innovation. Using hundreds of studies in various disciplines as a basis, Rogers defines innovation as “an idea, practice or object that is perceived as new by an individual or other unit of adoption” (1995, p. 11). “Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 1995, p. 5). The innovation-decision process is the “process through which an individual (or other decision making unit) passes from the first knowledge of an innovation, to forming the attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision” (Rogers, 1995, p, 20). There are also influences on the process, such as the prior conditions, characteristics of the decision-making unit, the perceived characteristics of the innovation, and communication channels.

Rogers (1995) discussed 5 attributes that impact the rate of adoption: (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability and (e) observability. “Relative advantage is the degree to which an innovation is perceived as being better than the idea it supercedes” (p. 212). Many administrators use incentives to increase the rate of
adoption. The main function of an incentive is to increase the degree of relative advantage. The second attribute, compatibility, “is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters” (p. 224). The third attribute, complexity, “is the degree to which an innovation is perceived as relatively difficult to use and to understand” (p. 242). The rate of adoption is slower with more complex innovations. The fourth, trialability, “is the degree to which an innovation may be experimented with on a limited basis. New ideas that can be tried on the installment plan are generally adopted more rapidly than innovations that are not divisible” (p. 243). The last attribute, observability, “is the degree to which the results of an innovation are visible to others” (p. 244).

All potential adopters of an innovation do not adopt the innovation at the same time. Consequently, on the basis of the degree to which an individual is relatively earlier in adopting the innovation, adopters can be classified into adopter categories (Rogers, 1995). Development of adopter categories requires determination of: a) the number of adopter categories; b) the percentage of adopters to include in each category; and c) a method to define categories (Rogers, 1995, p. 245).

The most widely accepted method of adopter categorization is that proposed by Rogers (1995). The categorization scheme proposed by Rogers offers several advantages. First, it is easy to use. Second, because it offers standardized categories results can be compared, replicated and generalized across studies.

There has been little research to dispute Rogers’ typology. Strutton, Lumpkin and Vitell (1994) argue against Roger's development of a typology of innovation with a focus on differences between adopter groups. Their research investigated the appropriateness of
Rogers’ typology of innovation characteristics across innovations differing on the extent the innovations are "new." The authors then investigated the predictive strength of those characteristics in the adoption decision. Although Rogers’ typology did not hold true for innovations that were not new and the late adopter categories, Rogers’ typology did hold true for new innovations and early adopters in this study.

Rogers' typology depicts the following characteristics by which potential adopters evaluate an innovation (a) relative advantage, (b) compatibility, (c) complexity, d) trialability and (e) communicability (observability) (1995). Roger's typology has received widespread acceptance.

Strutton, Lumpkin and Vitell (1994) also differentiated between continuous and discontinuous innovation. Continuous innovation causes little disruption in the behavior and involves the introduction of a modified product. Discontinuous innovation is a new product whose consumption requires new behavior patterns. In this context, the authors noted, Rogers' typology did apply.

One could argue that a modification of an existing product is not really an innovation and is less likely to be perceived as new, hence, the likelihood of Rogers' diffusion typology not fitting. Although distance education has been around for years, the use of technology in training can be considered a discontinuous innovation in that it requires new behavior patterns (Strutton, Lumpkin & Vitell 1994). Since the MCCVLC colleges are new to teaching and learning with technology and learning online and they are relatively behind other institutions on access and infrastructure, online training is considered a new innovation. This approach to training causes disruption in current observable behaviors. Rogers’ theory will remain the theoretical foundation of the study.
With the increase in distance education technologies in higher education the management of innovation is becoming increasingly more important. This study, based on the theoretical foundation of diffusion of innovation, will attempt to identify a relationship between selected factors and adopters versus non-adopters of web-based training.

Assumptions

The survey is based upon the assumption that web-based training (WBT) is as valuable as face to face and questions non-use. The assumption then becomes a limitation. The fact that a survey is self-report also adds to the limitations of the study.

Another limitation is the population, the MCCVLC staff. Generalizations to other community college staff will need to be carefully purported to like institutions: size, rural area, pay scale and other variables.

Surveys are reactive in nature. Surveys directly involve the respondent in the assessment process by eliciting a reaction. Surveys only tap respondents who are accessible and cooperative. Surveys often make the respondent feel special and thus can produce responses that are slanted. Surveys arouse a tendency to agree with positive statements or questions. Surveys are vulnerable to over-rater or under-rater bias (Fowler 1993; Ary, Jacobs & Razavieh, 1996; Isaac & Michael, 1997).
Chapter 2

Review of the Literature

The ultimate purpose of this study was to investigate factors influencing the adoption of Web-based Training by staff in the 28 Community Colleges that make up the Michigan Community Colleges’ Virtual Learning Collaborative (MCCVLC). The factors investigated in this study were (a) current technology use, (b) culture of learning, (c) peer support, (d) managerial or supervisory support, (e) type of training event, (f) training logistics, (g) marketing and promotion, (h) highest degree completed, (g) socioeconomic status (salary range), (h) gender, (i) city, (j) computer ownership and (k) Internet access. The purpose of this review of related literature was to review other adoption models and approaches; pay close attention to technological innovations; and focus on the variables related to this study.

During the last decade, companies have realized that the real basis for competition has shifted to how well knowledge and other intellectual assets are focused on making a company’s customers successful. The role of workers changed from being a replaceable commodity to being a fundamental capability behind the company’s existence and the source of long-term profitability and competitiveness (T. Davenport, 1996; 1998). In a knowledge-based economy, building intellects is as critical as building factories (Hibbard 1998). However, the life of knowledge and human skills today is shorter than ever. Four-year degrees are just the beginning of a forty year continuing education as life-long learning becomes imperative (Urdan & Weggen, 2000).

The information revolution during the second half of the 20th century added Information Technology (IT) to the equation (T. Davenport 1996; 1998). This led to
extensive information gathering and exchanges between organizations and their suppliers and customers. Hence, total quality management (TQM), just-in-time (JIT) deliveries, and automatic process control emerged. People’s roles changed from physical work to desk work (T. Davenport 1996; 1998; P. Davenport, 1997).

The gap between the demands of a knowledge economy and the educational status of the workforce is wide and must be addressed. Technology has changed the way we live, work, think and even learn. Today’s workforce has to process much more in a shorter amount of time (Dillich, 2000). Training managers need to deliver knowledge and skills more rapidly and efficiently. Just-in-time training becomes a critical element to success (Urdan & Weggen, 2000). Access to on-line training is critical to the new knowledge economy in which companies must compete in fast changing markets, turnout products in record time and keep employees trained in a learning-on-demand fashion (Quan, 2000; Allen, 2000).

Today, much of web-based training is dedicated to training IT. The need for continuous learning and on-line learning are a good match (Clark & Salomon, 1986). Many academic institutions and private corporations recognize the need for learning at a distance, continuing education and training on the job or in the classroom (Diebold, 1985).

Web-based instruction (WBI) can be viewed as an innovative approach for delivering instruction to a remote audience (Khan, 1997). Networked computers with multimedia capabilities are increasingly being used for teaching, research, and service activities in institutions of higher education (Gueldenzoph, 2000). Training is also essential to the successful integration of computers in higher education.
Demand for education and training is rapidly increasing in a wide range of content and skill areas to increasingly diverse learners because of the enhanced access to education (Shrestha & Sutphin, 2000). Clearly traditional learning is in transformation, leading to a new distance learning and network mode (Shrestha & Sutphin, 2000).

Online learning offers many benefits. Employees are able to keep current with evolving technologies. As learning systems change, increased skills are needed to access the training (Fritz, 1996). Training programs that offer multiple modes of training are likely to be even more attractive to the knowledge worker. Training programs help to attract and retain employees (Hitt, 1996).

Traditional residential classroom instruction is expensive and time consuming. Fortunately, we are in the midst of a paradigm shift in education and training from the classroom to the network. Web-based training is an extremely cost effective, efficient method for providing training, giving employees the chance to learn at their own speed and take a class when it won't interfere with productivity (Mitchell, 2000).

The recent digital fusion with the merger of the computer, communication and information technologies, enables a multimedia capability on the Internet. This technology can be used to complement face-to-face instruction or to provide entire courses over networks which are becoming more capable of efficiently delivering the complete multimedia spectrum (Burbules & Callister, 1996; Cyrs & Conway, 1997; Jacobsen, 1994; Jonassen, 1989; Krommers, Grabinger, & Dunlap, 1996; Nix & Spiro, 1990; Tergan, 1997; Vosniadou, De Corte, Glaser & Mandl, 1996).

Research on diffusion of innovation with web-based training or on-line learning is weak at this time. However, there are diffusion studies and practical white papers with
findings that support this nascent topic, adoption of web-based training. This literature review looks at some of the contentious issues relating to the development and acceptance of innovation and use as the foundation for the study. By investigating the approach to innovation and understanding the assimilation of IT in organizations and diffusion of past and present emerging technologies we gain a better understanding of the problem at hand. The following sections will reveal the breadth and depth of innovation topics, ending with a focus on research supporting the theoretical variables used in this study.

Approaching Innovation

Rogers (1995) discussed the innovation development process. This process consists of all the decisions and activities that occur from the recognition of need, through research, development and commercialization of an innovation, through diffusion and adoption of the innovation by users, to consequences. “Recognition of a problem or need may happen by means of a political process through which a problem arises to a high priority on the agenda of problems that deserve research” (p. 160). Rogers also realized innovation may come simply from a perception of need and the desire to seek solutions. This implies that innovations are purposeful.

Peter Drucker addressed his ideas on the sources of innovation in a 1998 article written for managers. Drucker felt that most innovations, especially the successful ones, result from a conscious, purposeful search for innovation opportunities, which are found in only a few situations (Drucker, 1998). Four areas of opportunity according to Drucker are (a) unexpected occurrences, (b) incongruities, (c) process needs and (d) industry and market changes. Three additional sources of opportunity noted are (a) demographic
changes, (b) changes in perception and (c) new knowledge. The article reveals stories of past innovations supporting the above sources. An example is the computer. It took over 15 years for business to realize the computer’s accounting abilities. Another past innovation is the paradigm shift of segmented automobile models to one of lifestyles. By advertising certain cars with certain types of lifestyles perceptions were altered. The importance of perception on adoption is salient when reviewing the adoption of health care innovations such as in-house exercise equipment. Purposeful systematic innovation should begin with the analysis of the sources of new opportunities. However, depending on their context, sources of innovation will have different levels of importance at different times.

Drucker’s sources of innovation approach fits well in Rogers’ five stages of the innovation process in an organization (Rogers, 1995). Rogers defines agenda-setting, the first of the five stages, as the stage in which an organizational problem creates a perceived need for an innovation. At this stage the organization defines and prioritizes need. Rogers defines the second stage, matching, as a planned and designed fit between the problem and the innovation. This supports Drucker’s suggestion that innovation results from a conscious, purposeful search (1998). By matching the organizational problem to an innovation, the importance of context in the diffusion process becomes even more evident (Holloway, 1996).

*Understanding the Assimilation of IT in Organizations*

A revolution around a technology innovation does not really arrive until the organization structures their activities around the new technology and the new technology adopts to the organization by becoming easy to use (Rogers, 1995). The innovation is
immersed so much in the context of the organization it becomes a part of it. Web-based training has not arrived there yet.

The stages theory is a framework for understanding the assimilation of information technology into the business organization (Nolan, 1993). The theory is a descriptive hypothesis for the growth and management of the computer in an organization. The stages theory was developed 20 years ago around 1973 to help managers understand the role and evolution of computers in their organization. It is based upon the discovery that plotting the annual computer expenditures of an organization formed an "S-shaped" curve, following the familiar pattern of "learning curves" and "experience curves."

The S-shaped curve reflects organizational learning that occurs when an organization applies computers to its business operations. As organizations "learned" how to utilize IT in their businesses, they spent more and more money developing the capability. Organizational learning about computers is a key concept in the stages theory.

Since organizational learning is partly formal transfer of recorded knowledge and partly informal accumulation of experiential knowledge, the theory holds that every organization must traverse the stages of learning in a sequential manner. The four stages are listed below (Nolan, 1993, p. 2-3).

Initiation: In stage I the organization first introduces new data processing technology into its low level, operational business processes (administrative systems such as payroll and accounts receivable).

Contagion: The learning curve begins to move upward sharply as the organization experiments with new uses of the technology in stage II. While the organization
concentrates on introducing the new IT at all available opportunities in the lower, operational level, it devotes less and less attention to the efficient use of existing IT resources. Management creates and permits organizational slack in IT activities by continuing to commit more resources to IT development than are strictly necessary to get the job done. The extra spending nurtures innovation, which is conducive to expanding the use of IT in the new areas of business. With high slack and low control, the use of IT grows rapidly, but in an unguided and inefficient manner.

Control: By the end of the Contagion stage, the computer budget generally exceeds revenue growth and becomes a control concern for senior management. Senior management then intercedes to curtail the rapid growth. In the Control stage, stage III, slack is "squeezed out" by enforcing a higher level of control through tighter budgeting, full charge-out systems and disciplined project management. The rapid growth of the previous stage slows somewhat as tighter control measures are imposed on IT usage and spending. High control and low slack promote high levels of efficiency, but discourage any innovation necessary to allow and encourage IT to permeate all organizational functions. The proper balance between control and organizational slack is the critical management decision that promotes effective organizational learning through the stages.

Integration: In stage IV, management strives for that critical balance as the new technology is firmly integrated into the company's operational business processes.

Four growth processes serve as a taxonomy to comprehensively describe computer activity and the dynamics of computer organizational learning in an organization according to Drucker in the same article.
1. Applications Portfolio: The applications portfolio is the use of information and the computer in the business organization. Developing a functional applications portfolio to support business objectives is the reason for investing in computer technology. The applications portfolio grows and evolves as new technology and new capabilities emerge.

2. Resources: refers to the money, technology and people needed to apply computers in the business.

3. Management: The management of the computer changes across the four stages. Management consists of all the techniques and procedures that ensure resources are applied in an effective and efficient manner (planning, project management). The objective of a manager is to balance between control and slack for each stage of technology adoption.

4. Users: The ability of users to effectively apply computers to their work grows over the four stages. In Stage I, users tends to be hands off, but by Stage IV, they are taking an active role in the design and development of computer applications to suit their needs.

Although the stages theory is focused on computer use primarily, there are a lot of similarities between what Nolan has reported and what Rogers has developed. Rogers’ (1995) five attributes that impact the rate of adoption: (a) relative advantage; (b) compatibility; (c) complexity; (d) trialability; and (e) observability can be compared to the stages theory. Trialability can be associated with initiation at a low level. The contagion stage can be associated with the attributes of observability and complexity. Control can be associated with relative advantage, while integration can be associated with compatibility (Rogers, 1995)
The stages theory holds that effective management of computer activity occurs by maintaining balance among the four growth processes. One common imbalance situation is technology getting too far ahead of an organization's ability to apply it. For example, IT managers would occasionally acquire advanced data base technology without having the appropriate technical skills in their programmer ranks and functional awareness of users to affectively apply the advanced technology.

The importance of this research to the study at hand is web-based training requires not only technical skills in the programmer ranks to support the learning infrastructure, but also the ability of users to effectively use the system and incorporate this type of learning into their workflow.

*Diffusion Versus Technology Transfer*

While technology transfer and diffusion are often used interchangeably to refer to the use of a new product, the production of the product, and the adoption of a new process, must be distinguished (Stewart, 1987).

The author illustrates the difference using an example of a firm that has developed a new product with plans to spend considerably to invest in its production and to encourage its purchase and use. Stewart refers to this stage as diffusion of use, which he states is good for the economy and the innovating firm that will profit from the adoption of its product. However, he points out that the technology that makes up this new product or is responsible for the production of the product is not what is being diffused. In fact, Stewart asserts that this same firm will spend money to prevent the spread of knowledge (technology transfer) about the product to other firms by obtaining patent rights, selling the rights to produce its product or entering into licensing agreements.
From an economic viewpoint, diffusion of use is restricted by demand, whereby transfer of technology, in the hands of the innovating firm, is a matter of supply. "This is technology transfer," Stewart says "in the short run an unqualified blessing to the economy, accelerating growth, but a loss to the innovating firm if accomplished without adequate compensation (Stewart, 1987, p. 77)."

Another way to look at the difference between technology transfer, diffusion, and diffusion of use is by asking the question, "What is being transferred and to whom?" Stewart cites the rate of adoption of new hybrid seed, studied by numerous social scientists, noting that what is being transferred is what needs to be diffused in order to sell the seed (product), not the actual technique (or transfer of knowledge) regarding how farmer's can grow their own hybrid corn seeds. While Rogers (1995) notes that technology transfer is the process of communication involved in adoption of an innovation, Stewart argues his definition does not take into account the power of the supplier (innovator) in controlling the diffusion of an innovation. To argue his position Stewart notes several ways innovators do control the technology transfer, through export (sales), by securing a patent to manufacture the product in a foreign country, or by securing a license. Cost is yet another way to distinguish between diffusion of use and transfer of technology. The cost of transfer may involve construction of a new plant, purchase of equipment, technical assistance and marketing expenses. The higher the cost, he argues, the less likely transfer will occur. In contrast, the innovator has no reason to limit diffusion of use (sale) of the product produced from the technology transfer.
When an innovator loses proprietary legal rights, they lose control over the diffusion of the technology itself. Initiative, Stewart notes, then passes from the supply side to the demand side.

In conclusion, Stewart asserts that the main implications for distinguishing between technology transfer and diffusion of use in this way is to recognize the danger of efforts to push for accelerated technology transfer (through compulsory licensing or shorter durations on patents) of an innovation while in the hands of the inventor. Doing so, he believes, will discourage invention and innovation in the long run.

**Diffusion of Emerging Technologies**

New technologies often produce a major disruption to the established trajectory of emerging technologies by drawing on new or different discipline bases, thus requiring the development of new competencies (Day & Schoemaker, 2000). In the early stages of development it is not always evident that any new technology will have a relative advantage. One of the most confusing aspects of emerging technologies is that use patterns and behaviors are almost impossible to clarify when the technology is in its beginning stages. Day & Schoemaker (2000) found four “ingredients” necessary to prevail when adopting an emerging technology: (a) attend to signals from the periphery; (b) invest in learner skills and knowledge; (c) maintain flexibility and be open to many options; and (d) maintain organizational separation since not every technology will work the same way for every function.

Day and Schoemaker (2000) identify four pitfalls for emerging technology supported by the dominance of traditional thinking: (a) delayed participation; (b) sticking with familiar technology; (c) reluctance to full commitment; and (d) a lack of persistence.
The first two pitfalls are both rooted in decision-making biases. The biases are that most people have an aversion to risk and a deep seeded preference for the status quo. With pitfall three, even if strong beliefs exist about the potential of a new technology, the actual actions may be inadequate. The authors go on to say that the tendency to lose patience is a recurring phenomenon. Firms that withdraw from a technology usually do not resume their efforts until others prove the viability of the emerging technology.

The Steam Engine

America preferred the waterwheel to steam power until the middle of the 19th century and by 1900 almost 156,00 steam engines were being used in American factories which out numbered the water wheel by a ratio of 4 to 1 (Atack, Bateman & Weiss, 1980).

The purpose of this article was to look at the factors that influenced the rate of diffusion of the steam engine in the nineteenth century and also to investigate if there were regional differences in the diffusion. More specifically, the authors wanted to look at the timing, pace, and the extent of usage of the steam engine prior to the 1900's.

The article broke down the distribution of the steam engine by region and looked specifically at each region as to individual adoption rates. The data gathered, per region, when charted out, represented the traditional S-shaped growth curve with varying levels of adoption per geographic region.

When looking at the regional adoption rate with regard to time of penetration, the data confirmed initial predictions of inception. The data showed that the Middle Atlantic States adopted the earliest (May, 1832) and the late adopters were in the Mountain and
Pacific States (April, 1842). The rational for the timing of adoption per region was due solely to the lack of supplies in each of the given regions necessary for full adoption.

The authors went on to explain that data regarding the diffusion of the steam engine were incomplete and estimates had to be made with regard to data. Due to the lack of complete data a simulation estimate was performed to create a more complete estimate. The simulation provided regional cost estimates that helped explain the transformation from the water wheel to the steam engine.

The study concluded the adoption of the steam engine eliminated several of the constraints from using water as a power source. The report also mentioned the onset of coal as a resource may have helped foster the use of steam engines. The steam engine would soon loose its popularity due to the invention of the electric motor.

The relevance of this to the study at hand is the importance of adequate resources to the diffusion process. Although the web-based training in Michigan was free, the software requires a minimum level of operating system and space for access. Human resources are also needed for support at each location.

*Computer Use in the Classroom*

van Braak (2001) investigated the relationship between computer use in the classroom and influencing factors on an individual level. Subjects were secondary school teachers familiar with computer use. He used logistic regression to analyze the strongest predictors for computer use in the classroom. Technological innovativeness, teaching a technology related subject, and computer experience were found to be the strongest predictors for computer use in the classroom.
The Stages of Concern Questionnaire (SOCQ) was used to examine the change in attitudes and behaviors toward the use of the Internet as an instructional tool (Gerschner & Snider, 2001). The intervention for the study was the training provided by the research team using the train-the-trainer model. The researchers used the Stages of Concern Questionnaire (SOCQ), which consists of 35 items that use a 7-point Likert response form. Analysis of the data results in a profile of the subject's intensity of concern at seven distinct stages: awareness; informational; personal; management; consequence; collaboration; and refocusing. The SOCQ questionnaire was developed at the Research and Development Center for Teacher Education, University of Texas at Austin, and has been frequently reported in change literature. The study assessed changes in attitude pre and post use and training of faculty using the Internet for the first time. The null hypothesis of no difference between pretest and posttest on the instrument was rejected.

Based on the results the researchers then developed the Concerns Based Adoption Model (CBAM) whereby an individual progresses through three clusters of concerns while adopting an innovation. The concerns are (a) self concerns, (b) task concerns and (c) impact concerns to be used in future research.

*CT and MRI Adoption*

Hillman and Schwartz looked at the adoption and diffusion of computerized tomography (CT) and magnetic resonance imaging (MRI) technology in the United States (Hillman & Schwartz, 1985). This study examines and compares the rates and patterns of diffusion of computerized tomography and magnetic resonance imaging over the first 4 years of their availability.
Although early diffusion of CT was more rapid than that of MRI, adoption of MRI in non-hospital settings equaled that of CT. Analysis of attributes of the technologies and attributes of the regulatory, reimbursement, and market environments surrounding the early diffusion of these technologies provides insight into their different diffusion patterns. In particular, the technical and financial uncertainties surrounding MRI have inhibited its diffusion compared with that of CT. Medicare's prospective reimbursement system and certificate-of-need (CON) regulation by states have reduced overall MRI diffusion and stimulated purchases of MRI by non-hospital organizations. The FDA's pre-market approval (PMA) program has changed marketing strategies and influenced the diffusion of MRI to a lesser degree.

Data for this study regarding the diffusion of CT was obtained from case studies published by the U.S. Congressional Office of Technology Assessment (OTA) and from studies of CT diffusion. Data for this study on the diffusion of MRI was obtained from survey and telephone interviews.

This analysis identifies problems in how the present health care system evaluates and adopts new, expensive, diagnostic technologies and suggests changes to make the system more responsive to present needs. In an optimal medical care system, new technologies and innovations would be adopted rapidly once their safety and efficacy are established and once favorable cost-effectiveness ratios are anticipated. The technologies would be purchased and sited in the most efficient and appropriate settings and would be available equally to everyone in need. Payment would reflect the actual costs of appropriate and efficient medical care at all times, regardless of which technologies are used and whether they are cost saving or cost increasing.
What is interesting about this study is the determination for need of the innovation did not come from the users or potential benefactors of the new technologies. Insurance companies seem to have the control. This can impede diffusion of innovation. In the study at hand, the governor of Michigan purchased the service. An interesting follow up to this study would be to investigate if any needs assessments were conducted before purchase.

**Performance decrements due to new technology**

Kubey, Lavin and Barrows (2002) surveyed 576 college students on their Internet dependency. Self-reported Internet dependency and impaired academic performance associated with greater use of all Internet applications (i.e. chat rooms). Too much Internet use lead to social isolation, loneliness, depression and especially poor time management. The most common use of computers was for Internet use, and the most common time to be on was the evening. Although that may be a time for students to use the Internet, it may be contributing to academic problems. The Internet may benefit students in collecting information from the web or make social contacts with individuals that were never possible before the Internet, however, the use of the Internet may become excessive and inhibit face-to-face socialization.

LaRose and Whitten (2000) take a social cognitive perspective in their research on teacher immediacy with web-based courses. The main problem of the Internet according to the authors is teacher immediacy of web-based courses. This may possibly have an negative impact on both affective and cognitive learning. Working with computers may translate into anxious feelings. If students become frustrated with the online course this may result in a lack of motivation and inhibit learning. In addition,
students are unable to form relationships with other students when courses are web-based. Though real time chats may be provided, non-verbal communication during interactions are an important part of relating to another person. There are no non-verbal cues online.

The authors continue to report that students lose a sense of taking a course from a professor and the instructor becomes a machine. However, students are able to spend more time on a task and work at their own pace, thus being able to comprehend more information at times. Sometimes something as simple as a picture of the instructor plays a positive role in the student’s reaction and participation. Increasing the immediacy and motivation for students to learn benefits web-based learning environments.

*Understanding Diffusion in Communities*

The rate of diffusion for a single innovation has been found to vary among communities and other types of socio-geographic areas, but whether an area manifests a characteristic rate of diffusion, and, if so, to what factors it may be related, has not been systematically investigated (Coughenour, 1964). Data obtained in personal interviews with farm operators in twelve Kentucky localities in 1950, 1955, and 1960 provides insight into these questions. Coughenour found that the relative pace of diffusion among localities for each of five recommended farm practices is quite similar, indicating the existence of an underlying rate of diffusion for each locality. A measure of relative locality diffusion rate was found to be more closely related to the median educational level of farmers, median level of contact with communication media, and an index for localities of the integration of communication structures. The locality median scale of
farming and measures of attitudes toward scientific farming, family visiting, and social participation are less closely related to average diffusion rate.

Data on the diffusion of five farm practices in twelve Kentucky localities were analyzed in regard to the speed of diffusion and the factors related to it. This was done to further refine the research on technological diffusion (among social groups). Personal interviews were conducted.

Average diffusion rates for the practices in one locality, relative to the rates in the other localities, were found to be highly correlated. This indicated the presence of an underlying average diffusion rate characteristic rate of each locality. This allowed more adequate interpretation of previous research findings.

The relationship between this study and the study at hand is the results of this study support (a) education level, (b) technology ownership, (c) access to networks and (d) location as possible predictors of adoption.

**The Determinants of Innovation in Public Agencies**

Mohr (1969) attempted to identify the determinants of innovation in public agencies. Innovation is defined in this study as the successful introduction into an existing situation means or ends that are new to the situation (Mohr, 1969). The study served a two-fold purpose: a) To explain a substantial proportion of the innovation studied, and b) To arrive at a better understanding of the nature of the explanatory model itself.

According to the empirical research that Mohr addresses in his study, interrelated factors such as size, wealth, or the availability of resources stand out among other determinants of innovation. The environment of the organization is also important.
Therefore, a three-dimensional hypothesis was established: innovation is (a) directly related to the motivation to innovate; (b) inversely related to the strength of obstacles toward innovation; and (c) directly related to the availability of resources for overcoming such obstacles.

Four exploratory interviews with highly placed public health professionals were conducted. Results show the importance of the attitudes of these health professionals on the innovativeness of local health departments. The professional’s ideology and activism were selected to indicate the motivation to innovate.

The major variables Mohr decided on were (a) activism-ideology, (b) number of white-collar occupations, (c) health department expenditure and (d) size of the jurisdiction.

A 23-item Likert-type instrument completed during the interview measured the attitude scale. The data was collected from 93 local public health organizations. Correlations among variables associated to adoption were compared.

Mohr’s study revealed that the motivation of the health professionals is related to the innovation of the department, but it is possible that health professional’s attitudes resulted in innovative behavior only when other conditions, such as the balance between obstacles and resources, were also favorable.

Mohr compared the correlation among major variables with two sources of obstacles: (a) community obstacles, measured by education and occupation, and (b) organizational obstacles, measured by the extent of public health training of key subordinate employees.
The author discovered that education is weakly correlated with innovation, but occupation is strongly correlated with innovation. The lack of training of the supervisors is a primary obstacle when the health professional is motivated to innovate.

**Innovative Attitudes and Behaviors**

Ettlie & O’Keefe (1982) explore the relationship between some of the various concepts and scales that have been used to characterize innovative attitudes and behaviors. Evidence in the innovation literature reveals the attitudes or values of organizational members are significantly related to innovative behaviors (Burkhart & Brass, 1990; Compeau & Higgins, 1999; Coughenour, 1964; Czepiel, 1986; Eastin & LaRose, 2000). This study compares four scales that measure values and attitudes toward change and innovation. The scales are: (a) The Hage and Dewar scale, which measures values favorable or unfavorable to change; (b) The Kirton scale, which measures innovation orientation assumed to be a stable dimension of personality and assumes that people fall somewhere on a continuum ranging from a marked tendency to innovate to being characteristically adaptive; (c) The Hardin use of the Trumbo readiness-to-change scale, which directly links change attitudes to the job situation; and (d) The Ettlie and O’keefe scale (constructed by the authors and used in this study), which is a self-evaluation of how the person compared with everyone else on "being innovative." The four scales have been used to measure attitudes and values relevant to change behavior.

The authors’ intent was to determine whether the four scales measured the same construct or whether any or all measured different constructs. A Likert scale of 73 behaviors describing innovation and other job-related behaviors in organizations was constructed to test the hypothesis that attitudes correlate significantly with multiple-act
criteria but do not consistently correlate with single-act criteria. This list of 73 behaviors was given in questionnaire format to two groups of male and female graduate and undergraduate students of business administration who had full-time jobs. A total of 123 (56%) usable questionnaires were returned.

Two major hypotheses were tested with the data collected: (a) There will be less correspondence between attitude and values scales reported in the innovation literature than would normally be expected in an inter-correlation matrix of scales purported to measure the same attitude and (b) Regardless of the confusion or purposeful differences in these scales that have been used to measure innovation attitudes and values, they are likely to predict or to be correlated significantly with a multiple-act criterion measure of innovation behaviors or intentions; but they are not likely to be consistently related to single-act criterion of intentions or behaviors.

The results of this study indicate that the innovative attitude and value scales appear to measure the same construct only when there is no distinction made between intentions to behave innovatively and actual innovative behavior. Innovative and change attitudes, as measured by these same 4 scales, do consistently predict multiple innovative intentions and behaviors but not, as expected, single behaviors or single intentions. The single best predictor in a multiple regression of the combined multiple innovative intention-behavior measure was found to be a creative scale ($r^2 = .43, p < .01$). The innovative behavior scale was called attitude toward being innovative. A factor analysis of this scale revealed dimensions related to innovative behavior in organizations were (a) the innovator, (b) the preserver of the status quo, and (c) the unchallenged, dissatisfied person.
Rogers’ (1995) innovativeness and adopter categories of early adopters, early majority, late majority and laggards are consistent with what Ettlie and O'Keefe (1982) found.

McCorkle, Alexander and Reardon (2001) further support adopter categories noting a variation in departmental faculty technical competencies. The authors report that some faculty (innovators/early adopters) manage to find the time and financial resources for technological advancement. Conversely, other faculty (dissatisfied persons or laggards) are truly at the end of the diffusion process when it comes to learning about applying technological innovations. They lack the inclination to deal with the frustrations of technology.

**Framing the Innovation**

J. D. Johnson advises that an innovation must be properly framed in terms of the stakeholders’ expectations (J. D. Johnson, 2000). Framing, which provides one with a context for action, defines an innovation in terms of the political and strategic imperatives of the university. The innovation environment refers to the internal tactical environment for innovation implementation. Innovation attributes refers to a characteristic of innovation such as trialability. The combination of the rational for cost effectiveness with the often political, symbolic and irrational world of the modern university provides an interesting tension.

J.D. Johnson states in his essay that successful implementation of an innovation is the absorption and stabilization of the innovation into ongoing work activities. It almost becomes a cliché that the reason information technologies and systems fail is that there is a failure to consider the needs of users and the larger political environment of the
institution. Greater understanding of the framing environment and the attribute factors and the leadership issues relating to them will enhance the ability to successfully implement new information technologies.

The concept of frames is most commonly used to indicate both a way of viewing the world and of interpreting it. Framing is putting perspective into words.

The initiation of innovations is more likely to occur in an internal environment in which people have easy access to information; there are rewards for sharing seeking and utilizing new information.

The author feels that managers often take the path of least resistance by selecting units for adoption that have the greatest likelihood of producing programs that show well rather than sustained innovations (J. D. Johnson, 2000).

Research Supporting Independent Variables

Current Technology Use

In a synthesis on research of internet based instruction, Piotrowski noted that obstacles to teaching and learning via the internet can be categorized as either (a) institutional, (b) instructional, (c) technical or personal and (d) that specific reservations about employing this technology may be closely related to the type (and degree) of technology use (Piotrowski, 2000). Piotrowski’s results are similar to van Braak’s (2001) results investigating the relationship between computer use in the classroom and influencing factors on an individual level. The amount of technology use and the extent of technology use are factors influencing adoption.

Using Roger’s classification of adopters, Mahajan, Muller & Srivastava (1990) found group differences on the usage of personal computers and software and on
experts influencing adoption. Significant results for the overall differences across the adopter categories suggest that adopters of personal computers who adopt earlier than others tend to use them more often, use a greater amount of software and have greater expertise in the use of personal computers. The authors also reported adopters of personal computers who adopt sooner than others are likely to read a large number of computer magazines and are more likely to review the advertising related to personal computers. Early adopters are more likely to be involved in personal computer decisions, in the evaluation of personal computers and in advising others about personal computers.

Schifter (2002) identifies lack of technical expertise as an inhibiting factor to using web-based training or instruction.

*Current Learner Technical Skills*

Not all students bring with them the skills needed to learn effectively from web-based training. The basic assumption is that a learner’s previous experience with a technology and their expectations and attitudes toward the technology may interact with the properties of a medium to influence the use of the technology and how information is interpreted (Pratt 1987). A learner’s beliefs about the demands placed on them by different media influences the learning process independently of instructional program features (Pratt, 1987). This supports an interactive effect between the use of technology and the prior experience of the learner. The most likely variable to affect how one learns is their prior experience related to the content and technology used for the instruction.

Schifter (2002) identifies training as a motivating factor for faculty to participate in web-based training or instruction. He also identifies lack of good training as an
inhibiting factor to web-based training use. Additional skills are needed to be able to participate in web-based training (Steckler, Farel, Bontempi, Umble, Polhamus & Trester, 2001). The more practice individuals have with using the web for training, the more likely they are to choose web-based training as a preferred method.

Wang and Newlin (2002) looked at the role of self-efficacy and reasons for taking an online class. The study looks at college students and their self-efficacy for course content and how technology components of online sections of class predict their performance. Self-efficacy is defined as the individual’s expectancy in his/her ability to do something. The student enrollment of the online class reveals that if the students like the environment and no face-to-face class time, their self-efficacy is higher than those that enrolled in the class simply due to course availability. Students who preferred web-based learning environments and were curious about the web classes studied more and read more from forum postings from other classmates. Technology skills correlated with self-efficacy beliefs and improved performance. Therefore, if students believed they could do this they fared better than students who were apprehensive.

Culture

Two distinct themes emerged in this literature review on culture and its impact on innovation and adoption. Several articles reviewed developed an expanded view of the influence of context on an organization’s ability to innovate (Rogers, 1995; Drucker, 1998; Day & Shoemaker, 2000; Coughner, 1964). The definition of context included attitudes and behaviors that are indicators of organizational culture. Other articles researched provided more of an experiential perspective on the diffusion of innovation (Nolan, 1993; van Braak, 2001; Mohr, 1969; Ettie & O’Keefe, 1982). That experience,
although grounded in a context, was focused on the culture of the organization at hand. Rogers (1995) cites hundreds of studies in the area of innovation in general. Almost 40 percent of the cited studies dealt with context in one way or another. Based on the research it was determined that context or culture of an organization should not be overlooked as a variable in this study to predict adopter characteristics.

Drazin and Shoonhaven maintain that at its core innovation theory is an adaptationist perspective guided by the basic assumptions that innovation is universally desirable for organizations and certain structures and practices can overcome inertia and increase the generation rate of innovation (Drazin and Shoonhaven, 1996, p. 1066). One area of research regarding innovation and organizations, according to the authors, has been the study of organizational contexts that enhance or impede the generation, adoption, and diffusion of innovation. The authors report their own review of the literature has shown the structure of relationships in any department will have a significant influence on the department's ability to produce new products. Further explanation from the authors is directed at firms that are competing for corporate control (as in mergers and acquisitions). Without realizing it competitive firms create contexts that are detrimental to internally generated innovation. The intense competition has an impact on managerial attention and resources. This shortage of managerial attention and resources impedes innovation within the organization.

To the authors creativity is a necessary but not significant condition for innovation. They agree that the study of innovation implies the study of creativity. They feel creativity is the missing link between context and innovation as an outcome. The authors identify encouragement for innovation at the (a) organizational, (b) supervisory
and (c) work group levels of analysis. The authors also suggest that workload pressures inhibit creativity.

Robert McClintock’s reflective essay on experience and innovation cautions researchers to pay very close attention to the effects new media has on the communication dynamics in educational settings (McClintock, 2001). As more technology is used in education, the pressure to show how it all makes a difference will increase. Instead of focusing just on the outcomes, educators need to focus on just what interactivity means. The author is adamant in asserting that higher education institutions can not access technology use in the same way they assess a multiple choice test. Educators that are using technology in teaching need to look at the feedback experiences and how the dynamics of communication and control differ from traditional ones when students have command of new information and communication technologies. The learning culture is not the same with digital technologies and more studies need to be done in this area. Under emerging conditions, the author supports the precepts of pedagogical common sense need substantial revision, particularly with respect to: (a) What is and is not “age appropriate;” (b) Who can make sound pedagogical choices; and (c) How feedback controlling the educational process should work. As different students learn different things at different times, a common culture will emerge from the overlap of their interests, with each providing a distinct contribution to the whole.

The culture of learning within the institution is critical. Questions that need to be addressed are: (a) “Is there a common emotional tone;” (b) “Is management supportive of development in general;” (c) “Are innovations closely related to goals;” and (d) “It is evident in research that anticipated benefits of web-based training might be less easily
achieved than what was originally thought?” Even if web-based technologies and training do contribute to restructuring of the way education is delivered, it also has the potential to alter embedded institutional cultural practices (Barley, 1999).

The relationship between innovation and culture is recognized in Rogers’ *Diffusion of Innovation* (1995). For the diffusion to take place, the acceptance needs to be systemic and not just practice characteristics of individuals. Cultural areas that affect the level of engagement are training, resources, technical support and communication (Hagner, 2000).

*Peer Support*

For the purpose of this research, peer support can be defined as: (a) Co-workers covering for you while you are training; (b) Trust within the team; (c) A cooperative work environment; and (d) Back up systems that are in place for covering work responsibilities in the group.

Five categories of response in innovation research are mentioned in Rogers’ (1995) diffusion research. The first category, innovators, will train themselves and sometimes go out and train others. Early adopters usually initiate the effort for information and training. Professional development for this group is also pretty straightforward. Provided with the resources, this group is eager to learn. Early adopters can usually be influential among their peers. The early majority will learn new technologies only after others recommend them. When they see early adopters succeed, this group is inspired to learn more. The late majority are skeptics. The skeptics learn new technology only under pressure from peers or when an old system goes away. Laggards represent the last category to change. Laggards are traditionalists, those who
have little, if any, computer literacy. Professional development is a moot point. They simply do not want or feel there is a need for development (Rogers, 1995).

The diffusion process of an innovation, whether it be a product or an idea, will vary in function of the characteristics of the innovation itself, as well as of the agents to whom it is directed (Rogers, 1995).

In order for the diffusion process of an innovation to take place, it is necessary that the innovation is adopted by a series of individuals who have what is defined as “innovativeness.” Rogers (1995) defined innovativeness as the degree to which an individual is relatively quicker in adopting an innovation than his or her peers or social system.

Mahajan, Miller & Srivastava (1990) proposed a method that allows for the five adopter categories proposed by Rogers (1995) to be distinguished. The authors considered that it is important to know the adopter categories so that it is possible to identify target markets and develop strategies to reach those markets. Each adopter category will require a different marketing and communication approach.

Martinez, Polo and Flavian (1998) in their meta-analysis of research on the differences between first and last adopters of consumer goods claim the diffusion of an innovation in a social system develops through time and is a function of how information is transmitted, who transmits the information and how that information is received in a particular social system or peer group.

One conclusion based on the research is that the results reflect how important it is for peers to adopt an innovation in any social system for success in implementation.
Some practical advantages to peer support are: (a) Learner’s grasp of new information is similar so they can often explain things to each other; (b) Support is available beyond the actual training event; (c) Because cooperative learning encourages more active participation, areas of learner confusion are more apparent to learners and instructors; and (d) Working with peers pushes trainees to think more practically with almost automatic transfer or application to their job tasks (Masie, 1997).

Swan and Newell (1995) investigated if involvement in a professional association is a factor influencing technology diffusion. The authors describe innovation as the development of new ideas about both technical and administrative systems. The authors focus on the importance of people and their transactions with others in the innovation process. An important part of diffusion is knowledge and information that allow people to think about new ideas. Rogers (1995) refers to awareness as a first stage of adoption. Through professional organizations individuals are able to learn about the latest developments in their field. The authors operationalize technological innovation as the adoption of technologies in firms. Technological innovation was measured by asking respondents to indicate which of a list of technologies their firms adopted.

Four measures of technological innovation were computed: (a) PICS - the degree of technological development in production control; (b) CAD - the degree of technological development within manufacturing; (c) PHIL - the degree of adoption of new manufacturing philosophies; and (d) TECH - the overall score of technological development obtained by adding all three scores together.
Colleagues were rated significantly higher than vendors, government or professional associations as a valuable source of innovation. However, professional association events were perceived to be more useful than other types of events. The overall analysis of the study suggests that the professional organization is perceived to be useful as a diffusion channel for knowledge about new developments, but the study did not indicate whether the knowledge is used in practice for the adoption of innovation.

What is useful from this study in association with the study at hand is the importance participants placed on their colleagues or peers in regard to innovation.

Schifter (2002) identified support and encouragement from colleagues as a motivating factor to use web-based training or instruction. He also identifies negative comments from colleagues and their past experience as an inhibiting factor of web-based training.

The social aspects of being part of a class are important and should not be overlooked when dealing with web-based instruction (Budd, 2002). Problems with web-based training are based on not incorporating student participation and interaction throughout the course. If the course is solely online, this can be accomplished through chat rooms and threaded discussion. Another problem of web-based learning is holding the student’s interest according to Budd (2002). Although trainees can review online video or audio or even PowerPoint slides, this mode of conveying information does not incorporate participative learning. One of the benefits of web-based training is the chance for individualized learning environments.

Web based learning provides the best instructors for people in various locations. Instructors can interact with an abundant amount of people at once. Traveling costs are
decreased when all individuals need to attain information using the web. Stokes (2001) researched the concept of telementoring. The concept describes the delivery of training and advice via video or e-mails (non-face-to-face encounter). It increases the interactivity of the learning process. This concept allows owners/managers to branch out and learn information without leaving their work environment. Communication problems may lead to many questions being asked from the mentor which might have been avoided in face-to-face interaction. Certain facets of the web experience are not always familiar to users. This could also be a barrier to communication. However, web-based training programs that provided the telementor for trainees were more successful than those that did not. Trainees and training managers reported better transfer of training to the job when telementors were used. The sense that someone is there to help breeds feelings of self-efficacy and confidence in the trainee’s ability to succeed.

Managerial or Supervisory Support

A bureaucratic structure provides ordered, organized activities to continue daily operations, but does this encourage and stimulate innovation? By comparison, the non-bureaucratic structure does not impede innovation; in fact, research supports non-bureaucratic structures as being more innovative (Daft, 1982). Daft suggests that organizational structures that are flexible and adaptive are associated with innovations and success while organizations that are more structured, stagnant and rigid are connected with failure. The dilemma which organizations face is their ability to encourage progress while remaining productive in daily procedures in a variety of settings. In this study, the definition of innovation is new change in the adopting organization. The innovation process is described as the performance gap. This gap is the
perceived need and the search for a better solution and finally the organizational change.
The innovation activity is the process of solving the problem.

A university’s upper level administration usually frames decision premises to
promote political capital (J. D. Johnson, 2000). Managerial support and effectiveness
when trying to implement a new innovation rests on how the communication from the
manager supports or does not support the innovation.

Managers also need to champion the innovations, lending authority and resources
to the innovation throughout the development and implementation period (J. D. Johnson,
2000; Rogers, 1995).

Lack of managerial support and attention impedes innovation (Drazin &
Shoonhaven, 1996). Schifter (2002) identifies the requirement from the department and
support from administrators as a motivating factor to use web-based training. Schifter
also identifies lack of support from the department and lack of release time as inhibiting
factors for using web-based training. Miller and Cardy (2000) think that mismanagement
of people, rather than failure of technologies, prevents firms from realizing the full
potential of technological innovation. The authors also state that management may
sometimes have unrealistic expectations of the new system and of the employees’
Improved efficiencies with the new technology. This is mostly due to neglect of people
factors and not the technology.

Marketing and Promotion

Marketing new products is similar to the innovation process. For products that
represent great improvements over products currently in the marketplace, consumers
have either no benchmark or an inappropriate benchmark for understanding the products
(Gourville, 2002). It took consumers years to understand what the personal computer was and how it might impact their lives. It still only penetrated 30% of their homes 15 years later.

For new products, it is much more difficult to predict consumer acceptance in the short run. The new products are usually so far from the old products that you really cannot compare the two. Strutton et al. (1994) as previously mentioned, differentiates between continuous and discontinuous innovations. The discontinuous innovations require new behavior patterns and are more difficult to predict.

The first step in predicting demand for new products is understanding what factors inherent to that product will encourage adoption and what factors will hinder adoption. What product characteristics will accelerate product purchase and usage and what product characteristics will act as roadblocks.

One study reviewed focuses on the culmination of a four-year study of high technology development in the electronics industry (Zirger & Maidique, 1990). The authors developed and tested a model to be used to determine new product success or failure by examining departmental issues (from research and development to marketing) that effect product development. Developing quantifiable constructs of the model and testing them was the purpose of this paper. The authors’ view is based on new product development in a technology-based industry as a change-producing activity that is usually blocked at key transfer points by the tendency at each stage of the process to resist change. The final analysis included 77 successful innovations and 71 failures. The conclusion was that there were five major factors that rose to the top: (a) Managerial excellence is critical to success; (b) New products must provide value to the customer; (c)
A primary contributor to success is strategic focus; (d) Management commitment is essential to success; (e) A contributor to new product success is the market environment.

*Training Logistics*

Currently higher education institutions are engaged in a number of information technology innovations. The innovation environment refers to the tactical environment where the innovation will be implemented (A. H. Johnson, 2000; McVey, 1996). A practical logistical barrier to web-based training is that although staff may want to participate in the training, their department may not have the right technology or infrastructure to allow them to participate (Barley, 1999).

Staff might also be required to sit at their desk and work on web-based training (Menezes, 2000). Staff may be distracted by all that is going on around them or even by the amount of work on their desk. A.H. Johnson suggests that a separate room be set aside for web-based training at the workplace (2000). This should be a moderately quiet room with few distractions. If possible, the room should be dedicated to this type of training only.

Logistics of training includes support structures that are in place in addition to the physical space. Grote (2000) looks at support factors that maximize student retention in distance learning:

1. The distance learning institution has established, audited quality assurance systems, is appropriately accredited, and has staff who take an interest in student progress and are accessible;

2. Evidence of learning resources that have been instructionally designed for the best possible distance learning application;
3. Processes for delivery of learning material and for tutoring, assessing, moderating, administration, dealing with student complaints and queries, library and other services are well resourced and of a high standard;

4. There is ongoing dialogue so that processes are reviewed and adjusted and problems are fixed before they grow too large;

5. Instructors, designers and academic support specialists stay abreast of current practice, trends and research in distance education technologies and

6. The institution employs new technologies after careful investigation, testing and staff training and is mindful of access issues for students.

Schifter (2002) identified strong technical support as a motivator to use web-based training and lack of dependable IT support as a key inhibitor to using web-based training.

One research study found that the duration of the training process, if too long, can cause participants to lose interest (Hoogveld, Paas, Jochemus & van Merrienboer, 2001). In addition to the duration of the training process, time allotted for each assignment was not congruent with participant schedules, thus the training was not completed.

*Type of Training Event*

Training managers are responsible for demonstrating that training brings about improved performance. Holton (1996) found that one cause of failure to transfer what is learned during training is that training design rarely provides for transfer of learning. Cognitive learning may well occur, but program participants may not have the
opportunity for practice or may not be taught how to apply their knowledge on the job. This is especially true in web-based training.

Students in open, distance and flexible learning environments who often work independently with self-instructional study materials, need help with organization and management of resources as well as the skills to critically reflect on information gathered independently and/or collaboratively. A considerable amount of work has gone on in supporting student learning with various types of cognitive tools and strategies in face-to-face technology enhanced learning environments (Jonassen, 1989).

Perception

Rosengren (1987) presents a comparative study of news diffusion in twelve countries over the assassination of Swedish Prime Minister Olof Palme in 1987. The study begins by generalizing that "On the whole, those interested in the type of news event at hand tend to learn it quicker, and comparatively often they learn it by way of personal communication (since it is important to them and their friends and acquaintances)"(Rosengren, 1987, p. 229). The concept of "importance" (macro) is distinguished from "relevance" (micro) (Rosengren, 1987, p. 231). The author notes that "After the first messages about a critical and important event have been released, at least three different processes of diffusion take place in society: diffusion among politicians and decision-makers at various levels, among journalists and the media, and among the public." (p. 233). The groundwork seemingly having been laid, three figures (bar charts) were presented depicting: (a) The primary media by which the Palme assassination was diffused in eleven countries (with television and radio predominant); (b) The comparative rate and amount of diffusion within 48 hours of the event (the diffusion curve in the USA
was far flatter than that of Japan, perhaps due to perception of relative importance); and
(c) The rate and amount of diffusion, which, gain, appears to be based on perception of
significance of the event.

Ettlie & O'Keefe (1982) explore the relationship between some of the various
concepts and scales that have been used to characterize innovative attitudes and
behaviors. Evidence in the innovation literature shows that the attitudes or values of
organizational members are significantly related to innovative behaviors.

A Likert scale of 73 behaviors describing innovation and other job-related
behaviors in organizations was constructed to test the hypothesis that attitudes correlate
significantly with multiple-act criteria but not consistently correlate with single-act
criteria. This list of 73 behaviors was given in questionnaire format to two groups of male
and female graduate and undergraduate students of business administration who had full-
time jobs. A total of 123 (56%) usable questionnaires were returned.

Two major hypotheses were tested with the data collected: (a) There will be less
correspondence between attitude and values scales reported in the innovation literature
than would normally be expected in an inter-correlation matrix of scales purported to
measure the same attitude and (b) Regardless of the confusion or purposeful differences
in these scales which have been used to measure innovation attitudes and values, they are
likely to predict or to be correlated significantly with a multiple-act criterion measure of
innovation behaviors or intentions; but they are not likely to be consistently related to
single-act criterion of intentions or behaviors.

The results of this study indicated that the innovative attitude and value scales
appear to measure the same construct only when there is no distinction made between
intentions to behave innovatively and actual innovative behavior. Innovative and change attitudes do consistently predict multiple innovative intentions and behaviors but not, as expected, single behaviors or single intentions.

Craig (2002) examined perceptions and patterns of technology use among graduate students enrolled in an on-line education course. A qualitative approach was used utilizing the constant comparative method of data analysis. Data was in the form of (a) participant observer field notes, (b) discussion board postings, (c) research papers, and (d) an online course survey. Results from the study indicated that students preferred to work at specific hours of the day and preferred to complete Internet-based research assignments over traditional assignments.

Motivation and Incentives

Padgett and Runlee’s research on faculty development suggests that motivation in technology training is a function of career stage and time pressures primarily. Faculty approaching tenure were less inclined to learn something that was not fully integrated into the system or did not have immediate professional relevance (Padgett & Runlee, 2000). The same may hold true for staff. Staff that have been employed a long time and near retirement may not see the relevance of web-based training.

Offering training and professional development opportunities for staff not only improves their skills, but also serves as an incentive for staff to stick around (Schafer, 2000). With compensation at levels not competitive with corporations, the university needs to look for incentives to keep employees.

There is sometimes doubt as to where the motivation comes in with a web-based course, internal or external. Web courses offer little interaction between instructor and
student, so the motivation needs to be external (LaRose & Whitten, 2000). Motivation and incentives are often difficult at the university level. The authors suggest that if we want employees to value training, some extrinsic incentives can be bonuses, prizes, time off, and other tangible rewards.

**Additional Factors Effecting Technology Use**

In a study of faculty use of technology in the classroom, a major concern of faculty members regarding the use of technology in instruction was the decreased interaction between student and teacher. In that same study faculty who perceived they had access to technology were more likely to incorporate technology into the classroom. Administrative support and use of technology are critical factors in the level of faculty use of technology (Gueldenzoph, 2000).

Raths (2000) observed the following regarding technology use: (a) Resolving core training issues involves more than just technology; (b) Accountability, job responsibility and training outcomes are fundamental issues regarding technology use; (c) Technical hurdles still remain even with current advances in technology and access; and (d) Computer based courses appeal mainly to those pressed for time.

Perceptions include thoughts such as “if training is not in the classroom it is not kosher,” and “the training industry is being run by vendors right now” (Raths 2000, p. 81). Online training requires the same consideration as traditional classroom-based training: (a) Employees have to balance their workloads; (b) Employees have to justify the need for additional training to managers; and (c) Employees must provide some evidence that they have learned and retained the information.
Shrestha & Sutphin (2000) reported on the results from a self-report survey that there is a relationship between viewer interaction and acceptance of programs delivered at a distance. People often resist new training techniques because they are not confident they will succeed. They could be intimidated by the new machine or technology. One approach to alleviate this concern is to offer hybrid training at first. By mixing face-to-face and web-based training, the participant is introduced to the new medium at a more comfortable pace. Finding the right mix of web-based training and classroom learning is vital to success (Masie, 2000). Resistance can also be a product of inadequate information about the new system (Masie, 1997).

In their article promoting technology champions to enhance the diffusion process, McCorkle, Alexander and Reardon (2001) propose that financial resources and limitations on faculty time are barriers to technology integration in higher ed. The authors discuss the acceleration of technological change makes it difficult for academic programs to effectively integrate innovations. Diffusion of any innovation takes time. As soon as an ideal approach is found to meet departmental needs, it is often outdated. Colleges are under pressure to continually innovate and update with very limited resources.

Success Factors in Distributed Instruction

Meyer-Peyton (2000) defines the elements of a successful distributed learning program as the following:

1. The program has a clear plan;
2. The delivery platform enables the implementation of the course goals and structures;
3. The equipment and infrastructure are reliable and robust;
4. When problems do occur, technical support is immediate;
5. The instructors are dedicated to the concept of distance learning and versed in
distance learning pedagogy;
6. The instructors are comfortable with the technology;
7. The instructional model incorporates a variety of techniques;
8. Local personnel assist with on site facilitating and support; and
9. The program is constantly monitored for effectiveness.

Schrum (2000) identifies the following issues to consider in designing successful
online instruction:

1. The designer/professor use instructional technology methods and strategies that
   promote student activity that correspond to the goals for each course;
2. Before decisions can be made about delivery or models, an instructor must make
   pedagogical decisions about the fundamental goals of a course;
3. Once the pedagogical questions are answered the instructor can turn to the
   organizational questions such as medium, assignments, group activities, group
   size, answering mail, managing data, responding to students, synchronous or
   asynchronous activities, advanced organizers, etc.
4. How are students going to interact with the material, the other students, the
   professor?
5. Institutional issues such as release time for development and pay, in addition to
   institutional support and acceptance of distance learning
6. It is essential that an evaluative component be added to each course to ensure
   student success in this type of environment and
7. Higher success rates in distance learning are shown in institutions that have a team of developers (technical person, subject matter expert and instructional designer) in place for distance learning course support.

Rockwell, Schaur, Fritz, & Marx (1999) identified in their research incentives and obstacles influencing higher education faculty and administrators to teach at a distance. Faculty concerns were related to: (a) time (required for preparation and delivery); (b) costs; (c) instructional design (faculty do not want to develop the course alone); (d) instructor/students relationship (will it suffer?); (e) reward structure (must be in place); (f) degree programs (lack of plan for programs or certificates lead to concern is the one course worth it); (g) policy (concern over the lack of institutional policy); (h) training (there needs to be adequate training for faculty); (i) developing effective technology skills and (j) developing good use of technology skills.

*Benefits of Web-based training*

According to survey research conducted by Sadler (1999), training can be effective via the web when the organization: (a) Aligns training plans with present and future business goals; (b) Determines employee roles and current skill levels and identifies what they need to learn; (c) Evaluates various training tools and products and determines where web training fits into a comprehensive educational program; (e) Prepares employees for training, ensures that they understand the goals, and visibly monitors their progress; and (f) Measures competence improvement to ensure return on investment.

The same survey suggests a good training provider offers the following: (a) Work analysis and profiling service that capture employees’ knowledge of what really works;
(b) Identification of the activities, work groups and skill sets most critical to success; (c) Assessment instruments that measure current competence levels and identify competence gaps at organizational, group and individual levels; (d) Network resident client server tools that automate the competence assessment and management process; development and planning services to create training strategies to close competence gaps and; (e) Ongoing support to continually measure and improve organizational performance as the firm's business strategy evolves. Organizations should never assume that employees can or will accomplish training in their spare time (Sadler, 1999).

Additional benefits of web-based training are that: (a) Learners assume control of their learning; (b) Web-based training can save time and money when a worker needs training; (c) Students can use web-based training without any prior knowledge except web browsing; and (d) There is a consistency in training (Kendler, 2000).

Conclusion

The review of the literature has determined numerous factors that might influence adoption of innovations. Prior technology use, managerial support, the culture of the organization, and the perceived newness of the innovation are just a few of the indicators for adoption of innovation. While authors have looked at adoption from many different angles and contexts, few have focused on the factors related to adoption. Given the many advantages of web-based learning and the lack of research focusing on factors of decision making, it is clear that there is a need for more research focused on this topic.

The literature review also supports the theoretical constructs determined for this study.
Chapter 3

Methodology

The review of the literature revealed that understanding adopter characteristics is integral in strategic planning and marketing for new innovations. More specifically, if organizations can identify factors affecting the decision to adopt, identification of change agents and champions to aid the diffusion process will be more accurate and successful. The review of literature also revealed the importance of peer leaders in the adoption process. Finally, by focusing on adopter characteristics and the contexts surrounding successful adoptions, institutions with limited resources can more efficiently plan for newer emerging technologies and change.

Based on the literature the purpose of this study was to investigate factors influencing the adoption of web-based training by full time staff in the 28 Community Colleges that make up the Michigan Community Colleges’ Virtual Learning Collaborative. The factors investigated in this study were (a) current technology use, (b) culture of learning, (c) peer support, (d) managerial or supervisory support, (e) training logistics, (f) type of training event, (g) marketing and promotion; (h) highest degree obtained, (i) gender, (j) age group, (k) socioeconomic status (salary range), (l) computer ownership and (m) Internet access.

Web-based training is one of the most prevalent in the discussion of professional and staff development. The main hurdles to web-based training such as (a) lack of interactivity, (b) content availability, (c) technology standards and (d) bandwidth are no longer the problems they once were as technology and connectivity have improved significantly over the past few years (Urdan & Weggen, 2000). However, in the
university or college setting, this method is not widely used or accepted as a viable training method for staff.

A descriptive research approach aimed at identifying problems or justifying current conditions of practice was used for this study (Isaac & Michael, 1997).

Research Questions

1. To what extent does current technology use influence the adoption of web-based training?

2. To what extent does the culture of learning influence the adoption of web-based training?

3. To what extent does peer support influence the adoption of web-based training?

4. To what extent does managerial or supervisory support influence the adoption of web-based training?

5. To what extent does type of training event influence the adoption of web-based training?

6. To what extent does training logistics influence the adoption of web-based training?

7. To what extent does marketing and promotion influence the adoption of web-based training?

8. To what extent does (a) highest degree obtained, (b) gender, (c) age group, (d) socioeconomic status (salary range), (e) city, (f) computer ownership and (g) Internet access influence the adoption of web-based training?
**Pilot Study**

A pilot study was conducted at Oakland Community College’s campus in Royal Oak, Michigan. The benefits to a pilot study include but are not limited to: (a) testing more precise hypotheses in the main study; (b) increase the chances of clear-cut findings; (c) reduces the number of errors and (d) provides enough data to make a decision as to continue or not.

Many resources purported the benefits of a pilot study, however none of the resources reviewed stated a specific number that must be in the pilot for this type of study in order to be successful (Ary & Razavieh, 1996; Brown, Race & Bull, 1999; Fowler, 1993; Isaac & Michael, 1997). Dr. Harry Munsinger in Issac and Michael’s *Handbook of Research and Evaluation* states that samples with Ns between 10 and 30 are a good size for a pilot study. The sample is large enough to test the null and offer a convenient sample size with which to work. The research plan was to pilot the survey questionnaire with staff from the Royal Oak campus of Oakland County Community College. Thirty-three full-time support staff were asked by their director to participate in the survey. In addition to participating in the survey, staff were asked to: (a) comment on any question in any way; (b) report any questions respondents found unclear; and (c) give general reactions to the survey instrument. Spaces were provided on the trial questionnaire for the respondent to make reactions and suggested changes. The results were analyzed to assess the effectiveness of the trial questionnaire to yield the information desired. Based on the pilot results, appropriate additions, deletions and modifications were made to the survey instrument. The pilot study data did not indicate any potential problems with the data or survey instrument. Minimal edits were made for clarity.
Instrumentation

The survey questionnaire was administered via paper. The survey was individually administered (placed in employee mailboxes) to full-time staff during the summer of 2003. The data collection process occurred over the course of 2 months, June and July 2003.

Sample of Community Colleges

The sampling frame encompassed 16 of the 28 community colleges that make up the Michigan Community College Virtual Learning Collaborative (MCCVLC). The organizational unit surveyed was the college, and the unit of analysis was the individual staff member. Data was aggregated across all 16 of the 28 colleges. Survey respondents were grouped into two categories: adopters and non-adopters.

Adopters were defined as individuals who have participated in at least one web-based training course. Non-adopters were defined as those who have not participated in and completed at least one web-based training course. A screener question was included in the survey to ascertain whether respondents should be categorized as adopters or non-adopters.

Obtaining the Sample of Survey Respondents

Simple random sampling was the method employed for sample selection. This technique requires a numbered list of the population, wherein each person in the population appears once (Fowler, 1993). Each college participating used their college’s internal database and applied a random sampling function. Seventy-five surveys were sent to each of the 16 participating colleges for a total of 1200 surveys administered. The names associated with the random sampling numbers at each institution were the
individuals surveyed (Fowler, 1993; Ary & Razavieh, 1996; Isaac & Michael, 1997). The IT Director or equivalent position at each participating institution generated the samples.

**Determination of Sample Size**

Based on previous experience with community college research in the subject area of web-based instruction, and an assessment of the statistical analyses required for this research project, the criterion of minimum acceptable sample size was set at 200 respondents. Ideally, in a study such as this there will be a minimum of 50 adopters for every 150 non-adopters included in the study. Sample size was determined based on the following considerations: (a) The minimum acceptable sample size required to ensure sound logistic regression analyses, (b) The anticipated percentage of adopters in the population (MCCVLC database), and (c) The anticipated response rate among those who administered the survey.

According to the literature, the recommended guideline is that the proportion of predictor variables to respondents should be relatively small. The ideal predictor-variable-to-respondent ratio is purported to be one variable per every 30 respondents. The rationale behind this conservative guideline is that if there are too many predictors in relation to the number of cases being measured, an inflated standard error of regression parameters may result, which in turn, may compromise the findings of the logistic regression.

Due to the lack of literature available on the topic of participation in web-based training by staff members in a community college setting, a ‘best guess’ estimate of 2% was made regarding the percentage of staff expected to meet the criteria of adopters. Similarly, a ‘best guess’ estimate of 45% was made regarding the anticipated response rate among those who administered the survey.
rate of staff members. Based on these considerations, it was estimated that 1200 surveys would need to be distributed in order to achieve the minimum sample size of adopters required for analysis. One hundred forty-eight adopters were identified in the study. 

**Questionnaire**

The 53-item survey questionnaire used in this study was a self-developed questionnaire based on the literature review and consideration of other surveys. The survey was designed to provide demographic information on the staff as well as quantitative data to address the seven research questions. In addition, the questionnaire included a screener question in order to identify respondents as MCCVLC staff adopters or non-adopters of web-based training.

**Expert Panel**

A panel of experts (MCCVLC advisory board members and on-line faculty) reviewed the researcher developed instrument to determine content validity (Parry, 1993). The instrument was revised to incorporate ideas and suggestions from the panel. A pilot study was used to assess instrument reliability and to gather further information and determine staff’s overall impressions of the instrument.

The procedure for following up with non-respondents was: (a) to gather and make a non-respondent list; (b) to compare that list against the list of respondent characteristics; (c) to look for any disproportionate 'trigger' for over represented groups such as full professors out of proportion to the sample; and (d) to send an e-mail reminder to the non-respondents. 523 surveys were returned for a 43.6% return rate.
Variables

Dependent Variable

The dependent variable was operationalized as a dichotomous variable indicating adoption or non-adoption by MCCVLC staff of web-based training. A screener question was employed to determine adopter status. The screener statements were: (a) I have never used web-based training; (b) I used web-based training but never completed a course; and (c) I have completed at least one web-based training course. Respondents were instructed to select only one statement from the screener.

Table 1
Adopters vs. Non Adopters of Web-based Training

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adopter (1)</td>
<td>A dichotomous variable that indicates whether or not the respondent has participated in and completed a web-based training course. Measure is obtained from a screener item in the survey, where 0 = non-adopter and 1 = adopter.</td>
</tr>
<tr>
<td>non-adopter (0)</td>
<td></td>
</tr>
<tr>
<td>of web-based training:</td>
<td></td>
</tr>
</tbody>
</table>

Independent (Predictor) Variables

The seven research questions were operationalized as the following constructs (predictor variables). The constructs were abbreviated for the statistical program SPSS as noted in the parenthesis.

Current technology use (TECHSKL).
Current technology use was defined as computer use on the job or at home, in addition to the user’s perception of level of computer expertise (Masie, 1997). The construct was measured using eight survey statements related to the current technology use on a 4 point Likert agreement scale with a fifth response choice of “does not apply.”

The agreement statements for this construct were: (a) I use the computer to communicate with others (email or instant messaging); (b) I often do work on a computer; (c) I often use a computer for personal use (e.g., writing letters, keeping track of personal information, homework, etc.); (d) I have had more negative than positive experiences using computers; (e) I do not feel in control when using a computer; (f) I feel comfortable using the Internet; (g) I know how to use a search engine; and (h) I have used tutorials or learning modules on a computer before (not including web-based courses).

_Culture of learning (LRNCEL)._ 

The culture of learning described the employees perception of: (a) organizational encouragement to dedicate a percentage of the work week to professional development; (b) organizational support of life-long learning; (c) does the organization value the concept of knowledge worker; (d) is learning tied to work processes; and (e) is continuous improvement the norm within the organization (Fritz, 1996). The construct was measured using five survey statements related to the culture of learning on a 4 point Likert agreement scale with a fifth response choice of “does not apply.”

The statements for this construct were: (a) Web-based training and access to anytime/anyplace supports our department’s goal for continuous improvement; (b) Lifelong learning/professional development is encouraged in our department; (c) There is
really no motivation in the department for me to take additional training courses; (d) Employees who participate in additional training or professional development courses are well looked-upon in our department; and (e) People in the department at my level don’t seem interested in participating in additional training.

Peer Support (PEERSUP).

Peer support was defined as: (a) co-workers covering for you while you are training; (b) a sense of team trust; (c) the perception of a cooperative work environment; (d) back up systems in place for covering work responsibilities in the group; and (e) the presence of peer mentors (Masie, 1997). The construct was measured using five survey statements related to the peer support on a 4 point Likert agreement scale with a fifth response choice of “does not apply.”

The agreement statements for peer support were how important is: (a) Peer support on location if you also have web support available to you during your web based training course; (b) Hearing testimonials from your peers before participating in a web-based training course; (c) Having others around (learning with you) when participating in a web-based training course; (d) Having phone or e-mail contacts with work-peers that have recently taken the training; and (e) Having phone or e-mail contacts with work-peers that are currently taking the training.

Managerial support (MGRSUP).

Managerial support was defined as the degree to which the respondent feels there is support for professional development and web-based training (Senge, 1995). The construct was measured using six survey statements related to managerial support on a 4 point Likert agreement scale with a fifth response choice of “does not apply.”
The agreement statements were: (a) My manager/supervisor allots work time for staff to participate in training; (b) My manager/supervisor promotes/allows us to participate in web-based training; (c) I am more likely to use web-based training if I know my manager/supervisor thinks that web-based training courses are valuable; (d) If my manager or supervisor were to initiate the request for web-based training, I would be more likely to think it is a valuable development task; (e) If my manager/supervisor provides manuals and learning materials to the department, I am more likely to sign up for a web-based training course; and (f) If my employer paid for a web-based training course, I would be interested in signing up for it.

Training logistics (LOGIS).

Training logistics was defined as physical sensory elements such as (a) lighting, (b) color, (c) sound, (d) space, (e) access, (f) technical support, (g) time and (h) furniture that characterize the place in which a student is supposed to learn (Berry, 2000). The construct was measured using eight survey statements related to training logistics on a 4 point Likert agreement scale with a fifth response choice of “does not apply.”

The agreement statements were: (a) Learning in my cubicle or office is not a good learning environment; (b) Having a dedicated place to take a web-based training course would encourage me to participate; (c) If there were a backup for my job duties, I would be more willing to participate in web-based training; (d) I have access to a computer at work that is adequate for web-based training; (e) I hate to take any training that takes me away from my work; (f) Working with a facilitator (with specific knowledge of the learning module) in the room is necessary in web-based training; (g) I do not have time to participate in a web-based training course; and (h) If sufficient technical support is
available on campus (hardware, software, people) I would be more likely to enroll in a web-based course.

*Type of Training Event (TREVENT).*

The type of training event is defined as hard skills training, soft skills training, training that is for the current job, and training that is for future potential jobs (Masie, 1997). The construct was measured using six survey statements related to the type of training event on a 4 point Likert agreement scale with a fifth response choice of “does not apply.”

The agreement statements were: (a) Web-based training is only good for information based topics; (b) Soft skills like communication and teamwork can not be learned with a computer; (c) Web-based training is good for enhancing skills; (d) I am more likely to participate in a formal training program than to choose professional development on my own; (e) I would use web-based training if I could stop and pick up where I left off, rather than having to go through an entire module; and (f) Most training if it is designed well can be put on a computer.

*Marketing and Promotion (MKTPRO).*

Marketing and promotion was defined as the amount of money that was spent on the marketing. Marketing and promotion also included how often were targeted trainees informed of the opportunity for training and how far in advance was the marketing distributed. (Masie, 1997). The construct was measured using eight survey statements related to marketing and promotion on a 4 point Likert agreement scale with a fifth response choice of “does not apply.”
The agreement statements were: (a) Having a color, laminated brochure would make me more like to choose web-based training; (b) Receiving information specific to the training would make me more likely to choose a web-based training course; (c) Flyers received too far in advance tend to get tossed aside and I forget about them; (d) I would be more likely to participate in a web-based training course if I could read testimonials about the training on a brochure or training provider’s web site; (e) Announcing training programs 3 or more weeks in advance gives me enough time to plan for the training; (f) I am more likely to use web-based training when the message/brochure about the training comes from my supervisor; (g) I would be more likely to participate in a web-based training course if I could read specific information about the course on the training provider’s web site; and (h) I would be more likely to participate in a web-based training course if I could evaluate a demo before signing up.

Demographic variables including (a) highest degree attained, (b) gender, (c) socioeconomic status (salary range), (d) age group, and (e) owning a computer, were evaluated as separate independent variables using univariate descriptive statistics. Once the descriptive statistics were run the Pearson Chi-Square and likelihood ratio tests were run to determine if the demographic does predict adoption. If the results were positive this was followed up with a logistic regression to look at between group differences.

**Coding**

The 4 point Likert scale items for all predictor variables were coded from 1-4 (strongly disagree to strongly agree) and the fifth response choice of “does not apply” was coded as a missing value (dot) in SPSS. In order to run the appropriate tests for this
study the data needed to be in the same direction. Any data that was not in the same
direction (forward) was recoded using SPSS and renamed for statistical purposes only.

Evaluation of Independent Variables

The reliability and validity of the constructs were assessed in order to determine
the feasibility of using the constructs directly as predictor variables in the logistic
regression analysis.

Simple Pearson correlation coefficients were generated for all survey items with
the exception of the demographic predictors. Composite variables were created by
computing the sum of all the relevant items for each domain. SPSS will not compute sum
scores for respondents who have any missing responses. SPSS will compute sum scores
only for respondents with full data. The SPSS syntax for creating composite scores for all
seven new sets of composite variables of interest are presented in Figure 1.

```spss
COMPUTE techskl = techskl1+techskl2+techskl3+techskl4+techskl5+techskl6+techskl7+techskl8 EXECUTE
COMPUTE lrncul = lrncul1+ lrncul 2+ lrncul 3+ lrncul 4+ lrncul 5 EXECUTE
COMPUTE peersup = peersup1+ peersup 2+ peersup 3+ peersup 4+ peersup 5 EXECUTE
COMPUTE mgrsup = mgrsupr1+ mgrsupr 2+ mgrsupr 3+ mgrsupr 4+ mgrsupr 5+ mgrsupr 6 EXECUTE
COMPUTE logis = logis1+ logis 2+ logis 3+ logis 4+ logis 5+ logis 6+ logis 7+ logis 8 EXECUTE
COMPUTE trevent = trevent1+ trevent 2+ trevent 3+ trevent 4+ trevent 5+ trevent 6 EXECUTE
COMPUTE mrktpro = mktpro1+ mktpro 2+ mktpro 3+ mktpro 4+ mktpro 5+ mktpro 6+ mktpro 7+ mktpro 8 EXECUTE
```

Figure 1. SPSS syntax for creating composite sum scores. Creating composite variables
for each of the domains of interest using the relevant survey items.

Reliability Testing of Questionnaire Items

The reliability of survey items was tested using the method of internal
consistency. The statistic employed was Cronbach’s Alpha. The purpose of using this
approach was to verify that each set of items grouped together to measure a particular
construct, reliably measures that construct.
Logistic Regression Methodology

The methodology for this study is based on a logistic regression approach to investigate the factors affecting adoption of web-based training. This design focuses on the responses of community college staff and determines the adopter versus non-adopter characteristics of this sample.

Candidate Predictor Variables

Through binary logistic regression modeling, predictor candidates were tested to determine which factors predict adoption.

Table 2 describes the measure used in evaluating statistical significance ($L^2$).

Table 2

<table>
<thead>
<tr>
<th>Measure</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2 Log likelihood ($L^2$) or Maximum likelihood: constant-only model versus full model (constant plus all predictors).</td>
<td>This term refers to the difference in contribution to the outcome, between the full model and the constant model. If no improvement was found when all predictors are added, the predictors are unrelated to the outcome. Differences were reported as –2 Log likelihood in SPSS.</td>
</tr>
</tbody>
</table>

The values were calculated by SPSS

Final Model

The entire data set was used in creating the final coefficients
Coefficients and Odds Ratios

The coefficient, $b$, for each variable (contained in the logistic regression equation) represented the change in log-odds for a case (for example: odds of adopting) and was defined as the ratio of the probability of observing the outcome to the probability of not observing the outcome. Similarly, the odds ratio is the ratio of two odds; the first odds with a one unit increase in one of the variables (with the remaining values held constant), while in the second odds all variable values are held constant.

Also reported was a transformation of the odds ratio into a probability statement. First, $p$ is defined as the proportion of respondents who adopt web-based instruction. Further, $q$ is defined as $1 - p$ or the proportion of respondents who do not adopt web-based instruction. Then, $pbq$ is equal to the change in the independent variable for which $b$ is calculated in the logistic regression equation. This probability statement is the first derivative of the cumulative logistic function evaluated at the mean of the dependent variable.

Assumptions and Limitations

The survey was based upon the assumption that web-based training is as valuable as face to face training, and questions non-use. The assumption then becomes a limitation. Also, the survey assumes that there is a need for professional training among staff members included in the sample. Factors such as perceived need for training, which could affect interest in, or willingness to participate in a training course (of any modality) are not considered in this survey. Not considered in this survey is the importance of incentives or motivation to take web-based training within an organization. The population at hand is union staff and there are clear incentives in the union contracts to
take any training. However, motivation and incentives are worth investigating in future studies. Another limitation is inherent in the assumption that an adopter is any individual who has participated in at least one web-based training course. This survey did take into account whether or not the individual completed the course. This analysis did not take into account if he or she enjoyed the course, and more importantly, whether he or she would be willing to participate in another course based on his or her previous experience; i.e., if an individual feels that he or she would not take another web-based training course, is that individual an adopter? By creating sum scores the survey sample was decreased. This poses some limitations in terms of lower power due to reduced sample size and generalizability to people with characteristics similar to those of respondents with full data. By computing the sum scores, however, I was able to analyze data that was theoretically meaningful and valid.
Chapter 4

Results

This chapter contains a summary of the data collected and analyzed for investigating the research questions stated in Chapters 1 and 3. The seven research questions were designed to investigate factors affecting the decision to adopt or not to adopt web-based training.

Survey Reliability

Reliability of survey items was tested using the method of internal consistency. The statistic employed was Cronbach’s $\alpha$ reliability coefficient. The purpose of using this approach was to verify that each set of items grouped together to measure a particular construct, reliably measures that construct. The items used to measure current technology skills had a Cronbach’s $\alpha$ of .92; the items used to measure learning culture had a Cronbach’s $\alpha$ of .76; the items used to measure peer support had a Cronbach’s $\alpha$ of .88; the items used to measure manager support had a Cronbach’s $\alpha$ of .81; the items used to measure training logistics had a Cronbach’s $\alpha$ of .63; the items used to measure type of training event had a Cronbach’s $\alpha$ of .71 and the items used to measure marketing and promotion had a Cronbach’s $\alpha$ of .69.

Demographics

There were 523 surveys returned. Only 502 were used. Of the 502 remaining survey participants, 162 were female and 340 were male. Out of the 162 female participants, 33% were categorized as adopters. Out of the 340 male participants, 19% were categorized as adopters.
Table 3
Gender Descriptive Statistics

<table>
<thead>
<tr>
<th>Gender</th>
<th>Non-Adopter</th>
<th>Adopter</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Male</td>
<td>263</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>71%</td>
<td>54%</td>
</tr>
<tr>
<td>1</td>
<td>Female</td>
<td>106</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>29%</td>
<td>46%</td>
</tr>
<tr>
<td></td>
<td>Total Count</td>
<td>369</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Of the female adopters 93% fell between the age group of 45 and 54 while the majority of male adopters fell between the age group of 35 and 44. Of the female non-adopters 9% fell between the age group of 55 and up; 46% fell between the age group of 45-54; 36% fell between the age group of 35-44; and 9% fell between the age group of 25-34. The male non-adopters had 7% in the age group 55 and up; 60% in the age group of 45-54; and 33% in the age group of 35-44. There were no males in the age group 25-34.

The highest percent of non-adopters both male and female fell between the age group of 45-54. The highest percentage of female adopters fell between the age group of 45-54 while the highest percentage of male adopters fell between the age group of 35-44.

The highest salary reported for female non-adopters was $45,000 with the lowest salary reported for this category of $33,000. The highest salary reported for male non-adopters was $100,000 with the lowest salary reported for this category of $63,000. The highest salary reported for female adopters was $50,000 with the lowest salary reported for this category of $30,000. The highest salary reported for the male adopters was $99,000 with the lowest salary reported for this category of $60,000. There was not enough evidence in this data to make any predictions regarding salary as a factor in the decision to adopt or not adopt web-based training.
In the category female non-adopters: 34% had advanced degrees; 7% had a 4 year degree from a college or university; 20% had a 2 year degree from a community college or equivalent; and 39% had a high school degree or equivalent. Of the male non-adopters 40% had advanced degrees and 60% had a 4 year degree from a college or university.

In the adopter categories, 92% of the female adopters had an advanced degree; 4% had a 4 year degree from a college or university; and 4% had a 2 year degree from a community college or equivalent. Males in the adopter category had 28% with advanced degrees and 72% had a 4 year degree from a college or university.

Table 4

<table>
<thead>
<tr>
<th>Highest degree obtained</th>
<th>Non-Adopter</th>
<th>Adopter</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 High school diploma or equivalent</td>
<td>Count: 16</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>%: 19%</td>
<td>0%</td>
<td>9%</td>
</tr>
<tr>
<td>3 Two-year community college degree or equivalent</td>
<td>Count: 9</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>%: 10%</td>
<td>2%</td>
<td>6%</td>
</tr>
<tr>
<td>4 Four-year college or university degree</td>
<td>Count: 29</td>
<td>40</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>%: 34%</td>
<td>41%</td>
<td>38%</td>
</tr>
<tr>
<td>5 Advanced degree</td>
<td>Count: 32</td>
<td>55</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>%: 37%</td>
<td>57%</td>
<td>48%</td>
</tr>
<tr>
<td>Total</td>
<td>Count: 86</td>
<td>97</td>
<td>183</td>
</tr>
<tr>
<td></td>
<td>%: 100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Using the Pearson Chi-Square and likelihood ratio it was determined that degree does predict adoption. Following up with a logistic regression to look at between group differences, we found there were no significant differences between having a 4 year degree or an advanced degree. There were, however, significant differences between: a 2 year degree or equivalent and a 4 year degree or equivalent; a 2 year degree or equivalent
and an advanced degree; a high school degree or equivalent and a 4 year degree or equivalent; and a high school degree or equivalent and an advanced degree.

**Research Questions**

1. To what extent does current technology use influence the adoption of web-based training?

There were 484 cases included in the analysis of the relationship between the adoption of web-based training and current technology use, 22.7% of which had adopted web-based training. A statistically significant relationship exists between adoption of web-based training and TECHSKL, the unit-weighted sum of responses to eight statements defining the scale of current technology use ($L^2 = 408.67$, $df = 1$, $p<.001$; SPSS output shown in Figure 2 in Appendix B). Based on a logistic regression coefficient ($b$) of .578 ($Wald = 17.94$, $df = 1$, $p <.0001$), a point estimate of the odds of adopting web-based training, given a unit increase in TECHSKL, is 1.78 ($e^b$). Expressed in another way, the probability of adopting web-based training ($Pr[adop]$) is estimated to increase .117 for every unit increase in TECHSKL (that is, $\Delta Pr[adop] = pbq$, where $p =$ proportion of adopters, $q = 1 - p$, and $b =$ logistic regression coefficient).

2. To what extent does the culture of learning influence the adoption of web-based training?

There were 484 cases included in the analysis of the relationship between the adoption of web-based training and the culture of learning, 24.3% of which had adopted web-based training. A statistically significant relationship exists between adoption of web-based training and LRNCUL, the unit-weighted sum of responses to six statements defining the scale of the culture of learning ($L^2 = 471.50$, $df = 1$, $p<.001$; SPSS output
shown in Figure 3 in Appendix B). Based on a logistic regression coefficient of .381 \((Wald = 56.91, df = 1, p < .0001)\), a point estimate of the odds of adopting web-based training, given a unit increase in LRNCUL, is 1.46. Expressed in another way, the probability of adopting web-based training is estimated to increase .07 for every unit increase in LRNCUL.

3. To what extent does peer support influence the adoption of web-based training?

There were 481 cases included in the analysis of the relationship between the adoption of web-based training and the peer support, 24.3% of which had adopted web-based training. A statistically significant relationship exists between adoption of web-based training and PEERSUP, the unit-weighted sum of responses to five statements defining the scale of the peer support \((L^2 = 533.43, df = 1, p < .001; \text{SPSS output shown in Figure 4 in Appendix B})\). Based on a logistic regression coefficient of .381 \((Wald = 114.06, df = 1, p < .0001)\), a point estimate of the odds of adopting web-based training, given a unit increase in PEERSUP, is .321. Expressed in another way, the probability of adopting web-based training is estimated to increase .20 for every unit increase in PEERSUP.

4. To what extent does managerial support influence the adoption of web-based training?

There were 412 cases included in the analysis of the relationship between the adoption of web-based training and managerial and supervisory support, 28.3% of which had adopted web-based training. A statistically significant relationship exists between adoption of web-based training and MGRSUP, the unit-weighted sum of responses to
five statements defining the scale of the managerial and supervisory support ($L^2 = 211.37, df = 1, p<.001$; SPSS output shown in Figure 5 in Appendix B). Based on a logistic regression coefficient of $1.493$ ($Wald = 108.29, df = 1, p <.0001$), a point estimate of the odds of adopting web-based training, given a unit increase in MGRSUP, is $4.45$. Expressed in another way, the probability of adopting web-based training is estimated to increase $.30$ for every unit increase in MGRSUP.

5. To what extent does the logistics of training influence the adoption of web-based training?

There were 398 cases included in the analysis of the relationship between the adoption of web-based training and training logistics, 28.3% of which had adopted web-based training. A statistically significant relationship exists between adoption of web-based training and LOGIS, the unit-weighted sum of responses to eight statements defining the scale of training logistics ($L^2 = 261.56, df = 1, p<.001$; SPSS output shown in Figure 6 in Appendix B). Based on a logistic regression coefficient of $1.493$ ($Wald = 93.66, df = 1, p <.0001$), a point estimate of the odds of adopting web-based training, given a unit increase in LOGIS, is $2.36$. Expressed in another way, the probability of adopting web-based training is estimated to increase $.17$ for every unit increase in LOGIS.

6. To what extent does the type of training event influence the adoption of web-based training?

There were 412 cases included in the analysis of the relationship between the adoption of web-based training and type of training event, 28.3% of which had adopted web-based training. A statistically significant relationship exists between adoption of
web-based training and TREVENT, the unit-weighted sum of responses to six statements defining the scale of the type of training event \( (L^2 = 481.29, df = 1, p < .001) \); SPSS output shown in Figure 7 in Appendix B). Based on a logistic regression coefficient of .714 \( (Wald = 108.29, df = 1, p < .0001) \), a point estimate of the odds of adopting web-based training, given a unit increase in TREVENT, is 2.04. Expressed in another way, the probability of adopting web-based training is estimated to increase 1.33 for every unit increase in TREVENT.

7. To what extent does marketing and promotion influence the adoption of web-based training?

There were 459 cases included in the analysis of the relationship between the adoption of web-based training and marketing and promotion, 25.7% of which had adopted web-based training. A statistically significant relationship exists between adoption of web-based training and MKTPRO, the unit-weighted sum of responses to eight statements defining the scale of the marketing and promotion \( (L^2 = 290.23, df = 1, p < .001) \); SPSS output shown in Figure 8 in Appendix B). Based on a logistic regression coefficient of .865 \( (Wald = 97.39, df = 1, p < .0001) \), a point estimate of the odds of adopting web-based training, given a unit increase in MKTPRO, is 2.375. Expressed in another way, the probability of adopting web-based training is estimated to increase .17 for every unit increase in MKTPRO.
Chapter 5

Discussion

Diffusion processes result in the acceptance or penetration of a new idea, behavior or physical innovation over time by a given social system (Rogers, 1995). The purpose of this study was to investigate factors influencing the adoption of web-based training by staff in the 28 Community Colleges that make up the Michigan Community Colleges’ Virtual Learning Collaborative. The factors investigated in this study were: (a) current technology use; (b) culture of learning; (c) peer support; (d) managerial or supervisory support; (e) type of training event; (f) training logistics; (g) marketing and promotion; (h) degree completed; (i) socioeconomic status; (j) gender; and (k) campus location.

Sixteen of the 28 community colleges participated with a useable survey return rate of 502. The remainder of this chapter was used to discuss the findings of this study.

Summary

Summary of Predictor Variables

All of the constructs were statistically significant and we were able to reject the null model that there is no difference between the null model and the full model. All seven constructs separately increased the likelihood of adoption. The results of this study are consistent with the literature review on adoption of innovation suggesting that all seven independent variables described were predictors of innovation.

An interest in technology adoption lies at the heart of this research. The current study and studies reported in the literature review support that current technology use is a strong predictor of adoption of new technologies (van Braak, 2001; Pitrowski, 2000;
Mahajan et al., 1990; Pratt, 1987). Yet the idea of any information system, like NetG, is meant to capture more than the presence of a new technology (Baumgarten, 1975). Future research in technology adoption needs to be concerned with organizational structure and processes, people, information, meaning and values.

**Current technology use**

The results of the study at hand showed a statistically significant relationship between current technology skills and the adoption of web-based training. Similar results were found in the literature review. Van Braak (2001) found computer experience to be a strong predictor for computer use in the classroom. Schifter (2002) identified lack of technical expertise as an inhibiting factor to using web-based training or instruction. Further support for the results of this study were found in Gueldenzaph’s study investigating factors affecting the level of technology use by faculty (2000). He found prior use of technology to be a critical factor in determining the level of use.

**Peer support**

The results of this study indicated that peer support was an important predictor of adoption. Lave and Wenger (1991) have purported the importance of a community of learners through legitimate participation. Coughenour, in his work on understanding diffusion in communities stressed the importance of networks and peers in the decision process (1964). Support and encouragement from colleagues was found to be a motivating factor to use web-based training or instruction (Schifter, 2002). Mohr (1969) discussed how the environment of the organization is a determinant of innovation in public agencies. His study revealed that attitudes of peer support resulted in innovative behavior among health professionals. Swan and Newell (1995) found involvement in a
professional association of one’s peers is a factor in influencing technology diffusion.

Diffusion of an innovation in a social system develops through time and is a function of how information is transmitted, who transmits that information and how that information is received in a peer group (Martinez, Polo & Flavian, 1998)

*Culture of learning*

The current study supported the relationship between learning culture and the decision to adopt web-based training. As previously noted, Mohr (1969) found the environment of the organization is a strong determinant of innovation. Mohr also observed the organizational culture as one of the obstacles to his study. The culture did not support the concept of life-long learning.

*Managerial support*

One dilemma many organizations face today is the ability to encourage progress while remaining productive in daily procedures. This is particularly hard for today’s managers. The current study revealed a strong relationship between managerial support and the decision to adopt web-based training. This is further supported in the literature review. Daft (1982) suggested that managers that are flexible and adaptive are associated with more innovative units than those that are more structured and bureaucratic.

Managerial support and effectiveness when trying to implement a new innovation rests on how the communication from the manager supports or does not support the innovation (J. D. Johnson, 2000). Lack of managerial support impedes innovation according to Drazin & Shoonhaven (1996). Miller and Cardy (2000) found mismanagement of people, rather than the failures of technologies, prevents firms from realizing the full potential of technological innovation.
Marketing and Promotion

The current study revealed a strong relationship between marketing and promotion and the decision to adopt web-based training. Zirger and Maidique (1990) investigated adopter characteristics in a technology based industry that will accelerate product purchase and usage. They found similar to the results of the study at hand that: (a) Managerial excellence is critical to success; (b) New products must provide value to the customer; (c) Strategic focus is critical to marketing success; (d) Management commitment is critical to success; and The marketing environment is a contributor to product success.

Type of Training Event

Grote (2000) and Holton (1996) addressed the concept of transfer of training and retention of training. Factors supporting transfer and retention are related to the type of training event and the training design. The study at hand revealed a strong relationship between the type of training event and adoption of web-based training.

Demographics

An interesting result is the higher percentage of female adopters versus male adopters. Although this was not prevalent in the literature review it is worth mentioning as a possible future research topic in the area of adopter characteristics.

The majority of female adopters fell between ages 45 and 54 while male adopters were between the ages of 35 and 44. An unexpected result is that there were no male adopters in the age group of 25-34. This could be due to the nature of jobs in higher education and the ability to attract younger males as opposed to the corporate
environment and may have nothing to do with adopter characteristics. This is a topic worth further research and investigation.

The female adopters had a higher percentage of advanced degrees than male adopters. This too might be typical demographics and be unrelated to adoption of web-based instruction; however the results of this study did indicate a relationship between education and the adoption of web-based instruction. The majority of all adopters had a 4 year degree or higher.

In addition to the analyses for the independent variable constructs in this study, a logistic regression procedure was run against all the variables in the study.

**Summary of Responses Retained as Significant Predictors**

1. Adopters were less inclined to believe that 3 weeks advance notice was adequate.
2. Both adopters and non-adopters agreed that an office or cubical is not a good learning environment, but adopters indicated a stronger level of agreement.
3. Adopters were far more inclined to believe they have time to participate in web-based training.
4. Both adopters and non-adopters disagreed with the premise that only information-based topics can be taught on a computer, but the adopters demonstrated a stronger level of disagreement.
5. Both adopters and non-adopters disagreed with the premise that soft skills cannot be learned on a computer, but the adopters demonstrated a stronger level of disagreement.
6. A larger percentage of adopters frequently do work on their computer.
7. Nearly all adopters frequently use a computer for personal work whereas one-fifth of non-adopters do not.
8. Adopters were extremely comfortable with computers while non-adopters were more likely to have negative experiences.

9. More adopters have experience using search engines.

10. Both adopters and non-adopters agreed that most training can be put on a computer, but adopters indicated a stronger level of agreement.

11. More adopters were attracted to the idea of receiving a color-laminated brochure.

12. Nearly all non-adopters somewhat agreed that a demo would influence their willingness to try a web-based training course, while adopters were more or less evenly distributed in their opinions.

**Extended Discussion**

**Motivation for Learning**

According to survey research addressed in chapter two conducted by Sadler (1999), training can be effective via the web when the organization: (a) Aligns training plans with present and future business goals; (b) Determines employee roles and current skill levels and identifies what they need to learn; (c) Evaluates various training tools and products and determines where web training fits into a comprehensive educational program; (e) Prepares employees for training, ensures that they understand the goals, and visibly monitors their progress; and (f) Measures competence improvement to ensure return on investment. John Keller (1983, 1988) discusses the importance of relevance in his ARCS model of motivation for learning. The similarities of Sadler’s strategies to insure effective training and Keller’s relevance strategies are significant enough to mention. Keller’s relevance strategies (1982, 1988) represent various ways to help learners see why what they are learning should be important to them. Furthermore,
these strategies work to produce motivational effects of how something is taught, as opposed to producing effects of what is taught. Sadler (1999) discussed the importance of aligning training plans with present and future business goals. Keller (1983, 1988) suggests the strategies of present worth to clearly state the current value of instruction and the strategy of future usefulness, explicitly tying instructional goals to the learner's future activities and having learners participate in activities in which they relate the instruction to their own future goals. Keller (1983, 1988) stresses the importance of choice as a strategy for motivation. The sixth strategy that enhances relevance is choice. Choice may be implemented by allowing learners to use different methods to pursue their work or allowing learners a choice in how they organize it. Sadler (1999) suggests evaluating various training tools and products and determining where web-based training fits into a comprehensive educational program, allowing the learner to make the choice of what tool fits their current work schedule or learning preference. In addition to organizational incentives and motivation, future studies would benefit investigating the connection between motivation for learning and web-based instruction design, and how that design might influence the decision to adopt or not to adopt web-based training.

The results from this study provide interesting insights to training managers and directors. The relationship between adoption and managerial and supervisory support is such that staff would be more likely to adopt if they felt they had their manager’s support. Managers need to champion the innovations, lending authority and resources to the innovation throughout the development and implementation period (J. D. Johnson, 2000; Rogers, 1995). Lack of managerial support and attention impedes innovation (Drazin & Shoonhaven, 1996).
Shrestha & Sutphin (2000) reported on the results from a self-report survey that there is a relationship between viewer interaction and acceptance of programs delivered at a distance. People often resist new training techniques because they are not confident they will succeed. The study at hand indicated nearly all non-adopters somewhat agreed that a demo would influence their willingness to try a web-based training course.

The study by A.H. Johnson suggests staff may be distracted by all that is going on around them or even by the amount of work on their desk (2000). Barley’s study indicated a practical logistical barrier to web-based training is that although staff may want to participate in the training, their department may not have the right technology or infrastructure to allow them to participate (Barley, 1999). The results of the study at hand showed a relationship between training logistics and adoption.

Rogers (1995) argued that when we seek to standardize the categories of adopters, we are faced with three problems: (a) to determine the number of categories; (b) to determine the proportion of members of the system to be included in each of the categories; and (c) to determine the method which defines said categories. Furthermore, the resulting categories must be exhaustive (they must include all the units being studied); they must be mutually exclusive; and they must derive from one main classification. The study at hand investigated community college staff. The population meets Rogers’ specifications. However, it is necessary to note that the community colleges in Michigan are from many different areas, some more remote than others. If more of the respondents had filled out the response regarding what city their college was locate in, demographic analyses could have been run on the responses from the different areas adding value to the study.
Evidence in the literature review revealed the attitudes or values of organizational members are significantly related to innovative behaviors (Burkhart & Brass, 1990; Compeau & Higgins, 1999; Cszepiel, 1986; Eastin & LaRose, 2000; Ettlie & O’Keefe, 1982). Supported in the aforementioned studies were the seven constructs used in this study. However, there were minor challenges in the data worth mentioning in this discussion.

The response data seemed skewed, resulting in several contingency tables containing zero cells (i.e., cells with no cases). Possible reasons for this are: (a) The independent variables had too many levels, and thus too many cells, relative to the number of cases in the study (i.e., the data was spread too thin across the levels of the independent variables); and (b) There may have been too few cases relative to the number of predictor variables examined.

Other important causes of instability relate to the choice of predictive characteristics and to the number of outcome events available in the data to fit any given model. Including too many predictive variables in a regression model may improve the predictive performance on data, but may alter it on validation data, reflecting a problem of overfitting (Tabachnick & Fidell, 1996). Another approach can be to control for conditions under which the stability of prediction performance would be improved. In the case of this study, the predictor variables could have been developed based on an initial survey to gather information regarding the population prior to development.

**Implications for Practice**

*Utilize communication tools throughout web-based training*
The advantages of using web-based teaching and learning allow students to attain live and first hand information on the web concerning their field of study. In addition, the amount of information available on the entire Internet should be utilized and not taken for granted. Easy access, particularly to web-based training, is abundant. Practitioners should utilize communication tools to enhance web-based training. E-mail and chat rooms are very popular uses for communication between both the instructors and students. Chat rooms help to refine concepts of the training and encourage collaborative learning.

Students are exposed to a vast amount of information and are invited to explore content further. Trainees and students can interact with their instructors real time. Threaded discussions allow students to reflect on readings and respond at their own schedules.

*Provide immediate feedback*

Interactivity is important to any training activity either online or face-to-face. Online tests and quizzes produce immediate feedback to the students. This allows instructors or facilitators to focus on what the trainees did wrong and not waste time on what the trainees did right. Based on the results of online quizzes and exams, facilitators and training managers can suggest customized remediation for trainees based on their results.

*Teacher immediacy*

As important as providing immediate feedback is including pictures of the experts or small video clips to “connect” the trainees with the expertise. LaRose and Whitten (2000) stated that working with computers may translate into anxious feelings. Adding objects to help with the connectivity to the expert increases student reaction and participation.
Select web-based training that can pre-test trainees

A barrier that presents itself throughout the research on web-based training is the time necessary to complete the training compared to work demands. In today’s busy work environments staff do not have the time to sit through training topics they already know. Training managers should look for web-based training opportunities that pre-test the trainee and only require the training that is needed. Different levels of expertise need to be acknowledged upfront in order to accommodate each trainee.

Monitoring trainee activity online

Monitoring online activity of trainee progress is imperative in order to keep track of the learning process. This is important because of the lack of face-to-face meeting time and observation of the trainees’ nonverbal activity. The literature review and the study at hand supported the use of facilitators or trainers to monitor practice. Learners should not be left totally on their own until they are confident and skilled in web-based training. Providing proctors or trainers at the onset of implementing a web-based training program should increase adoption and success of the program.

Invest in learner skills and knowledge

When adopting a new emerging technology, invest in learner skills and knowledge. Even though web-based training was free to every educational institution in Michigan, the software requires a certain skill set to be able to use. Nearly all adopters frequently used a computer for personal work, whereas one-fifth of non-adopters did not. Adopters were extremely comfortable with computers as noted in the results.

Understanding the importance of peer support
Some practical advantages of peer support are: (a) Learner’s grasp of new information is similar so they can explain things to each other; (b) Support is available beyond the actual training event; (c) Because cooperative learning encourages more active participation, areas of learner confusion are more apparent to learners and instructors; and (d) Working with peers pushes trainees to think more practically with almost automatic transfer or application to their job tasks (Massie, 1997).

Management needs to be flexible

Many times when a new technological innovation is introduced management has unrealistic expectations of the new system and of the employees readiness to use the new system. There are also unrealistic expectations of the employee’s improved efficiencies. Managers need to pay attention to the people factors first and the technology factors second when dealing with technology innovations such as web-based training. Managers need to champion the innovations.

Support for interaction and socialization

Formal mechanisms such as cooperative and collaborative learning practices have to be integrated into the teaching and learning transaction in order to benefit student learning in any significant way.

Conclusion

Not every advancement in technology catches on right away. The full potential of any new technology such as web-based training takes time to be realized. Many times society cannot see the full potential of something for quite a few years. Railroads were considered just a fad that would pass (Atack, Bateman & Weiss, 1980). Higher education
might be looking for certain gains and missing other types of benefits from web-based training.

Web-based training is not the optimal solution for all training needs just as training is not the answer to all learning and performance challenges. Some of the benefits of web-based training include anytime and anyplace access, self-paced training, interactive learning and inexpensive global distribution (Dillich, 2000).

One contribution of this study includes the identification of significant constructs for studying adopter characteristics. Future studies in this area could prove to be beneficial to software development companies, human resource representatives, information technology directors, and training managers and directors. This study has been a first step in exploring factors affecting adoption of web-based training among community college staff. Due to the reduction of variables for the constructs studied, further research is suggested. Based on this Michigan community college study one can not generalize or state with confidence the factors affecting adoption of web-based training for all community college staff. One can with confidence repeat the study with other community college samples.

Personally, I would like to see the focus of diffusion research expand to answer questions such as: *When and by what process are technically inefficient innovations diffused or efficient innovations rejected?* There seems to be a bias in the literature which suggest that innovations and diffusion of innovations will benefit adopters. Realizing there is only so much one can report in a study or article, it would be interesting to see if targeted end users participated in any needs assessment before the innovation was purchased and put in place for use. Perhaps investigating the antecedents to intention to
adopt web-based training is warranted in this type of study in the future. Rogers (1995) argued that the dominant perspective in the diffusion of innovation literature reinforces proinnovation biases because it relies on a model of choice in which adopters make independent, rational choices. Is this truly the case in organizations today? Regardless, the topic of diffusion of innovation leaves us with many questions to further the research in this area.
Bibliography


Dillich, S. (2000, May 26). Online training gets in sync: You can put a range of courses on the web, but the wrong offerings designed the wrong way are no better than poor instruction. *Computing Canada, 26*, p. 34.


Appendix A

Survey

Screener Question

Please check the appropriate box: (choose only one)

- [ ] I have never used web-based training.
- [ ] I used web-based training but never completed a course.
- [ ] I have completed at least one web-based training course.

If you have never used web-based training, Go to Question #1.

If you used web-based training, please answer the questions in the box below, before proceeding to question #1.

<table>
<thead>
<tr>
<th>a. How many web-based training courses have you completed? ____________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
</tr>
<tr>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b. How would you rate your most recent web-based training experience?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
</tr>
<tr>
<td>[ ]</td>
</tr>
</tbody>
</table>

c. Would you take another web-based course? Yes / No / I Don’t Know

Current information technology use and skills

1. For each item listed below, please indicate your level of agreement or disagreement with the statement by checking one box per row only.

<table>
<thead>
<tr>
<th>I use the computer to communicate with others (email or instant messaging).</th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
<th>Does Not Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I often do work on a computer.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I often use a computer for personal use (e.g., writing letters, keeping track of personal information, homework, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I have had more negative than positive experiences using computers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I do not feel in control when using a computer.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I feel comfortable using the internet.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I know how to use a search engine.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I have used tutorials or learning modules on a computer before (not including web-based courses).</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
</tr>
</tbody>
</table>

Learning Culture

2. For each item listed below, please indicate your level of agreement or disagreement with the statement by checking one box per row only.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
<th>Does Not Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I have used tutorials or learning modules on a computer before (not including web-based courses).</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
</tr>
</tbody>
</table>
Web-based training and access to anytime/anyplace supports our department’s goal for continuous improvement. □ □ □ □ □ □

Lifelong learning/professional development is encouraged in our department. □ □ □ □ □ □

There is really no motivation in the department for me to take additional training courses. □ □ □ □ □ □

Employees who participate in additional training or professional development courses are well looked-upon in our department. □ □ □ □ □ □

People in the department at my level don’t seem interested in participating in additional training courses. □ □ □ □ □ □

Peer Support

3. Please indicate how important a role each of the following would play in your decision to enroll in a web-based training course, by checking one box for each statement below.

<table>
<thead>
<tr>
<th>How Important Is…</th>
<th>Very Unimportant</th>
<th>Somewhat Unimportant</th>
<th>Somewhat Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer support on location if you also have web support available to you during your web-based training course?</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
</tr>
<tr>
<td>Hearing testimonials from your peers before participating in a web-based training course?</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
</tr>
<tr>
<td>Having others around (learning with you) when participating in a web-based training course?</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
</tr>
<tr>
<td>Having phone or email contacts with work-peers that have previously taken the training?</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
</tr>
<tr>
<td>Having phone or email contacts with work-peers that are currently taking the training?</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
<td>□ □ □ □</td>
</tr>
</tbody>
</table>
Manager/Supervisor Support

4. For each item listed below, please indicate your level of agreement or disagreement with the statement by checking one box per row only.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
<th>Does Not Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>My manager/supervisor allots work time for staff to participate in training.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>My manager/supervisor promotes/allows us to participate in web-based training.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>I am more likely to use web-based training if I know my manager/supervisor thinks that web-based training courses are valuable.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>If my manager/supervisor were to initiate the request for web-based training, I would be more likely to think it is a valuable development task.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>If my manager/supervisor provides manuals and learning materials to the department, I am more likely to sign up for a web-based training course.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>If my employer paid for a web-based training course, I would be interested in signing up for it.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
</tbody>
</table>

Logistics

5. For each item listed below, please indicate your level of agreement or disagreement with the statement by checking one box per row only.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
<th>Does Not Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning in my cubical or office is not a good learning environment.</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>Having a dedicated place to take a web-based training course would encourage me to participate.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>If there were a backup for my job duties, I would be more willing to participate in web-based training.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>I have access to a computer at work that is adequate for web-based training.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>I hate to take any training that keeps me from my work.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Working with a facilitator (with specific knowledge of the learning module) in the room is necessary in web-based training.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>I do not have time to participate in a web-based training course.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>If sufficient technical support is available on campus (hardware, software, people) I would be more likely to enroll in a web-based training course.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
</tbody>
</table>

Type of Training Event.

6. For each item listed below, please indicate your level of agreement or disagreement with the statement by checking one box per row only.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
<th>Does Not Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web-based training is only good for information based topics.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Soft skills like communication and teamwork can not be learned with a computer.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Web-based training is good for enhancing skills.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>I am more likely to participate in a formal training program than to choose professional development on my own.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>I would use web-based training if I could stop and pick up where I left</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
</tr>
</tbody>
</table>
off, rather than having to go through an entire module.
Most training if it is designed well can be put on a computer.

Marketing and Promotion

7. For each item listed below, please indicate your level of agreement or disagreement with the statement by checking one box per row only.

<table>
<thead>
<tr>
<th>Having a color, laminated brochure would make me more likely to choose web-based training.</th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
<th>Does Not Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiving information specific to the training would make me more likely to choose a web-based training course.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flyers received too far in advance tend to get tossed aside and I forget about them.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would be more likely to participate in a web-based training course if I could read testimonials about the training on a brochure or the training provider’s web site.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Announcing training programs 3 or more weeks in advance gives me enough time to plan for the training.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am more likely to use web-based training when the message/brochure about the training comes from my supervisor.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would be more likely to participate in a web-based training course if I could read specific information about the course on the training provider’s web site.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would be more likely to participate in a web-based training course if I could evaluate a demo before signing up.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Demographic Questions

1. What is your gender (Male / Female)?
   - Male
   - Female

2. What is the highest degree you have obtained? (Please check one)
   - None
   - High school diploma or equivalent
   - Two-year community college degree or equivalent
   - Four-year college or university degree
   - Advanced degree

3. What is your age?
   - 18-24
   - 25-34
   - 35-44
   - 45-54
   - 55 and above

4. What is your annual salary? ____________________ (opt)

5. In what city is your campus located? ___________________________

6. Do you have a computer at home? (Yes / No)

7. Do you have access to the Internet at home? (Yes / No)
### Appendix B

#### Logistic Regression Tables

#### Model Summary

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>408.670(a)</td>
<td>.170</td>
<td>.246</td>
</tr>
</tbody>
</table>

#### Variables in the Equation

<table>
<thead>
<tr>
<th>Step 1(a)</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TechRVR</td>
<td>.578</td>
<td>.137</td>
<td>17.937</td>
<td>1</td>
<td>.000</td>
<td>1.783</td>
</tr>
<tr>
<td>Constant</td>
<td>-18.520</td>
<td>4.233</td>
<td>19.147</td>
<td>1</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

Variable(s) entered on step 1: TECHSKL.

*Figure 2: Current Technology Use*

#### Model Summary

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>471.501(a)</td>
<td>.128</td>
<td>.190</td>
</tr>
</tbody>
</table>

#### Variables in the Equation

<table>
<thead>
<tr>
<th>Step 1(a)</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRNCUL</td>
<td>.381</td>
<td>.051</td>
<td>56.916</td>
<td>1</td>
<td>.000</td>
<td>1.464</td>
</tr>
<tr>
<td>Constant</td>
<td>-7.193</td>
<td>.830</td>
<td>75.173</td>
<td>1</td>
<td>.000</td>
<td>.001</td>
</tr>
</tbody>
</table>

Variable(s) entered on step 1: LRNCUL.

*Figure 3: Learning Culture*

#### Model Summary

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>533.432(a)</td>
<td>.001</td>
<td>.001</td>
</tr>
</tbody>
</table>

#### Variables in the Equation

<table>
<thead>
<tr>
<th>Step 1(a)</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEERSUP</td>
<td>1.135</td>
<td>.106</td>
<td>114.056</td>
<td>1</td>
<td>.000</td>
<td>.321</td>
</tr>
<tr>
<td>Constant</td>
<td>.945</td>
<td>.374</td>
<td>6.384</td>
<td>1</td>
<td>.012</td>
<td>.389</td>
</tr>
</tbody>
</table>

Variable(s) entered on step 1: PEERSUP.

*Figure 4: Peer Support*
### Model Summary

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>211.375(a)</td>
<td>.494</td>
<td>.708</td>
</tr>
</tbody>
</table>

### Variables in the Equation

<table>
<thead>
<tr>
<th>Step 1(a)</th>
<th>MGRSUP</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-30.335</td>
<td>2.889</td>
<td>110.279</td>
<td></td>
<td>1</td>
<td>.000</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Variable(s) entered on step 1: MGRSUP.

*Figure 5: Manager and Supervisory Support*

### Model Summary

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>261.562(a)</td>
<td>.415</td>
<td>.596</td>
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</table>

### Variables in the Equation

<table>
<thead>
<tr>
<th>Step 1(a)</th>
<th>LOGIS</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
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<td>1.893</td>
<td>100.002</td>
<td></td>
<td>1</td>
<td>.000</td>
<td>.000</td>
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</tbody>
</table>

Variable(s) entered on step 1: LOGIS.

*Figure 6: Training Logistics*

### Model Summary

<table>
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<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>481.290(a)</td>
<td>.110</td>
<td>.164</td>
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</table>

### Variables in the Equation

<table>
<thead>
<tr>
<th>Step 1(a)</th>
<th>TREVENT</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>50.563</td>
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<td>.000</td>
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</table>

Variable(s) entered on step 1: TREVENT.

*Figure 7: Type of Training Event*
### Variables in the Equation

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>290.238(a)</td>
<td>.398</td>
<td>.585</td>
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</tbody>
</table>

**Table 1: Model Summary**

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.088</td>
<td>97.392</td>
<td>1</td>
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<td>2.375</td>
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<tr>
<td>MKTPRO</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>CL</td>
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<tr>
<td>Constant</td>
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<td>106.084</td>
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<td>.000</td>
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</tbody>
</table>

Variable(s) entered on step 1: MKTPRO.

*Figure 8: Marketing and Promotion*
Karen Marie Peters Vitae

Karen Peters, Ph.D. ACCOUNT EXECUTIVE
Over 26 years of executive, management and instructional/training design and development experience with government, industry and academia. Karen has served on national and international committees on teaching and learning with technology and has been a leader in the design, development and utilization of learning management systems for the past 8 years.

Major Strengths
- Strategic Academic Technology Planning
- Organizational Development
- Diffusion of Innovation
- Learning Management Systems
- Project Management/Team Leadership
- Learning Needs Assessment
- Emerging Academic Technologies
- Learning Architect

Relevant Work Experience

SCT Malvern, PA 9/2002 to present (currently located in Oakland County MI)
SCT Account Executive for Teaching and Learning
Responsible for all aspects of Academic Technology design, delivery, support and strategic planning for multi-campus community college system. Manage staff in support of academic technology and faculty development. Responsible for administration of multi-million dollar contract/budget.

THE PENNSYLVANIA STATE UNIVERSITY University Park, PA 8/95 to 9/2002
Director of Information and Instructional Technology
Responsible for assistance in strategic planning, development and integration of office information system networks; and for recommending guidelines for the acquisition of equipment and development of software to ensure compatibility of communications technology, process and procedures for the law school administrative units; and for providing training and instruction in the use of equipment for administrative and academic purpose.

Dickinson School of Law at the Pennsylvania State University, Carlisle PA 9/2001 to 7/2002
Manager, Instructional Designer
Responsible for all aspects of Instructional Design, Project Management and Needs Assessment throughout the University. Manage training and design staff.

Faculty Development Specialist
Responsible for the design, management and implementation of training seminars for over 3000 faculty to encourage the use of emerging technologies in the classroom.

Center for Academic Computing, Penn State Univ., University Park, PA 8/95 to 8/2001
Senior Instructional Designer
Responsible for the design, development, project management and implementation of over 30 courses and/or programs online.

Consultant
Technical consultant for interactive multi-media based tutorials designed for use in higher education. Needs Assessment consultant for University wide needs initiatives.

Project Manager
Responsible for the blueprint, management and design of various Educational Technology WWW. Experience includes training and consulting internally and externally. Lead on University Web Based Training Initiative; Course Management and Penn State developed on-line classroom tools like CourseTalk and ASK.

HRB (a Raytheon company), State College, PA 9/96 to 10/98
Manager, Instructional Designer
Part Time Instructional Designer
Responsible for the design and development of multimedia and web-based training for various government and other engineering contracts both resident and distance ed.

Pennsylvania Power and Light, Berwick, PA 5/95 to 8/95
Cooperative Assistant
Responsible for updating PP&L's Computer Based Training Programs for their National Nuclear Training Facility. Coordinated and proctored mandatory Federal examinations.

State Farm Insurance Company, Concordville, PA 4/78 to 12/87
Computer Operator
Performed all facets of data processing for the production and distribution of insurance related forms.