Comfort level and computer anxiety in teachers after a computer and internet workshop

by

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CHAPTER ONE: INTRODUCTION

Introduction

This study focused on the relationship between the initial computer anxiety scores of novice computer using teachers and their progress in developing a degree of comfort with a laptop computer and the internet through participation in a three-day workshop. Chapter one contains five sections: 1) an overview of the study, 2) background, 3) a review of research, 4) a statement of the problem, and 5) a summary of chapter one.

Overview of Study

The reported study was just one part of a larger project entitled the Iowa / US West Teacher Technology Project. The intent of the Iowa / US West Teacher Technology Project was to increase the computer telecommunications abilities of Iowa teachers. The targets for this project were the novice computer using teachers in the state. The overall research plan for the project included an initial survey called the Teacher Technology Survey (TTS) that was mailed to teachers in the Spring of 1997. The TTS gathered demographic information and contained other instruments to measure personal innovativeness (IS), perceived organizational innovativeness(PORGI), and computer anxiety (CAIN). This survey was administered a second time in the Fall of 1997 after all training was completed and will be administered again in the Fall of 1998. The data collected by the TTS will reveal any changes in personal innovativeness, perceived organizational innovativeness and computer anxiety over the life of the project. The research plan also included the measurement of teacher comfort levels measured pre- and post workshop. That data was included in this study.

In an effort to recruit novice computer using teachers, the project distributed application forms to all of the school districts and teachers in Iowa. Selection criteria were written to supposedly exclude teachers who were over-qualified by training and experience. A total of 1521 applications were received and 262 of those were excluded as being overqualified. The remaining applicant names were sorted by Area Education Association district and then further divided into "rural" and "urban" categories. This resulted in 30 boxes containing applicant names. The 395 participants were drawn from these boxes based on the population of each AEA.

Participation in the Iowa / US West Teacher Technology Project brought both benefits and responsibilities for each participant. Each of the teachers involved in this study was given the use of a laptop

computer and three days of training in computer operation and use of the internet. The project also subsidized part of the cost of the teachers' internet connections using local providers. Each of these teachers also had the responsibility to train an additional ten teachers to use the internet in the classroom during the next year. In this fashion, the Iowa / U S West Teacher Technology project affected the internet knowledge and usage patterns of approximately 4,400 Iowa teachers.

The 395 teachers who were chosen to participate in this program came from all parts of the state. In order to train each of these teachers, 24 workshops were held at various sites. Trainers were selected representing K-12 education, the Area Education Agencies, and higher education. Each workshop was designed to take place over three consecutive days. At the conclusion of the workshop the teachers took home their new laptop computers. Each participant in the workshop also received a 3-ring notebook that served as a resource during the workshop and as a detailed guide for later review and training of additional teachers.

The workshop was designed to meet the needs of all learners and used a combination of teaching strategies including: direct instruction, cooperative learning, tutorials, small group and large group discussion. The workshop was evaluated by the participants, 87% of whom rated their overall level of satisfaction as above average or excellent. The highest ratings for the workshop were "quality of the presenters", "quality of materials used", "opportunity for participant interaction", and " applicability of information". All of these were rated above average to excellent by over 90% of the respondents.

The workshop itself was divided into four sections. First the participants were introduced to their new laptop computers. Half of the teachers received Macintosh computers and half received Dell (IBM compatible) computers. The computers were similarly equipped with modems, identical software packages, and had similar capabilities (hard drives, RAM). The second section of the workshop was devoted to the use of the word processing program. Participants were introduced to the basics of word processing and given time to practice what they had learned. Next, the teachers were introduced to the internet and the World Wide Web. A great deal of emphasis was placed on copyright issues as they apply to internet usage. Teachers also learned how to conduct searches using different search engines, how to evaluate sites for inclusion in their curriculum, and how to set bookmarks and record URLs for later use. During this section of the workshop, participants also spent

time on-line trying out their new skills. The final section of the workshop was devoted to setting up and using electronic mail. This section also included how to establish accounts with internet service providers and participants were given names of persons who could help them if difficulties arose. The workshop concluded with information about the responsibility of each participant to select and train ten other teachers in their school districts. For a detailed outline of the workshop, see Appendix C.

Background

The Internet, frequently referred to as the "Information Superhighway", has been the focus of much discussion in political and educational circles. Vice President Gore, speaking for the Clinton administration, has set as a national goal the linking of every school, library and hospital to the internet by the end of this decade (Lippman, 1994). Within educational circles, the internet is seen as the source of almost unlimited amounts of information as well as opportunities for students to interact directly with people from other cities, states and countries. Collaborative studies can be devised and experts consulted without the necessity of leaving the classroom. On-line courses are available for students where educational opportunities may be limited. Students can even design and build their own World Wide Web pages and invite others to join them in unique collaborations (Flake, 1996).

The interest in connecting classrooms to the internet is not just at the national level. At least nine states have already devised statewide plans for providing internet access in K-12 classrooms. These states include: Florida, Arizona, Indiana, Nebraska, New Mexico, Pennsylvania, Texas, Virginia, and West Virginia (Topp, 1996). Training teachers and providing access to the internet for teachers are a part of all of these plans.

The attention focused on bringing the internet into the classroom is not a good predictor of the number of teachers using this resource. An education technology survey from 1995 found that while 85% of the teachers and media specialists surveyed reported using a computer during the year, only 16% of the teachers and media specialists used the internet during the year (Educational Technology Survey, 1995). The participants in the same survey identified a number of significant barriers to the use of the internet in the classroom including: a lack of access, lack of time and a lack of workshops or training in the use of the internet in the classroom. (Educational Technology Survey, 1995).

Review of Research

Several different lines of research provided information that explained the current study, including the work on computer anxiety, teacher attitudes, teacher training and innovation theory. Computers must be viewed as an "innovation bundle" with each different application and use considered separately according to the concerns based adoption study by Wedman (1986). This might explain why teachers who use computers do not necessarily use them to access the internet. The literature on computer anxiety indicates that among adult students there is a significant relationship between knowledge about computers and computer attitudes including anxiety, confidence and liking (Massoud,1991).

Training has been widely recognized as important in overcoming computer anxiety. Marcoulides (1988) found that the higher the initial computer anxiety of students, the lower their achievement in a computer course (as cited in McInerney, McInerney, Lawson & Roche, 1994). This finding led to the search for ways to lower the computer anxiety of adult learners. Many of these lines of research were incorporated into the research on teachers' comfort levels while learning about new technology. Grant (1994) concluded that a teacher's development of comfort was critical in learning to use computers in the classroom and that trainers needed to pay attention to this process when designing teacher training. Indeed, the literature regarding teacher attitudes and teacher training also discussed the need of teachers to become comfortable with the new technology (Dupagne & Krendl, 1992) and recommended hands-on experiences during computer training to promote the development of comfort (Woodrow, 1991a). Other descriptions of computer training for teachers have included offering the course over an extended period of time with opportunities for the teachers to receive feedback and answers to their technology related questions (Pina & Harris, 1994). Honeyman and White (1987) reported that significant changes are seen in reducing computer anxiety after 30 hours of training.

These widely accepted recommendations do not reflect what happens in typical school districts. When school budgets are limited, one of the first items eliminated from the budget is staff development. The reality faced by school districts is that funding is unreliable. Even though funding for teacher training may accompany the introduction of new technologies and curricula, it is seldom continued long enough for the innovation to become accepted practice (Marshall, 1995).

Statement of the Problem

The problem investigated by this study is that although politicians and educators alike endorse the use of the internet in the classroom, few teachers receive training to enable them to incorporate the internet into their classrooms. Most teachers will use a computer to access the internet, therefore training must include computer skills as well as information about the internet. Training must also be of sufficient duration to allow indivduals who demonstrate computer anxiety to develop a level of comfort in using the computer.

Purpose of the Study

The purpose of this study is to ascertain whether or not a three day workshop can provide sufficient information and practice to enable teachers with different levels of computer anxiety to become comfortable enough with the new technology to be able to incorporate the internet into their classrooms.

The questions which form the focus of this study are:

(1) Did this three day workshop significantly increase the comfort level of novice computer using teachers in using a laptop computer to access the internet?

(2) Can the initial computer anxiety score of teachers predict the amount of change in their level of comfort when comfort level is measured pre- and post-workshop?

Summary

This study was part of the Iowa/U S West Teacher Technology Project which sought to increase the computer telecommunications skills of Iowa teachers by giving them laptop computers and training and then requiring them to train 10 more teachers within a year. The purpose of this study was 1) to investigate whether a three day workshop could significantly increase the comfort level of novice computer using teachers in using a laptop computer to access the internet, 2) to discover whether the initial computer anxiety score of teachers could predict the amount of change in their level of comfort, and 3) to ascertain whether teachers felt comfortable enough at the end of the workshop to train students and peers.

The literature related to innovation theory, teacher attitudes, computer anxiety, comfort level research, and teacher training was reviewed and is reported in the following chapter.

CHAPTER TWO: LITERATURE REVIEW

This chapter contains a discussion of the problem as it relates to current research and writings. In particular, it examines the benefit of internet usage to students, innovation theory, computer anxiety and comfort levels, and recommendations for teacher training.

The Internet

The internet is a network of computer networks and is composed of millions of computers. Tens of millions of people access the internet daily, sending and receiving electronic mail, seeking and providing information and offering and purchasing goods and services. Some of these millions are teachers and students. Few educators access the internet from their schools. In fact, the 1995 Education Technology Survey prepared for the National Education Association and others showed that only 16% of US teachers and media specialists used the internet at school.

These figures seem very low when the view of the role of the internet in education is so positive. The same survey (1995) reported that more than half of those responding:

> ...felt that online services and Internet prepare young people for the information age, facilitate exchange of information between schools and learning centers, support schools and teachers through community services, and assist teachers' professional development. (p. 3)

More specific benefits of internet usage by students were outlined by Flake (1996) who concluded:

> WWW holds the potential of providing a very open approach to education where students no longer are dependent upon their teacher or a text-book as their sole source of information...WWW also holds the potential of raising the standards of education. (p.100)

In addition to these testimonials, an examination of the internet reveals that it is rich in resources for students and teachers. The Web Museum (http://mistral.enst.fr//louvre/) allows students to tour Paris, France, to view famous paintings, and listen to classical music. Tours are also available at the White House site (http://www.whitehouse.gov). Students can learn how to do their own research and publish their findings at the National Student Research Center web site (http://yn.la.ca.us/nsrc/nsrc.html). Teachers can find lesson plans at the Awesome Library (http://www.neat_schoolhouse.org/lessonlhtml), models of instructional design at the ISD homepage (http://www.seas.gwu.edu/student/tlooms/ISD/isd_homepage.html), and scoring rubrics at the Global Warming Conference homepage (http://www.covis.nwu.edu/globalWarming/rubrics/rubricOV.html) on the

internet. In order for the resources of the internet to benefit students and teachers, a system of support must be developed to increase the adoption of this innovation.

Innovation Theory

The adoption by teachers of the internet for use in classroom teaching is, at its heart, the story of the diffusion of an innovation (internet in the classroom). A clearer understanding of the current state of this process can be gained by examining innovation theory. Diffusion of innovation theory (Rogers, 1995) describes the process by which innovations are accepted over time and draws portraits of those who accept an innovation in successive stages. The Innovators are the first 2.5% who accept an innovation, the Early Adopters make up the next 13.5%, the Early Majority the next 34% followed by the Late Majority also 34%, and finally the Laggards who comprise the last 16% of the population (p. 262). By this estimate, the 16% of teachers and media specialists using the internet in 1995 would represent the Innovators and Early Adopters among that population. It is likely then, that the population of teachers who volunteered for participation in the U.S. West project would be representative of the Early and Late Majority categories. According to Rogers, the Early Majority are deliberate in their decision making. They will not accept an innovation unless they are convinced that it will be useful to them. The Late Majority are described as skeptical and need to have much of the uncertainty about an innovation dispelled before it will be adopted. The Late Majority also respond to peer pressure when considering the adoption decision. Training for these groups must concentrate on the benefits of the internet to students and teachers, must include enough practical, hands-on experiences to remove the uncertainty surrounding the internet, and should be conducted in groups so that teachers can influence one another.

Rogers also describes the steps in the adoption of an innovation by an individual. The first stage is Knowledge and includes the awareness of a new innovation and the how-to's that enable an individual to be persuaded to try the innovation. Persuasion is the second stage of adoption and is characterized by the formation of ideas regarding the benefit of the innovation. In this stage individuals seek to overcome the uncertainty associated with the innovation and develop a level of comfort regarding it. In the Decision stage individuals either reject the innovation or decide to adopt it on a trial basis. During the Implementation stage, new adopters

actually put the innovation to use. This is followed by the Confirmation stage in which the adopter decides whether to continue to use the innovation or to reject it (p. 162). The participants in the U S West project can be expected to be in different stages of adoption depending upon their past experiences and knowledge. As volunteers they might have advanced as far as the decision stage and have decided to adopt the internet on a trial basis. However, the project offered participants a free laptop computer and some may have decided to participate because of that lure. It would be reasonable to assume that participants would range from the Knowledge stage through the Persuasion and Decision stages. Training for these groups must be designed to meet their specific needs.

Those who would seek to influence the adoption of an innovation are called "change agents" by Rogers. Of them, Rogers says, "Change agents could perhaps play their most distinctive and important role in the innovation-decision process if they concentrated on how-to knowledge, which is probably most essential to clients in their trial of an innovation" (p. 166). Change agents in the role of workshop leaders would be well advised to concentrate on how to operate the computer, how to access the internet, and how to incorporate the internet into classroom activities. In addition to these necessary pieces of information, workshop leaders must also work at dispelling uncertainty and anxiety in workshop participants and fostering their development of comfort with computers and the internet. If these goals are accomplished, potential adopters may move from the Knowledge and Persuasion stages into a Decision to adopt the internet for use in their classrooms. The workshop for teachers participating in the U S West project was designed to accomplish these goals.

Besides knowledge of an innovation, adopters also must have access to it. Because internet usage requires a network connection as well as the use of a computer, providing access can be critical. Respondents to the Educational Technology Survey (1995) indicated that a lack of access to equipment and phone lines were barriers to 80% of them, while another barrier rated at 80% was the lack of knowledge about the internet (p. 11). In schools that had internet services available, the use of the internet by teachers increased to 42% (p.4). The U S West project addressed this need by furnishing each participant with a laptop computer and by underwriting part of the cost of an internet connection to their homes.

Computer Anxiety and Comfort Levels

Much has been written about computer anxiety and its effects on teachers who are trying to learn about computers. Computer anxiety has been defined as "the fear or apprehension felt by individuals when they used computers, or when they considered the possibility of computer utilization" (Simonson, Maurer, Torrardi & Whitaker, 1987). Honeyman and White (1987) demonstrated that students and teachers who exhibit computer anxiety develop negative attitudes toward computers and perform more poorly on computer tasks than those who do not exhibit computer anxiety. Research has demonstrated that students must conquer computer anxiety before they can begin to feel comfortable with computers (Cole, 1995). A review of the literature regarding teacher attitudes towards computers was reported by Dupagne and Krendl in 1992. They found that teachers' attitudes toward computers were generally positive, but that they had a number of apprehensions regarding both the hardware and software associated with using the computer in the clasroom. Dupagne and Krendl concluded that teacher training was a critical component of any school district's technology plan.

Many researchers now focus on the teachers' development of comfort during training. For the purpose of this study, computer anxiety and comfort level are defined as different types of teacher attitudes towards computers. Others have listed three types of teacher attitudes towards computers: computer anxiety, confidence with computers (this equates to comfort level in this study) and computer liking (Woodrow, 1991a). As teachers' levels of computer anxiety decrease, their confidence and comfort levels increase (Castleman, 1995; Cole, 1995; Pina & Harris, 1994; Shick, 1996).

Grant described the development of comfort in novice computer users enrolled in a ten week in-service program that met three hours per week. She found that these teachers progressed through four separate levels of comfort in working with computers. The first stage was that of Discomfort in which teachers were worried about their grades, about being compared to their peers, and in which they experienced frustration in dealing with incompatible computers and difficulty in finding answers to their questions. During the second stage, described by Grant as Promise of Comfort, teachers began to experience success in dealing with the computer, sought answers to questions in small groups and became willing to try something new on the computer. The Emerging Confidence and Fascination stage was marked by individual experimentation and exploration with the

computer. Teachers began to believe they could be successful using the computer in their classrooms. The fourth phase was Interactive Comfort and was characterized by increased use of the computer. Teachers in this phase had become comfortable with their own errors. They were able to solve many of their own problems and looked forward to learning more about the computer (pp. 101-147). Focusing on the levels of comfort teachers develop while working with computers enables trainers to anticipate the needs of their students and to design classroom experiences to satisfy those needs.

Teacher Training

What types of training are most effective in introducing new educational technologies? Ely (1990) stated that training can be received in many forms, but that "...knowledge and skills must be present for change to occur." (p.300) A number of research studies have shown that computer anxiety can be overcome through teacher training (Cole, 1995; Koohang, 1989; McNamara & Pedigo, 1995; Shick, 1996). Still disputed in the literature is the length of time which must be spent in training to overcome computer anxiety. Overbaugh and Reed (1990) found conflicting results in their two studies. In the first study, six hours of training on one day were found to be effective in reducing computer anxiety. The second study found that the one day six hour format did not reduce computer anxiety, but the three 2-hour sessions held one week apart did prove effective in reducing computer anxiety. Overbaugh and Reed attributed the differences in their studies to the small sample sizes involved and suggested that further research with larger samples be done to determine the effectiveness of short training sessions. Honeyman and White (1987) found that computer anxiety was reduced after 30 hours of training. Other researchers have shown that training sessions held over extended periods with breaks in between sessions were effective in reducing computer anxiety and increasing comfort levels of participants (Grant, 1994; McNamara & Pedigo, 1995; Overbaugh & Reed, 1992).

Other recommendations for training have emerged from the research. Many investigators recommend that training should be hands-on (Castleman, 1995; Cole, 1995; Grant, 1994; McNamara & Pedigo, 1995; Pine & Harris, 1994). McInerney, McInerney, Lawson and Roche (1994) found direct instruction more effective in alleviating computer anxiety than a mixture of direct instruction and collaborative self-learning. Some reccomendations are for individualized training based on teacher needs (Cole, 1995; Farley, 1992; McNamara &

Pedigo, 1995) while other researchers have used group instruction (Grant, 1994; Overbaugh & Reed, 1992). Both individualized and group instruction have been effective in reducing computer anxiety and increasing the comfort levels of participants.

Summary

The internet is a new telecommunication innovation that is of benefit to both educators and students and requires the use of a computer. Some novice computer users experience computer anxiety which can cause avoidance of computers and thus decrease the likelihood of internet usage. One way to confront computer anxiety and to increase the adoption of computers and internet usage is teacher training. Training is one way of increasing knowledge about an innovation and enabling new users to make the decision to adopt the innovation.

This chapter contains a summary of the relevant research in the areas of innovation theory, computer anxiety and development of comfort, and teacher training. What emerges from this examination is the recommendation that training be provided to teachers and that the training should be hands-on and conducted either individually or in groups. What is yet uncertain is whether or not short periods of training can alleviate computer anxiety and foster the development of comfort and confidence.

CHAPTER THREE: METHODOLOGY

Introduction

The purpose of this chapter is to describe the research methodology which was used in this study. The chapter has five sections: 1) subjects, 2) instruments, 3) data collection, and 4) data analysis and 5) a summary.

Subjects

The subjects for this study were the 395 Iowa teachers selected to participate in the U S West Teacher Technology Project. There were initially 1521 applicants for the project, but 262 were excluded as overqualified. From the remaining subjects, 395 teachers were chosen to participate. Of the total number of subjects, 15 were used as a beta group to test the workshop design and the comfort level survey design, leaving a total of 380 subjects.

Instruments

All of the subjects received an initial survey which included demographic information and the Computer Anxiety Index (CAIN). Subjects were identified by the last six digits of their social security numbers so that later instruments could be matched to the original survey thus eliminating the need to duplicate demographic information on each instrument.

The development of the Comfort Level Assessment (CLASS) began with a review of the literature on comfort level research. The initial survey was constructed from an outline of the workshop and adapted from surveys reported in the literature, particularly the work of McNamara and Pedigo (1995) and Cole (1995). The instrument was then pilot-tested, along with the workshop, by a beta group of fifteen particpants. The pilot-testing resulted in major changes to both the workshop and the CLASS. Content experts reviewed the CLASS after the final revisions to ensure that it reflected the content of the workshop, therefore, the CLASS had content validity. A test of reliability was performed on the CLASS and yielded a Cronbach's alpha of .94.

The CLASS was designed to reflect the subject's initial level of comfort (if any) if asked to independently perform specific tasks using the computer and/or the internet. The subjects were first asked to indicate whether or not they could independently perform the specific task (yes, no). If yes, they were asked to

indicate the level of comfort they would feel while performing the task. The response method was a four level Likert-type scale indicating levels:

1 = very uncomfortable
2 = uncomfortable
3 = comfortable
4 = very comfortable

The two levels of questions yielded a range of responses from 0 (not able to perform = no comfort) to 4 (very comfortable).

Subjects were also asked to estimate the level of comfort they would need to feel in order to 1) teach students about computers and the internet and 2) teach peers about computers and the internet. A free response type question also asked subjects how they had gotten information about computers and the internet prior to training. On the post workshop survey this question was changed to find out how subjects planned to get further information on computers and the internet following training.

The CAIN is a measure of computer anxiety. It is composed of 26 questions and subjects respond based on a 6-point Likert-type scale. Research using this measure has generated normed scores and a reliability estimate of .90 (Simonson, Maurer, Montag-Torardi, & Whitaker, 1987). A test of reliability on the CAIN made during this study yielded a Cronbach's alpha of .94.

Data Collection

This study was approved by the Iowa State University Human Subjects Committee.

The CLASS was administered by the trainers at the beginning of the first day of the three-day workshop, prior to any instruction. It was administered again at the end of the third day of instruction. The surveys were then sent by the trainers to the workshop coordinator who forwarded them to the evaluation team.

Several problems arose during the data collection. The greatest problem for later data analysis was the reluctance of 50 respondents to expose their social security numbers. Another problem for some participants was the workshop schedule. Several subjects began the training at one workshop and finished it at another workshop. This resulted in their pre- and post- workshop surveys being reported in separate groups. When social security numbers were given, these were matched. Other problems were those shared by all surveys, subjects did not follow directions when completing them resulting in unmatched or incomplete data. Twelve

pre-workshop and 13 post-workshop surveys could not be matched. The results of these problems were directly felt in the data analysis where varying numbers of responses and subjects will be noted.

Data Analysis

Data were coded and entered into a computer. Appropriate statistical tests were performed using the SPSS computer program.

Summary

The subjects for this study were the 395 teachers selected for participation in the Iowa/U S West Teacher Technology Project. Data was collected using two surveys: 1) the Teacher Technology Survey (TTS) was mailed to participants prior to training and collected demographic information, personal innovativness data, perceived organizational innovativeness information and computer anxiety data; 2) the Comfort Level Assessment (CLASS) was administered at the workshop both before and after training. Data was coded and entered into the SPSS computer program which was used to perform subsequent data analysis.

CHAPTER FOUR: RESULTS

Introduction

This chapter will discuss the data obtained during the study and the steps which were taken to analyze that data. Sections included are: 1) description of the sample, 2) profile of the participants, 3) computer experience and computer anxiety, 4) purpose of the study, 5) statistical findings, and 6) a summary of the chapter.

The Teacher Technology Survey (TTS) gathered demographic information as well as the Computer Anxiety Index (CAIN) data. Information regarding participants' comfort levels before and after training was collected using the Comfort Level Assessment (CLASS).

The data obtained from these sources were matched using the last six digits of the participants' social security numbers. During the matching process it became obvious that some participants were very reluctant to expose even part of their social security numbers. Fifty of the TTS surveys could not be matched with the CLASS survey due to problems with social security numbers. In addition to these difficulties, some subjects participated in two separate workshops, beginning the training at one and concluding it at another. This resulted in split data which were matched when the social security numbers were available. Twelve pre-workshop and 13 post-workshop surveys could not be matched.

Other problems with the surveys are those associated with all surveys, some subjects misunderstood the directions or chose not to complete the survey in its entireity. As a result, the numbers reported in the discussions that follow will vary from item to item.

Description of the Sample

The subjects for this study were the 395 Iowa teachers selected to participate in the U.S West Teacher Technology Project. There were initially 1521 applicants for the project, but 262 were excluded as overqualified. From the remaining subjects, 395 teachers were chosen to participate. Of the total number of subjects, 15 were used as a beta group to test the workshop design and the comfort level survey design, leaving a total of 380 subjects.

Profile of the Participants

Demographic information indicated that the participants were predominantly female (73.1% female and 26.9% male), were experienced teachers (mean 17.7 years of teaching), were largely middle aged (mean 43.5, range 24-61 years), and were almost exclusively caucasian (96.0%).

As shown in Table 1, 9.8% of the teachers had only a BS or BA degree, while 38.3% had a BS or BA degree plus 15 semester hours. Masters degrees were held by 18.9% while another 31.4% had an MS or MA plus 15 semester hours. Six participants had a Ph.D. or Ed.D.

Nearly forty-two percent (41.8%) of the participants taught at the elementary school level while 21.8% taught at a middle school and 25% taught high school. Another 12% taught in some combination of these.

A wide range of teaching areas was represented including math (5.8%), science (6.1%), social studies (4.0%), language arts (8.0 %), vocational education (3.7%), art (5.0%), and foreign language (2.7%). All subjects were taught by 14.9% of the participants, while 35.3% taught some combination of subjects and 14.6% reported "other" as their teaching area.

Computer Anxiety and Computer Experience

As a group, the participants in the U.S. West project proved to be less computer anxious than the norm. The mean for the norm group on the CAIN was 63.4 while the mean for the US West group was 45.83. The range of scores for the study group was 26 (lowest possible score) to 151 (highest possible score 158). Therefore, although most of the subjects had low computer anxiety, there were a few who were very computer anxious. The distribution of the computer anxiety scores for this sample are shown in Figure 1.

The data collected regarding prior computer experience yielded supporting information (Figure 2). Although one subject reported having no computer experience, 47.2% reported having "some experience", 38.7% claimed "quite a bit of experience", and 7.7% acknowledged having "extensive" computer experience. This data also shows the group as predominantly experienced with a few having little or no experience working with computers.

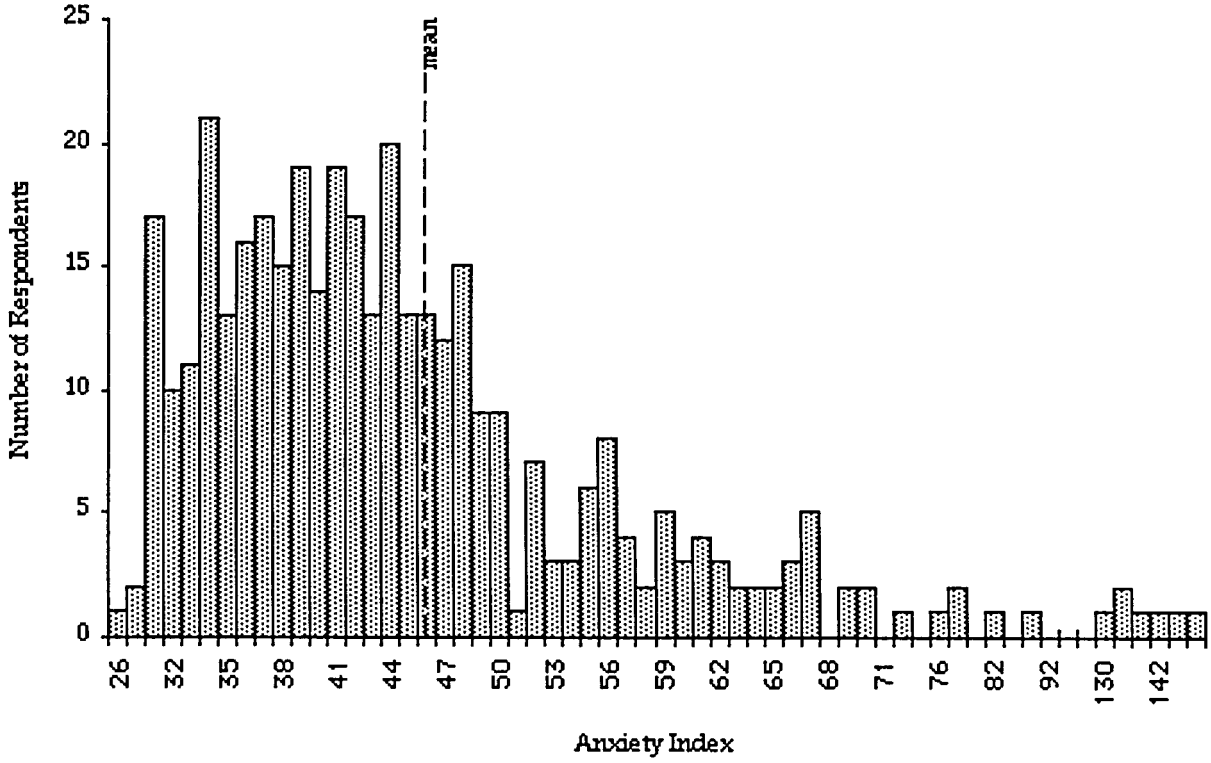

Figure 1. Distribution of Computer Anxiety Scores

When participants were queried regarding specific types of computer programs, they portrayed themselves as slightly less experienced (Table 2). Most participants were familiar with word processing programs and 72.1% claimed to have "quite a bit" or "extensive" experience. Spreadsheet programs were less used by participants with only 14.6% reporting "quite a bit" or "extensive" experience. Least used of all were database programs with only 10.1% reporting "quite a bit" or "extensive" experience.

When queried about their on-line experience, 32.6% of the subjects had used electronic mail "quite a bit" or "extensively". Their experience accessing the World Wide Web fell short of this with only 24.3% of participants acknowledging "quite a bit" or "extensive" experience.

Table 1. Demographic Information and Descriptive Statistics

Variable	N	Percent	Mean	Standard Deviation
Level of Education				
BS/BA	37	9.8		
BS/BA + 15 hours	144	38.3		
MS/MA	71	18.9		
MS/MA + 15 hours	118	31.4		
PhD/EdD	6	1.4		
Gender				
Male	101	26.9		
Female	274	73.1		
Own a Computer				
Yes	277	64.1		
No	100	23.1		
Race				
African/American	1	.3		
American Indian	1	.3		
Asian/American	1	.3		
Caucasian/White	362	96.0		
Mexican/American	2	.5		
Other	3	.8		
Do not wish to share	7	1.9		
Subject Taught				
Math	22	5.8		
Science	23	6.1		
Social Studies	15	4.0		
Language Arts	30	8.0		
Vocational	14	3.7		
Arts	19	5.0		
Foreign Language	10	2.7		
All Subjects	56	14.9		
Other	55	14.6		
Combination	133	35.3		
Level Taught				
Elementary	157	41.8		
Middle School	82	21.8		
High School	94	25.0		
K-12	14	3.7		
Middle/High School	19	5.1		
Elementary/High School	1	.3		
Elementary/Middle School	8	2.1		
Other	1	.3		
Comfort Level				
Pre-workshop			42.22	16.99
Post-workshop			66.68	12.99
Change			24.46	15.98
Computer Anxiety			45.83	8.88

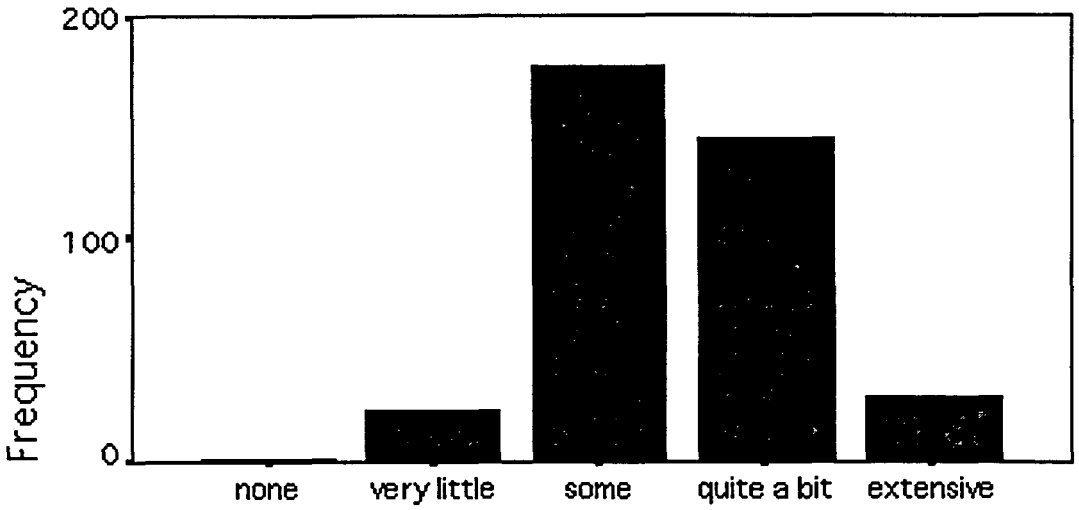

Figure 2. Computer Experience (N=395)

Purpose of the Study

The purpose of this study was to ascertain whether or not a three day workshop could provide enough information and practice to enable teachers with different levels of computer anxiety to become comfortable enough with the new technology to be able to incorporate the internet into their classrooms.

The questions which form the focus of this study are:

(1) Can a three day workshop significantly increase the comfort level of novice computer using teachers in using a laptop computer to access the internet?

(2) Can the initial computer anxiety score of teachers predict the amount of change in their level of comfort when comfort level is measured pre- and post-workshop?

Whether or not teachers would be comfortable enough to use the internet in their teaching of students was indicated by an item on the survey asking how comfortable they thought they would need to be in order to use the internet with students. When this level was compared to their average comfort levels at the end of the workshop, 48.8% of the 380 participants were found to meet or exceed their target comfort levels. The group did better when asked about teaching their peers. On this item 54.6% of the 380 respondents (met or exceeded

their target comfort levels. The finding that more teachers felt prepared to teach their peers than their students is interesting and causes one to wonder if students might be seen as more expert in computer and internet use than the teachers. This could be the subject of another study.

To discern whether or not a three-day workshop could significantly increase the comfort levels of the

Table 2. Types of Computer Experience

Type of Experience	Frequency	Percent	Mean	Standard Deviation
Computer Experience			3.47	.74
none	1	.3		
very little	23	6.1		
some	177	47.2		
quite a bit	145	38.7		
extensive	29	7.7		
Word Processor Experience			3.67	.81
none	4	1.1		
very little	22	5.9		
some	116	30.9		
quite a bit	185	49.3		
extensive	48	12.8		
Spreadsheet Experience			2.44	1.00
none	66	17.5		
very little	147	39.0		
some	109	28.9		
quite a bit	44	11.7		
extensive	11	2.9		
Database Experience			2.28	1.00
none	90	23.9		
very little	139	37.0		
some	109	29.0		
quite a bit	28	7.4		
extensive	10	2.7		
Electronic Mail Experience			2.91	1.11
none	51	13.5		
very little	76	20.2		
some	127	33.7		
quite a bit	101	26.8		
extensive	22	5.8		
World Wide Web Experience			2.82	1.01
none	44	11.8		
very little	83	22.2		
some	156	41.7		
quite a bit	77	20.6		
extensive	14	3.7		

participants, a t-test of paired samples was performed on the means of the pre-workshop CLASS and the post-workshop CLASS. A significant increase in comfort levels was found (Table 3). This means that the workshop was effective in increasing the comfort levels of teachers.

In seeking an answer to whether the CAIN score could account for a large part of the post-workshop

Table 3. t-test of Pre- and Post- Workshop Comfort Levels (371 pairs)

Variable	Mean	t-value	Significance
Total Post Workshop Comfort Level	66.7466		
		36.02	<.01*
Total Pre Workshop Comfort Level	39.4528		

* a significant correlation

comfort level, a number of correlations were run (See Table 4). The correlation of the CAIN score with the post-workshop comfort level showed a slightly negative relationship which was statistically significant but not practically significant as it could account for only 6% of the post-workshop comfort level. The relationship was somewhat weaker between the CAIN score and the pre-workshop comfort level. While it might be expected that computer anxiety would have an inverse relationship to comfort levels, the magnitude of this relationship was surprisingly small.

Strong correlations were found between the different types of computer experience. These results are to be expected as experience with different types of computer programs contributes to computer experience as a whole and the variables include many of the same effects.

A strong negative correlation was noted between the total pre-workshop comfort level and the change in comfort level. This implies that the higher the initial comfort level, the smaller the change in comfort level.

Another interesting finding was that the correlations between the types of computer experience and the total pre-worshop comfort level were higher than the correlations between the same types of computer

Table 4. Correlations Between Variables

Variables	1	2	3	4	5	6	7	8	9	10	11
1 Computer Anxiety											
2 Pre-workshop Comfort Total	-.17* (325)										
3 Post-workshop Comfort Total	-.24* (327)	.49* (371)									
4 Change in Comfort Level	.01 (323)	-.75* (371)	.21* (371)								
5 Age	.07 (372)	-.10 (324)	-.06 (326)	.07 (322)							
6 Computer Experience	-.20* (374)	.61* (324)	.39* (326)	-.37* (322)	-.03 (371)						
7 Word Proc. Experience	-.25* (374)	.51* (324)	.41* (326)	-.23* (322)	-.11 (372)	.77* (373)					
8 SpreadSheet Experience	-.15* (376)	.57* (326)	.35* (328)	-.33* (324)	-.07 (373)	.66* (375)	.58* (375)				
9 Database Experience	-.10 (375)	.54* (325)	.32* (327)	-.33* (323)	.01 (372)	.64* (374)	.56* (374)	.76* (376)			
10 E-mail Experience	-.09 (376)	.56* (326)	.35* (328)	-.34* (324)	-.09 (373)	.52* (375)	.47* (375)	.39* (377)	.40* (376)		
11 World Wide Web Experience	-.17* (373)	.62* (323)	.39* (325)	-.37* (321)	-.13 (371)	.61* (372)	.53* (373)	.49* (374)	.44* (374)	.75* (374)	

* = P<.01, a significant correlation

Table 5. t-tests of Most and Least Computer Experienced Groups

Variable	N	Mean	Mean Difference	t-value	Significance
Change[a]					
most experience[b]	151	22.21	9.46	-6.00	<.01*
least experience[c]	171	31.67			
Total Pre-Wkshp Comfort[d]					
most experience	151	48.89	17.66	11.47	<.01*
least experience	173	31.23			
Total Pos-Wkshp Comfort[e]					
most experience	153	70.90	7.84	6.51	<.01*
least experience	173	63.06			

a= Change in comfort level from pre-workshop CLASS to post-workshop CLASS
b= Group that indicated "quite a bit" or "extensive" on the computer experience variable
c= Group that indicated "none", "little" or "some" on the computer experience variable
d= Comfort level from pre-workshop CLASS
e= Comfort level from post-workshop CLASS

experience and the total post-workshop comfort level. To investigate this further, the subjects were divided into groups by their computer experience. Group one was composed of those who indicated they had "quite a bit" or "extensive" computer experience Group two consisted of those who reported "none", " a little bit", and "some" computer experience. An independent t-test was run comparing the means of the two groups on three variables: change, pre-workshop comfort level, and post-workshop comfort level. The results are shown in Table 5.

As reported in Table 5, the group with the least computer experience made greater gains than the most experienced group. The mean difference was 9.46, this was a statistically significant difference. Similar differences were discovered when examining the total pre-workshop and total post-workshop comfort levels of the two groups. The mean difference for the pre-workshop comfort levels was 17.66, this fell to a mean difference of 7.84 on the post-workshop comfort level. Both were statistically significant. These findings also have practical significance as the mean difference of 9.46 points represented more than ten percent of the total possible score. This difference in the gains of the two groups led to questions about the effectiveness of the

workshop for all teachers. The data seemed to show that the workshop was more effective for teachers with little computer experience than for teachers with a great deal of computer experience. The possibility of a "ceiling effect" must be considered in this context. One type of ceiling effect can result if the maximum score range is not wide enough to accomodate the change in comfort level. This would be evidenced by a large number of participants reaching the maximum possible score. In this sample, eighteen of the 380 participants scored the maximum of 80 points on the post-workshop CLASS. This might be an indication of a ceiling effect, but the mean of the group with the most computer experience was just 70, indicating that the ceiling effect did not apply to all those with a lot of computer experience. Another type of ceiling effect occurs when there is a mis-match between the curriculum and the student. In this project, the workshop was designed for novice computer users and may not have been suited to the needs of experienced computer users.

The subjects next were divided into groups by CAIN score and the 16% with the greatest computer anxiety were compared to the 16% with the least computer anxiety. The variables included in the comparison were 1) change score (total post comfort level - total pre comfort level), 2) pre-workshop comfort level and 3) post-workshop comfort level. Table 6 shows the results of the t-tests on change, pre-workshop comfort level and post-workshop comfort level.

A t-test performed on the means of the most and least anxious groups' change scores determined that there were no significant differences between the two groups. On the other two variables there was a significant difference between the most and the least anxious groups. The most anxious group had a mean of 47.85 on the pre-workshop comfort level and the least anxious group had a mean of 31.64. The gap narrowed only slightly on the post-workshop comfort level with the most anxious group showing a mean of 72.58 and the least anxious group a mean of 59.51. The most anxious group scored lower than the least anxious group on both the pre- and the post-workshop comfort level measures, but they increased their comfort levels by the same amount as the least anxious group. This means that the workshop was equally effective in developing comfort in teachers with widely varying computer anxiety scores.

One of the questions this study sought to answer was whether the CAIN score could be used to predict the change in comfort level. After examining the correlational data and the t-tests described above, computer

Table 6. t-tests of Most and Least Anxious Groups

Variable	N	Mean	Mean Difference	t-value	Significance
Change[a]					
most anxious[b]	60	24.73			
			3.14	-1.11	.268
least anxious[c]	55	27.87			
Pre Comfort[d]					
most anxious	60	31.64			
			16.21	5.22	<.01*
least anxious	55	47.85			
Post Comfort[e]					
most anxious	60	59.51			
			13.07	6.23	<.01*
least anxious	55	72.58			

a= Change in comfort level from pre-workshop CLASS to post-workshop CLASS
b= Group composed of the top 16% of CAIN scores
c= Group composed of the bottom 16% of CAIN scores
d= Comfort level from pre-workshop CLASS
e= Comfort level from post-workshop CLASS

experience emerged as another significant factor. To determine if either of these variables had predictive power, a multiple linear regression was performed with change as the dependent variable and computer anxiety and computer experience as the independent variables. The backward method was selected. In this method all the independent variables are in the equation at the beginning and they are tested and removed when the maximum probability of F (which was pre-set at 0.10) is reached. The SPSS program first examined the variable with the smallest partial correlation coefficient, "computer anxiety" in this case. Since the probability of its F is greater than the default criterion value of 0.10, the variable "computer anxiety" was removed. The equation was recalculated using the remaining variable "computer experience" and the statistics in Table 7, Table 8 and Table 9 were produced.

According to this analysis, computer experience was a good predictor of the change in comfort level and computer anxiety made no independent contribution to the change in comfort levels. To verify this, another

Table 7. Multiple regression

Multiple R	.36482		
R Square	.13309		
Adjusted R Square	.13038		
Standard Error	13.88199		
ANALYSIS OF VARIANCE	DF	Sum of Squares	Mean Square
Regression	1	9438.03821	9438.03821
Residual	319	61474.39170	192.70969
F= 4897542	Signif F=.0000		

linear regression was run with computer anxiety as the sole independent variable. The significance of the F in that test was .9185. Thus, computer anxiety was eliminated as a possible predictor of the change in comfort level. These results should be considered by those planning computer/internet training for teachers. They imply that the most important thing trainers can do for teachers is to give them lots of experience using computers.

Table 8. Backward elimination at the last step: Variables in the equation

Variable	B	SE B	Beta	T	Sig T
Computer Experience	-7.237344	1.034166	-.364821	-6.998	.0000
(Constant)	52.434855	3.687406		14.220	.0000

Table 9. Backward elimination at the last step: Variables not in the equation

Variable	Beta In	Partial	Min Toler	T	Sig T
Computer Anxiety	-.063367	-.066902	.966342	-1.196	.2327

Summary

The Teacher Technology Survey was mailed to participants in the U.S. West Teacher Technology project prior to training. At the beginning and at the end of the 3-day workshop which was required for all participants, subjects were given the CLASS. Data were coded and entered into a computer for analysis using the SPSS program.

The demographics of the participants and their CAIN scores were analyzed. A t-test was performed on the pre- and post workshop comfort levels and significant differences were established. The Pearson product moment correlation technique was used to determine the strength of the relationships between the CAIN scores, the computer experience scores, and the pre- and post- workshop CLASS scores. The variables representing different types of computer experience correlated highly with each other. The CAIN correlation with the pre-and post- workshop comfort levels was significant, but the correlation with the change variable was not.

The subjects were separated by CAIN score and the 16% who were most anxious were compared with the 16% who were least anxious. Again, the difference in the means of the change scores was not significant, but the differences in the means of the pre- and post- workshop comfort levels were significant.

The subjects were divided by computer experience and the least experienced group was compared to the most experienced group on three variables: change, pre-workshop comfort levels and post-workshop comfort levels. The t-tests were performed and the differences in the means of the groups for the three variables were found to be significant.

Multiple linear regression yielded the information that computer experience was a good predictor of the change in comfort level and computer anxiety made no independent contribution to change in comfort level. These were significant findings and will be discussed further in Chapter Five.

CHAPTER FIVE: CONCLUSIONS

Introduction

This study is part of the Iowa/US West Teacher Technology project which was designed to increase the computer telecommunication capabilities of Iowa teachers by providing them with laptop computers, training and support for internet connections and by requiring them to train ten more teachers within a year. Three hundred ninety-five Iowa teachers participated in the project.

The purpose of this study was to discover if a three-day workshop could significantly increase the comfort level of novice computer using teachers. It further sought to determine if the CAIN score was a good predictor of the change in comfort level of teachers due to training. And finally, the study tried to determine if the teachers felt comfortable enough at the end of the workshop to teach students and/or peers about this new innovation.

The review of literature addressed (1) the benefit of the internet to educators, (2) Innovation theory, (3) computer anxiety and comfort levels, and (4) recommendations for teacher training. This examination of the literature yielded the recommendation that training be provided to teachers in order to advance the adoption of the internet for use in the classroom. Furthermore, the training should be hands-on and conducted either individually or in groups. What was uncertain was whether or not short periods of training could alleviate computer anxiety and foster the development of comfort and confidence.

This study utilized two surveys to collect information from the participants of the Iowa/U.S. West Teacher Technology project. Data from these surveys were coded and entered into a computer for analysis using the SPSS program.

Significance of the Study

In the area of comfort level research this study is significant for several reasons. The sample size in this study (380) is much larger than most other comfort level studies many of which have sample sizes of 10-30. Sample size is important because "The larger the sample, the more likely the subjects' scores will be representative of population scores. Also, increasing the sample size increases the likelihood of rejecting the null hypothesis when in fact it is false." (Gall, Borg & Gall, 1996, p. 229) This study also verifies that

training can increase teachers' confidence/comfort levels, replicating the findings of Castleman (1995), Cole (1995), Pina and Harris (1994) and Schick(1996). It is important to replicate findings in an area of research so that possible measurement errors in individual studies do not bias the understandings of researchers in that area.

This study found that teachers with varying levels of computer anxiety could develop comfort working with the internet and computers. This may be different from Cole's (1995) findings that teachers must conquer computer anxiety before developing comfort. However, this study did not measure computer anxiety post-workshop, so it is not possible to tell whether or not computer anxiety changed during training. The overall evaluation plan for the Iowa/U.S. West Project does include repeated measures of computer anxiety and those may answer some questions about how computer anxiety changes.

Finally, this study established that computer experience is a predictor of the change in comfort level. The specific results may have been confounded by a ceiling effect which may have restricted the distribution of change scores across higher levels of initial ability. The findings of this study are that the group with the least amount of computer experience made greater gains in comfort than those with more computer experience. Further study is recommended to determine whether the change in comfort level of the group with greater computer experience was artificially restricted by a ceiling effect.

Recommendations for Further Study

Questions in research lead sometimes to answers, but always lead to more questions. This study has suggested some answers, but also spawned more questions. For example, does computer anxiety change as readily as comfort levels seem to? Can computer experience predict change in computer anxiety? Is the total number of hours of training an important factor in developing comfort or is the amount of hands-on experience more important? Is 24 hours worth of training on three consecutive days as effective as 24 hours of training with breaks of days? weeks? months in between? Is there a threshold of comfort that, once passed, leads to continuous development of confidence working with computers and the internet? What is the best way to provide novice computer using teachers with computer experience? Did the teachers who were not ready to teach students and/or peers at the end of the training workshop schedule their training for peers later than those who were ready to train at the end of the workshop?

Some of these questions may find answers as the Iowa/U S West Project continues, but the others will await the interest of researchers who share an interest in the development of comfort in novice computer using teachrs.

Summary

This study examined the development of comfort in teachers who participated in a three-day workshop on computers and the internet. The purpose of the study was to discover if a three-day workshop could provide enough information and practice to enable teachers with different levels of computer anxiety to become comfortable enough with the new technology to be able to incorporate the internet into their classrooms. Further the study sought to determine if the workshop could significantly increase the comfort level of novice computer using teachers in using a laptop computer to access the internet. Finally, the relationship between comfort level and the initial computer anxiety score of participants was investigated to determine if it could predict the amount of change in the teachers' levels of comfort from pre- to post- workshop.

Comfort levels were found to increase significantly from pre- to post workshop. The CAIN was found to be a poor predictor of the change in comfort levels, but the level of computer experience was indicated as good predictor of the change in comfort levels. Approximately half of the participants achieved the comfort levels they felt would prepare them to teach students and peers to use computers and the internet.

Prior computer experience was shown to be a more important factor to consider than computer anxiety when planning computer and internet training. The significance of the study was discussed and further research questions were suggested.

APPENDIX A: HUMAN SUBJECTS APPROVAL FORM

Information for Review of Research Involving Human Subjects
Iowa State University

1. **Title of Project:** Iowa/US West Teacher Technology Project

2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are protected. I will report any adverse reactions to the committee. Additions to or changes in research procedures after the project has been approved will be submitted to the committee for review. I agree to request renewal of approval for any project continuing more than one year.

Principal investigator: Caryl Bender **5/1/97** **Signature:**

Department: Curriculum & Instruction **Campus address:** E006 Lagomarcino

Phone number to report results: 4-6916

3. **Signatures of other investigators:** **Relationship to principal investigator:**

4/3/97 date — Major Professor

date

4. **Principal investigator(s): (check all that apply)**
- ☐ Faculty
- ☐ Staff
- X Graduate Student
- ☐ Undergraduate Student

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5. **Project: (check all that apply):**
- ☐ Research
- X Thesis or dissertation
- ☐ Class Project
- ☐ Independent Study (490, 590, Honors project)

6. **Number of subjects: (complete all that apply)**

400	# Adults, non-students
0	# ISU students
0	# Minors under 14
0	# Minors 14-17
0	other: explain

7. **Brief description of proposed research involving human subjects:** (See instructions, item 7.) The subjects are 400 K-12 teachers from Iowa who are participating in the Iowa/US West Teacher Technology Project. All teachers will participate in a 3 day training session. As part of this investigation the teachers will complete a pre-instruction survey and a post-instruction survey which seek to measure the changes in comfort level of teachers with regard to specific computer/internet related tasks.

(Please do not attach research, thesis, or dissertation proposals.)

8. **Informed consent:**
- X Signed informed consent will be obtained. (Attach a copy of your form.)
- ☐ Modified informed consent will be obtained. (See instructions, item 8.)
- ☐ Not applicable to this project.

9. Confidentiality of Data: Describe below the methods you will use to ensure the confidentiality of data obtained. (See instructions, item 9.) 36

Identification numbers will only be used as a method of matching responses from this survey with other surveys. Responses will not be reported on an individual basis but grouped during data analysis.

10. What risks or discomfort will be part of the study? Will subjects in the research be placed at risk or incur discomfort? Describe any risks to the subjects and precautions that will be taken to minimize them. (The concept of risk goes beyond physical risk and includes risks to subjects' dignity and self-respect as well as psychological or emotional risk. See instructions, item 10.)

11. CHECK ALL of the following that apply to your research:

- ☐ A. Medical clearance necessary before subjects can participate
- ☐ B. Administration of substances (foods, drugs, etc.) to subjects
- ☐ C. Physical exercise or conditioning for subjects
- ☐ D. Samples (blood, tissue, etc.) from subjects
- ☐ E. Administration of infectious agents or recombinant DNA
- ☐ F. Deception of subjects
- ☐ G. Subjects under 14 years of age and/or
- ☐ Subjects 14 - 17 years of age
- ☐ H. Subjects in institutions (nursing homes, prisons, etc.)
- ☐ I. Research must be approved by another institution or agency (Attach letters of approval)

If you checked any of the items in 11, please complete the following in the space below (include any attachments):

Items A–E	Describe the procedures and note the proposed safety precautions.
Items D–E	The principal investigator should send a copy of this form to Environmental Health and Safety, 118 Agronomy Lab for review.
Item F	Describe how subjects will be deceived; justify the deception; indicate the debriefing procedure, including the timing and information to be presented to subjects.
Item G	For subjects under the age of 14, indicate how informed consent will be obtained from parents or legally authorized representatives as well as from subjects.
Items H–I	Specify the agency or institution that must approve the project. If subjects in any outside agency or institution are involved, approval must be obtained prior to beginning the research, and the letter of approval should be filed.

Last name of Principal Investigator Bender

Checklist for Attachments and Time Schedule. The following are attached (please check):

12. ☐ Letter or written statement to subject indicating clearly:
    a) the purpose of the research
    b) the use of any identifier codes (names, numbers), how they will be used, and when they will be removed (see item 17)
    c) an estimate of time needed for participation in the research
    d) if applicable, the location of the research activity
    e) how you will ensure confidentiality
    f) in a longitudinal study, when and how you will contact subjects later
    g) that participation is voluntary; nonparticipation will not affect evaluations of the subject

13. X Signed consent form (if applicable)

14. ☐ Letter of approval for research from cooperating organizations or institutions (if applicable)

15. X Data-gathering instruments

16. Anticipated dates for contact with subjects:
First contact: Summer 1997 Last contact: Fall 1997

17. If applicable: anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual tapes will be erased:

Signature of Departmental Executive Officer

5-6-97 date Department or administrative unit Curriculum

19. Decision of the University Human Subjects Review Committee:
☒ Project Approved ☐ Project Not Approved ☐ No Ac

Patricia M. Keith, Committee Chairperson 5/8/97 (date) _____ (signature) _____ (person)

APPENDIX B: INSTRUMENTS

Iowa/US West Teacher Technology Project Survey

Please respond to the following questions. All responses will be kept confidential.

Part I. Demographic Information

Last six digits of your social security number _____

Please check the appropriate response:

1. What is your gender? ❑ *male* ❑ *female*

2. What is your age? _____

3. What best describes your race or national origin?
   ❑ *African-American/Black* ❑ *American Indian or Alaskan Native* ❑ *Arab or Middle Eastern Origin*
   ❑ *Asian-American or Pacific Islander* ❑ *Caucasian/White* ❑ *Mexican-American or Hispanic Origin*
   ❑ *Other, please specify* _____ ❑ *I do not wish to share this information.*

4. Please indicate your level of education. (check one)
   ❑ *BS/BA* ❑ *BS/BA + 15 sem. cr.* ❑ *MS/MA* ❑ *MS/MA + 15 sem. cr.* ❑ *Ph.D/Ed.D*

5. Years of teaching experience (including this year). _____

6. At what level do you teach? ❑ *elementary school* ❑ *middle school* ❑ *high school* ❑ *K-12*

7. What subject area(s) do you teach? (circle all that apply)
   ❑ *math* ❑ *science* ❑ *social studies* ❑ *language arts (English, literature)*
   ❑ *vocational* ❑ *arts* ❑ *foreign language* ❑ *all subjects* ❑ *other*

8. Indicate your level of experience with computers. ❑ *none* ❑ *very little* ❑ *some* ❑ *quite a bit* ❑ *extensive*

9. Indicate your level of experience using word processing programs.
   ❑ *none* ❑ *very little* ❑ *some* ❑ *quite a bit* ❑ *extensive*

10. Indicate your level of experience using spreadsheets.
    ❑ *none* ❑ *very little* ❑ *some* ❑ *quite a bit* ❑ *extensive*

11. Indicate your level of experience using databases. ❑ *none* ❑ *very little* ❑ *some* ❑ *quite a bit* ❑ *extensive*

12. Indicate your level of experience with E-mail. ❑ *none* ❑ *very little* ❑ *some* ❑ *quite a bit* ❑ *extensive*

13. Indicate your level of experience with the World Wide Web.
    ❑ *none* ❑ *very little* ❑ *some* ❑ *quite a bit* ❑ *extensive*

14. Do you own a personal computer? ❑ *yes* ❑ *no*

15. To how many professional organizations do you belong? _____

Technology Research and Evaluation Group
E006 Lagomarcino Hall • College of Education • Iowa State University • Ames, IA 50011
January 1997

Part III.
Inventory of Characteristics of Teaching Organizations

Please rate the following statements by circling the appropriate response:

1 = Strongly Disagree
2 = Disagree
3 = Moderately Disagree
4 = Undecided
5 = Moderately Agree
6 = Agree
7 = Strongly Agree

The Organization I Work for (is):	SD	D	MD	U	MA	A	SA
1. cautious about accepting new ideas.	1	2	3	4	5	6	7
2. a leader among other organizations.	1	2	3	4	5	6	7
3. suspicious of new ways of thinking.	1	2	3	4	5	6	7
4. very inventive.	1	2	3	4	5	6	7
5. often consulted by other organizations for advice and information.	1	2	3	4	5	6	7
6. skeptical of new ideas.	1	2	3	4	5	6	7
7. creative in its method of operation.	1	2	3	4	5	6	7
8. usually one of the last of its kind to change to a new method of operation.	1	2	3	4	5	6	7
9. considered one of the leaders of its type.	1	2	3	4	5	6	7
10. receptive to new ideas.	1	2	3	4	5	6	7
11. challenged by unsolved problems.	1	2	3	4	5	6	7
12. follows the belief that "the old way of doing things is the best".	1	2	3	4	5	6	7
13. very original in its operating procedures.	1	2	3	4	5	6	7
14. does not respond quickly enough to necessary changes.	1	2	3	4	5	6	7
15. reluctant to adopt new ways of doing things until other organizations have used them successfully.	1	2	3	4	5	6	7
16. frequently initiates new methods of operation.	1	2	3	4	5	6	7
17. slow to change.	1	2	3	4	5	6	7
18. rarely involves employees in the decision-making process.	1	2	3	4	5	6	7
19. maintains good communication between supervisors and employees	1	2	3	4	5	6	7
20. influential with other organizations.	1	2	3	4	5	6	7
21. seeks out new ways to do things.	1	2	3	4	5	6	7
22. rarely trusts new ideas and ways of functioning.	1	2	3	4	5	6	7
23. never satisfactorily explains to employees the reasons for procedural changes.	1	2	3	4	5	6	7
24. frequently tries out new ideas.	1	2	3	4	5	6	7
25. willing and ready to accept outside help when necessary.	1	2	3	4	5	6	7

Part II.
Inventory of Characteristics of Teachers

Please rate the following statements by circling the appropriate response:

1 = Strongly Disagree
2 = Disagree
3 = Moderately Disagree
4 = Undecided
5 = Moderately Agree
6 = Agree
7 = Strongly Agree

	SD	D	MD	U	MA	A	SA
1. My peers often ask me for advice or information.	1	2	3	4	5	6	7
2. I enjoy trying out new ideas.	1	2	3	4	5	6	7
3. I seek out new ways to do things.	1	2	3	4	5	6	7
4. I am generally cautious about accepting new ideas.	1	2	3	4	5	6	7
5. I frequently improvise methods for solving a problem when the answer is not apparent.	1	2	3	4	5	6	7
6. I am suspicious of new inventions and new ways of thinking.	1	2	3	4	5	6	7
7. I rarely trust new ideas until I can see whether the vast majority of people around me accept them.	1	2	3	4	5	6	7
8. I feel that I am an influential member of my peer group.	1	2	3	4	5	6	7
9. I consider myself to be creative and original in my thinking and behavior.	1	2	3	4	5	6	7
10. I am aware that I am usually one of the last people in my group to accept something new.	1	2	3	4	5	6	7
11. I am an inventive kind of person.	1	2	3	4	5	6	7
12. I enjoy taking part in the leadership responsibilities of the groups I belong to.	1	2	3	4	5	6	7
13. I am reluctant about adopting new ways of doing things until I see them working for people around me.	1	2	3	4	5	6	7
14. I find it stimulating to be original in my thinking and behavior.	1	2	3	4	5	6	7
15. I tend to feel that the old way of living and doing things is the best.	1	2	3	4	5	6	7
16. I am challenged by ambiguities and unsolved problems.	1	2	3	4	5	6	7
17. I must see other people using new innovations before I will consider them.	1	2	3	4	5	6	7
18. I am receptive to new ideas.	1	2	3	4	5	6	7
19. I am challenged by unanswered questions.	1	2	3	4	5	6	7
20. I often find myself skeptical of new ideas.	1	2	3	4	5	6	7

Part IV.
Computer Opinion Survey

Please rate the following statements by circling the appropriate response:
(Note: For this section, 1=Strongly Agree.)

1 = Strongly Agree
2 = Agree
3 = Slightly Agree
4 = Slightly Disagree
5 = Disagree
6 = Strongly Disagree

	SA	A	SA	SD	D	SD
1. Having a computer available to me would improve my productivity.	1	2	3	4	5	6
2. If I had to use a computer for some project, it would probably save me some time and work.	1	2	3	4	5	6
3. If I use a computer, I get a better picture of facts and figures.	1	2	3	4	5	6
4. Having a computer available would improve my general satisfaction.	1	2	3	4	5	6
5. Having to use a computer could make my life less enjoyable.	1	2	3	4	5	6
6. Having a computer available to me could make things easier for me.	1	2	3	4	5	6
7. I feel very negative about computers in general.	1	2	3	4	5	6
8. Having a computer available to me could make work more fun for me.	1	2	3	4	5	6
9. If I had a computer at my disposal, I would try to get rid of it.	1	2	3	4	5	6
10. I look forward to a time when computers are more widely used.	1	2	3	4	5	6
11. I doubt if I would ever use computers very much.	1	2	3	4	5	6
12. I avoid using computers whenever I can.	1	2	3	4	5	6
13. I enjoy using computers.	1	2	3	4	5	6
14. I feel there are too many computers around now.	1	2	3	4	5	6
15. Computers are probably going to be an important part of my life.	1	2	3	4	5	6
16. A computer would make learning fun.	1	2	3	4	5	6
17. If I were to use a computer, I could get a lot of satisfaction from it.	1	2	3	4	5	6
18. If I had to use a computer, it would probably be more trouble than it was worth.	1	2	3	4	5	6
19. I am usually comfortable when I have to use computers.	1	2	3	4	5	6
20. I sometimes get nervous just thinking about computers.	1	2	3	4	5	6
21. I will probably never learn to use a computer.	1	2	3	4	5	6
22. Computers are too complicated to be of much use to me.	1	2	3	4	5	6
23. If I had to use a computer all the time, I would probably be very unhappy.	1	2	3	4	5	6
24. I sometimes feel intimidated when I have to use a computer.	1	2	3	4	5	6
25. I sometimes feel that computers are smarter than I am.	1	2	3	4	5	6
26. I can think of many ways that I could use a computer.	1	2	3	4	5	6

Iowa/ US West
Teacher Technology Project

Pre-Instruction Survey

(All responses will be kept confidential)

Please enter the last 6 digits of your social security number:_____

Answer the following questions by circling yes or no. If yes, please indicate the level of comfort you would feel if you were asked to perform the task independently. Use the scale below to determine your answer.

1 = very uncomfortable
2 = uncomfortable
3 = comfortable
4 = very comfortable

Are you able to:	Can you?		If yes, what is your comfort level?			
1. Remove your laptop from the box and set it up?	*No*	*Yes*	*1*	*2*	*3*	*4*
2. Name the external components of your laptop and describe their uses?	*No*	*Yes*	*1*	*2*	*3*	*4*
3. Effectively manipulate the trackball/pad?	*No*	*Yes*	*1*	*2*	*3*	*4*
4. Open and close windows?	*No*	*Yes*	*1*	*2*	*3*	*4*
5. Manipulate icons and the menu bar?	*No*	*Yes*	*1*	*2*	*3*	*4*
6. Create a new document using Microsoft works?	*No*	*Yes*	*1*	*2*	*3*	*4*
7. Edit and format a document using Microsoft Works?	*No*	*Yes*	*1*	*2*	*3*	*4*
8. Save a document using Microsoft Works?	*No*	*Yes*	*1*	*2*	*3*	*4*
9. Define: WWW, Internet Service Provider(ISP) web browser, hypertext, URL, web site?	*No*	*Yes*	*1*	*2*	*3*	*4*
10. Use Netscape Navigator to locate information on the? Internet?	*No*	*Yes*	*1*	*2*	*3*	*4*
11. Conduct an effective Internet search using two search engines?	*No*	*Yes*	*1*	*2*	*3*	*4*
12. Evaluate Internet sites using appropriate criteria?	*No*	*Yes*	*1*	*2*	*3*	*4*
13. Explain copyright guidelines related to the WWW?	*No*	*Yes*	*1*	*2*	*3*	*4*

more questions on back

	Can you?		If yes, what is your comfort level?			
14. Send and receive e-mail messages?	*No*	*Yes*	*1*	*2*	*3*	*4*
15. Integrate Internet resources into classroom activities?	*No*	*Yes*	*1*	*2*	*3*	*4*
16. Explain challenges facing teachers as they integrate Internet -based activities?	*No*	*Yes*	*1*	*2*	*3*	*4*
17. Explain teacher requirements for participation in the project?	*No*	*Yes*	*1*	*2*	*3*	*4*
18. Locate resources to support your training session?	*No*	*Yes*	*1*	*2*	*3*	*4*

Considering your answers above, what comfort level would you need to feel before you:

	What comfort level would you need?			
19. Use Internet lessons with students in your class(es)?	*1*	*2*	*3*	*4*
20. Teach other educators how to use the Internet for instruction?	*1*	*2*	*3*	*4*

21. Prior to this workshop, how have you gotten information about how to use computers and the internet?

Thank you for providing this information. If you would like a summary of the research findings from this survey, call Caryl Bender 515-296-8615.

Iowa/ US West
Teacher Technology Project

Post-Instruction Survey

(All responses will be kept confidential)

Please enter the last 6 digits of your social security number:_____

Answer the following questions by circling yes or no. If yes, please indicate the level of comfort you would feel if you were asked to perform the task independently. Use the scale below to determine your answer.

1 = very uncomfortable
2 = uncomfortable
3 = comfortable
4 = very comfortable

Are you able to:	Can you?		If yes, what is your comfort level?			
1. Remove your laptop from the box and set it up?	*No*	*Yes*	*1*	*2*	*3*	*4*
2. Name the external components of your laptop and describe their uses?	*No*	*Yes*	*1*	*2*	*3*	*4*
3. Effectively manipulate the trackball/pad?	*No*	*Yes*	*1*	*2*	*3*	*4*
4. Open and close windows?	*No*	*Yes*	*1*	*2*	*3*	*4*
5. Manipulate icons and the menu bar?	*No*	*Yes*	*1*	*2*	*3*	*4*
6. Create a new document using Microsoft works?	*No*	*Yes*	*1*	*2*	*3*	*4*
7. Edit and format a document using Microsoft Works?	*No*	*Yes*	*1*	*2*	*3*	*4*
8. Save a document using Microsoft Works?	*No*	*Yes*	*1*	*2*	*3*	*4*
9. Define: WWW, Internet Service Provider(ISP) web browser, hypertext, URL, web site?	*No*	*Yes*	*1*	*2*	*3*	*4*
10. Use Netscape Navigator to locate information on the? Internet?	*No*	*Yes*	*1*	*2*	*3*	*4*
11. Conduct an effective Internet search using two search engines?	*No*	*Yes*	*1*	*2*	*3*	*4*
12. Evaluate Internet sites using appropriate criteria?	*No*	*Yes*	*1*	*2*	*3*	*4*
13. Explain copyright guidelines related to the WWW?	*No*	*Yes*	*1*	*2*	*3*	*4*

more questions on back

Are you able to:	Can You?		If yes, what is your comfort level?			
14. Send and receive e-mail messages?	*No*	*Yes*	*1*	*2*	*3*	*4*
15. Integrate Internet resources into classroom activities?	*No*	*Yes*	*1*	*2*	*3*	*4*
16. Explain challenges facing teachers as they integrate Internet -based activities?	*No*	*Yes*	*1*	*2*	*3*	*4*
17. Explain teacher requirements for participation in the project?	*No*	*Yes*	*1*	*2*	*3*	*4*
18. Locate resources to support your training session?	*No*	*Yes*	*1*	*2*	*3*	*4*

Considering your answers above, what comfort level would you need to feel before you:

	What comfort level would you need?			
19. Use Internet lessons with students in your class(es)?	*1*	*2*	*3*	*4*
20. Teach other educators how to use the Internet for instruction?	*1*	*2*	*3*	*4*

21. Following this workshop, how will you get more information about how to use computers and the internet?

Thank you for providing this information. If you would like a summary of the research findings from this survey, call Caryl Bender 515-296-8615.

APPENDIX C: WORKSHOP SCHEDULE

Iowa-U S WEST Teacher Technology Workshop

WORKSHOP SCHEDULE

Day 1

8:00 - 9:00 a.m. I. Project and Workshop Introduction.

A. Introduction of Workshop Presenters.

B. Overview of the Iowa-U S WEST Teacher Technology Project.

C. Introduction of Participants.
Take Attendance.

D. Introduction to the Workshop Notebook.
1. Workshop Announcement.
2. Teaching Novices.
3. Design and Implementation Team.
4. Project Trainers.
5. Overview of the Workshop Schedule.
6. Graduate Credit Options.
7. Travel Expense Form.
8. Overview of The Entire Notebook.

E. Pre-Instruction Survey.

9:00 - 9:10 a.m. BREAK

9:10 - 10:30 a.m. II. Laptop Hardware and Software For The Project.

A. Distribution of Laptops, Modems and Software.

B. Laptop Orientation.
1. Interior & Exterior Components.
2. Connecting the Power Supply.
3. Using a PC Modem Card.
4. Care of the laptop.

10:30 - 10:40 a.m. BREAK

10:40 - 12:00 noon C. Tutorial - Part I.

12:00 - 1:00 p.m. LUNCH BREAK
Getting Acquainted Activity.

1:00 - 2:10 p.m.	C.	Tutorial - Part II.
	D.	Software Orientation.
	E.	Internet Service Providers (optional)
2:10 - 2:20 p.m.	BREAK	
2:20 - 3:10 p.m.	F.	Introduction to Microsoft Works word processing. 1. The Basics of Word Processing.
3:10 - 3:20 p.m.	BREAK	
3:20 - 4:15 p.m.		2. Activity: Word Processing Activity.
4:15 - 4:30 p.m.	WRAP-UP	

Day 2

8:00 - 8:15 a.m.	QUESTION & ANSWER/ REVIEW Take Attendance.	
8:15 - 9:10 a.m.	III.	Introduction to the Internet.
	A.	Defining the Internet and the World Wide Web.
	B.	Fundamentals of Browsers.
9:10 - 9:20 a.m.	BREAK	
9:20 - 10:20 a.m.	C.	Navigating the Internet. Handout: Outstanding Sites.
	D.	Searching the Internet. 1. Using Search Engines. 2. Evaluating Search Engines. 3. Developing a Search Strategy.
10:20 - 10:30 a.m.	BREAK	
10:30 - 12:00 noon		Activity: Searching The Web.
12:00 - 1:00 p.m.	LUNCH BREAK Sharing Activity.	
1:00 - 2:10 p.m.	E.	Evaluating WWW sites. Activity: Evaluation of a Web Site.

2:10 - 2:20 p.m. BREAK

2:20 - 3:10 p.m.
F. Advanced Features.
- Using Bookmarks.

G. Downloading From the Internet.

3:10 - 3:20 p.m. BREAK

3:20 - 4:15 p.m.
H. Related Issues:
1. Activity: Integrating the Web Into The Classroom.
2. Copyright Issues.
Handouts: Copyright.
Internet Use Guidelines.
Fair Use Guidelines.
Rights To Privacy Form. (Sign the form.)

4:15 - 4:30 p.m. WRAP-UP

Day 3

8:00 - 8:15 a.m. QUESTION & ANSWER/ REVIEW
Take Attendance.

8:15 - 9:20 a.m. IV. Electronic Mail (e-mail).

A. Introduction to e-mail.

B. Fundamentals of e-mail.

9:20 - 9:30 a.m. BREAK

9:30 - 10:40 a.m. C. Activity: Integrating E-Mail Into the Classroom.

10:40 - 10:50 a.m. BREAK

10:50 - 12:00 noon V. Putting It All Together.

A. Activity: How To Get Administrators Involved.

B. Activity: Challenges of Integrating Technology.

C. Developing Your Program for Training Ten Additional Teachers.
1. Requirements Presentation & Discussion.

12:00 - 1:00 p.m. LUNCH BREAK
Sharing Activity.

1:00 - 2:10 p.m.

2. Activity: Requirements - Brainstorming Ideas for Your Training Program.
3. Handout: Documentation for Training 10 Additional Teachers.
4. Handout: List of Others in Your AEA Who May Be Trained.

D. Teaching Strategies.
Activity: Qualities of an Effective Technology Coach.

2:10 - 2:20 p.m. BREAK

2:20 - 3:20 p.m.

E. Support.
1. Project Resources.
   a. LISTSERV.
   b. WWW Site for the Project.
   c. NetForum.
   d. AEA Support Personnel.

2. Additional Resources.
   a. Vendor Information for Laptop Equipment.
   b. Activity: What Followup Training and Activities Are Needed?

3:20 - 3:30 p.m. BREAK

3:30 - 4:15 p.m.

F. Technology Integration (optional).

VI. Evaluations.
A. Post-Instruction Survey.
B. Post-Workshop Evaluation.

4:15 - 4:30 p.m. WRAP-UP
PC Pick-up Form.

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