Computer Anxiety Levels of Virginia Cooperative Extension Field Personnel

by

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(ABSTRACT)

Extension professionals must have easy access to and knowledge of emerging technologies to deliver programs more efficiently and effectively. With the increasing use of computer technology comes an increasing number of individuals who have computer anxiety. This study examined selected variables as predictors of computer anxiety. Data were collected from 402 Virginia Cooperative Extension field personnel. The personnel included Agricultural and Natural Resources agents, Family and Consumer Sciences agents, 4-H agents, technicians, and secretaries. A modified version of Oetting's 1983 Computer Anxiety Scale (COMPAS) was used to determine the computer anxiety levels. For this instrument, an internal consistency reliability of Cronbach's alpha r = .95 resulted from this study. The survey results were analyzed using the Statistical Package for the Social Sciences (SPSS). The overall mean score for the respondents to this study was 101.68, on a 200 point scale, which was interpreted using the COMPAS manual to

indicate that only 20% of the Virginia Cooperative Extension personnel were “anxious” or “very anxious.” Regression analysis indicated that time per day using a computer, years with Extension, and age were the significant variables related to anxiety. Increased computer use reduced but did not entirely eliminate computer anxiety.

A profile of a respondent who was relaxed about computer use included being age 20 to 29, a secretary, and using a computer more than two hours per day. A person anxious about computer use was middle aged (40 and over), a technician, and used the computer less than two hours per day. The results indicated that the more a respondent used the computer per day the less anxious they were. A large number of personnel used the computer to compile and produce educational material and to communicate with colleagues.

The Virginia Cooperative Extension administration should direct their attention regarding computer training to respondents who are 40 years of age and older and are technicians. To reduce computer anxiety, personnel should be provided with in-service training emphasizing computer applications.

Additional research could identify why technicians have higher levels of computer anxiety. Further study could identify other variables that may be related to computer anxiety.

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Chapter 1

INTRODUCTION

Since its beginning with Federal support in 1914, the Cooperative Extension System's (CES) mission has been to "help people improve their lives through an educational process that uses scientific knowledge to address issues and needs" (USDA, 1993, p. 3). The Cooperative Extension System is a constantly changing organization. It provides assistance to meet the nation's research, knowledge and educational programs, and material needs to enable its clientele to make practical decisions for the improvement of their lives (USDA, 1993).

Changing with the nation's needs is seen in Virginia Cooperative Extension (VCE). Virginia Cooperative Extension established the farm demonstration method in order for farmers to see new and improved techniques to produce commodities. A need existed for farmers to receive additional instruction in farm topics. In 1915, with the help of the Norfolk and Western Railroad Company, Virginia Cooperative Extension assembled a "demonstration train," in Roanoke, Virginia, known as the "Better Farming Special." The train traveled through Virginia with Extension agents giving on board demonstrations to people in rural areas.

Train cars contained livestock care instruction, farm products, machinery, and specimens of farm crops grown in Virginia. The train included a home economics car to instruct and display demonstrations, including preservation of vegetables and fruits. Other train cars were for lecturing on new scientific techniques to produce better crops and other related farm topics. At each stop 1500 to 2000 people visited the train. "Schools closed,

if they were nearby, so teachers could take their pupils to see the train" (College of the fields, 1987, p. 14). Farmers would come from as far as 20 miles to view the train.

The Extension has always focused a major effort of educating its clientele on agricultural topics. The future Extension will have to focus on a more diverse population. Extension will continue to focus on the discipline approach, but more interdisciplinary teams will address issues. The discipline approach focuses on transference of existing information to traditional clientele consisting of 4-H youth, farmers, and homemakers. Discipline programming is limited to issues addressed by these groups. Extension agents tailored their information and delivery methods to the traditional groups. Extension agents, using issue-based programming, focus on broader national and global issues outside the realm of the traditionalist and address what the non-traditional, diverse clientele faces today (Blackburn, 1984).

Communications

In the past, Extension agents provided information to clientele by hard copy material or demonstrations. The future agent will add electronically transferred information by use of computers or other types of distance transfer as an educational methodology. Combinations of hard copy, electronic information, and demonstrations can be adapted depending on the clients.

The first form of information transfer was the carrier pigeon. About 1862 the telegraph replaced the carrier pigeon system. In 1876, Alexander Graham Bell invented the telephone. In Europe, in 1910, the development of transmission printed pages became known as the facsimile (fax).

In the early 1990s the conversion of the telephone, telegraph, facsimile, and computer led to a new form of local and global communication known as Computer Mediated Communication (CMC) (Waldron & Moore, 1994). CMC is defined as "any communication that is directly assisted by a computer terminal under the control of the user" (Woodbridge, 1991, p. 2).

CMC includes computer connected electronic mail (e-mail), computer conferencing, and multi-media connected to a telecommunication network to transmit data, graphics, pictures, and sound (Waldron & Moore, 1994). There are other ways a computer can facilitate communications: computer-based learning (CBL), computer conferencing (CC), and electronic bulletin boards (EBS).

Communication and information technologies are vital components of Extension's current and future infrastructure. Agents and staff will have to transmit information between offices and clientele at a distance. A major use of technology for agents will be the data base access ability to information from around the world assisting them in researching sources related to local problems. This added information resource will likely become a greater informational source than just transmitting data to client groups. Transmitted information includes textual, graphical, educational, demographic, scientific, or other types of data transmitted by means of telephone lines. A concern arises with Virginia Cooperative Extension regarding whether unit offices have adequate telephone lines available to transmit needed information, and if enough computers are available to receive the information. A greater concern is the needs of personnel on their knowledge of information formats that includes electronic mail, electronic bulletin boards, computer conferencing, and on-line data base and information banks (Defining software. . . 1994, p.

16). Electronic mail (e-mail) is an exchange of textual, numeric data, and graphics. It is a computer shared network providing rapid, inexpensive communications with individuals and groups to exchange ideas and information (Upgrove, 1991). Extension can use the e-mail as a baseline tool for communication with state, local, federal branches of the United States Department of Agriculture, land-grant universities, and colleges world wide. This access can provide clientele with new and updated information. In Virginia the land-grant universities and the state Extension are linked through the Internet and e-mail systems. These linkages provide Extension professionals the ability to communicate electronically across the nation to deliver research-based programs and information to communities nationwide (USDA, 1993).

Extension personnel can use information technology to administer computer surveys and gather data currently collected by mail. A study by Sproull (1986) found e-mail surveys produced a higher return rate at a lower cost than the conventional mailed surveys. The response time was half the time of mailed questionnaires. Sproull suggested sending a signed endorsement letter along with the e-mailed survey to ensure legitimacy. Follow-ups can be done through the e-mail system. The Kawasaki and Raven (1995) study determined that 60% of Montana Extension agents returned surveys by e-mail compared to 40% by regular mail. This study concurred with Sproull's conclusion that e-mail was more cost effective and a faster method of collecting data. Some drawbacks that Sproull encountered included: (a) limited computer equipment in some Extension offices, (b) not all offices were on the same networks, and (c) some respondents did not have access to e-mail systems.

The traditional Extension programs suit the small and medium-sized farms operated by individuals with little or no technical education. The structure of agriculture is changing to a bimodal distribution of farm sizes. These new farm sizes increase the use of agribusiness techniques and globalization. Extension will have to meet the challenges of not only its traditional clientele, but also the commercial operators who produce the majority of the United States food and fiber (Meier, 1989). This approach lends itself to an increased use of computers and web sites for information. This need is due to the expanding clientele base that will find extended learning programs at the land-grant institutions more prevalent in the future. In the 1990s, the emphasis on providing information to clientele will shift to discovery learning/problem solving/thinking/ application skills (Meier, 1989). The Extension will lose the support of the public if it does not take an active role in using new technology in educational programs.

The Cooperative Extension has been experiencing progressive and swift changes the last few years (Strategic Planning Council, 1991). These include social, economic, and demographic changes that have an impact on the clientele served by the Cooperative Extension. One of the main challenges of all branches of the Cooperative Extension has been to apply new knowledge and information for the benefit of its clientele. The 1991 report*, Future Application of Communication Technology* by ECOP and ES-USDA, stated, "Advances in communication technologies are an asset to the Cooperative Extension System only when the System's workforce is proficient in their use. Many Extension professionals do not possess the necessary knowledge and skills to work effectively and efficiently in a networked environment" (p. 6). The report further stated that computers will become an important tool to help assimilate knowledge. These changing needs are

challenging the national Cooperative Extension System and Virginia Cooperative Extension. Personnel in the Cooperative Extension System and Virginia Cooperative Extension have to become more knowledgeable within their organizations. This can be accomplished by Extension personnel receiving improved technology skills applied to changes to meet the needs of their clientele. To accomplish its future mission Virginia Cooperative Extension will have to address some important issues. One issue is the retraining of present staff and agents to become more computer literate. Training is essential not only in computer usage but also in accessing electronic bulletin boards, data bases, and mail systems to help unit offices keep in touch with the latest information.

How and when information is gathered and used by staff is a critical point in meeting the needs of Extension clientele and agents (Radhakishna & Thomson, 1996). The traditional delivery methods of Extension are: printed material, press releases, radio, and county meetings. However, new communication technologies offer ways to strengthen the traditional delivery methods by broadening the audience base, having more educators involved, and improving the timeliness of information. A study conducted by Agnew (1991) found state Extension directors perceived program delivery would change by 1996. Changes taking place are an increased use of electronic communications and instructional devices. The increased electronic changes include the use of telecommunication as a mode of delivery, the access to electronic data sources, the interactive instructional video, and the use of computers.

The Cooperative Extension has been strong and viable for over 75 years. "It has practiced a grassroots approach to programming based on the client's needs. People have known, trusted, and relied upon Extension professionals" (Harriman, 1992, p. 26). One of

Extension's roles is to facilitate information transfer to its clientele. State and field staff must be able to use and adapt communication technology to access and disseminate current and new information. To be more available to the clientele, personnel training is needed to utilize distance learning via audio, video, and computer means. To maintain the strong grassroots base of support that Cooperative Extension has, it is critical for the staff and field agents to communicate updated information to meet the public's needs (Harriman, 1992).

Modern Technology

Impacts on how the Extension will enter the next century include the shifting population, workforce changes, rural to urban movement, family farms being converted to commercial farms, younger farmers leaving the family farm, and diverse populations. Extension personnel will have to maintain their present skills and learn new ones to keep the extension service strong as an organization. Skills to conduct research on the needs of shifting populations has to be developed and strengthened (Harriman, 1992).

New technology will assist in providing clientele with new educational programs. Modern technologies such as computers, satellites, videos, and cable television will bring new information to growing urban, metropolitan, and rural areas. Agents will be able to electronically produce information that can be available virtually to everyone. Every county office should have a modem to link to electronic bulletin boards and e-mail systems. There is tremendous potential for the Extension to use computer communication networks to find sources of practical information. It is important that all agents, staff, and secretaries become computer literate. The staff development office can not adequately handle the

training of Extension personnel. A separate computer support office should be provided to develop original programs and networks around the world (Astroth, 1990).

The United States Department of Agriculture in 1972 stated:

> It is the policy of the Extension Service to provide for training of employees as an integral part of its responsibility for the conduct of its affairs. In order to fulfill their functions adequately, ES personnel need to prepare for the immediate job ahead, for changes in problems and situations as these affect the work to be done, for changes in ES program emphasis, for inclusion of new techniques and research findings regarding educational process and extension education methodology, and for continuing self-development (p. 2).

Computer technology allows Extension agents the ability to process individualized information and lets the user respond immediately. The ability to update information quickly for the dissemination through the computer will strengthen the Extension delivery systems. Every agent should have the latest information from subject-matter specialists (Douche, 1979).

Staff development programs are a major component in the continual success of any Extension. Due to the reduction of staff in the 1980s and early 1990s, Extension personnel will have to utilize information technology even more to overcome the difficulties that come with less staff.

New Extension employees should possess a scientific base of knowledge and be technically competent (Bowers, 1986). Current employees will need to receive training or retraining to improve their skills, competencies, and knowledge in the use of new technologies, such as computers, to become proficient in these areas. The application of informational technology will increase individual productivity, improve system-wide communications, increase organizational efficiency, and support program management and delivery. Education on mastering the computer for daily use will assist and support

Virginia Cooperative Extension staff. The adoption of information technologies and encouragement to personnel to use information technologies will help to carry out the mission of the Virginia Cooperative Extension (DeVries, 1993).

Calhoun's 1981 study found the introduction of computers into the work place caused considerable employee job dissatisfaction and failed to produce the expected production increases (as cited in Marcoulides, Mayes & Wiseman, 1995). Marcoulides' 1988 study showed computer anxiety was a significant variable for predicting computer achievement. While experience was also important in predicting achievement, computer anxiety was a more critical factor.

As employees face new technologies and training, the question arises of whether computers will produce anxiety, fear, resistance, and possible hostility in employees. With training, concerns arise regarding employees' attitudes toward computers and their uses.

Learning to use computer-based technology (CBT) is a way of changing people's behavior. CBT is a way of getting employees to abandon the "old way" of doing things and making "new ways" part of their everyday routine (Henry, 1994). Computer-anxious people are people who fear using computers or become afraid at the prospect of using them (Johassen, 1985).

There are factors that may generate and create problems when using or learning to use new technologies. Such anxiety is referred to as computer anxiety. Computer anxiety is also known as "technostress" and "cyberphobia." In this study cyberphobia will be referred to as computer anxiety.

It is important for a successful organization to communicate well, both internally and publicly. Extension's flow of information is particularly important due to its

decentralized organization. Knowing the Extension organizational needs is beneficial in increasing the effectiveness of the organization. Effective communication builds morale, reduces misunderstandings and conflicts, and helps extension personnel respond quickly to clientele's needs (Weigel, 1994). If Cooperative Extension, as the public knows it, is to survive and flourish into the 21st century it must view itself as a universal information processing system. The Cooperative Extension must make a commitment to system-wide improvements in infrastructure, staffing, training, audience targeting, and support (FACT, 1991). The improvements need to include the training and retraining of personnel in the uses of new and existing electronic technologies.

During the past 10 years, the southern region of the United States has seen a dramatic increase in use of computers in county extension offices. The issue is how Extension personnel will interact with technology to interpret trends, deliver programs, information, and teach problem solving (Ezell, 1989). Increasing computer use raises the question of whether Extension agents are anxious about the use of computers. If so, they may not accept and use computers effectively in their work. This could pose a problem for administrators of overcoming employee resistance to computer use (Smith & Kotrlik, 1990b).

Possible Solutions to Computer Anxiety

When computer anxiety is identified in an individual the training staff will have to determine some type of program to correct the anxiety. A step-by-step instruction can be used to show the individual how simple using the computer really can be by working with a person on an individual basis. The trainer can explain to the individual it is all right to fail at a task. The trainer then can assist the person by "walking" him or her through a problem

situation. A person should become involved in deciding how to solve a problem by contributing information on how to solve the situation. This gives the individual a feeling of participation (Henry, 1994).

There are psychological techniques called desensitization of a computer anxiety situation. Training can be started with a non-threatening simple situation and once that level is accomplished the person becomes desensitized to that level. The training can then be moved to a more complex situation. This allows individuals to build computer skills and reduce their fear level. Individuals should be allowed to express and encouraged to face their fears of computers. Once people understand their fears they can be provided with relaxation techniques, counseling, good manuals, computer consultants, and behavior modification (Applelbaum, 1990).

Gardner, Render, and Ross (1984) suggested four actions for minimizing computer anxiety: training and education, user support, design of the system, and psychological support. Training should be conducted by knowledgeable computer trainers or consultants and not a computer person within a company. Educational manuals and instructions should be written in layman's language for all to understand. The trainee should understand the basic computer functions. The trainer can provide support to a person by understanding computer anxiety, its causes and ways to reduce it. The trainer can explain techniques to a person exhibiting computer anxiety to elevate the situation. Support can be given by providing additional time using the computer during or after training periods.

Another technique is the Computerphobia Reduction Program. It was recommended that the program include two weekly individualized skills-acquisition treatments and a once-a-week group program meeting that last five weeks. The goal of the

program is to allow the person to participate in a weekly individualized program while attending regular classes. This aids the person to maintain and improve performance before the onset of failure. This program showed a strong success. Over a two year study period 161 persons chose to take the program. Of the 161 people there was a completion rate of 93% or 150 people who successfully completed the course (Rosen, Sears, & Weil, 1993).

Statement of the Problem

Change has always been an integral part of being an Extension agent. With today's changes occurring faster than ever before, there is a need to keep up with information and delivery of this information to the clientele. Extension professionals must have easy access to and knowledge of the use of new emerging technologies to deliver programs more efficiently and effectively. Computer skills and access to a computer are paramount (Buchanan, 1993). There is no question about the availability of technology. The most fundamental question is how to best help Extension personnel use it.

Purpose

The purpose of this study was to determine the level of technology anxiety experienced by agents and staff in Virginia Cooperative Extension. This purpose included determining if Extension personnel being trained and retrained in computer technology showed computer anxiety.

In addition, an assessment of the current training of personnel and the effect of computer anxiety on their ability to utilize the computer and software programs were made. Training assessment will assist training personnel in identifying ways to overcome

computer anxiety. The training of personnel was assessed to determine if after computer technology training personnel continue to use the educational information acquired to benefit their clientele.

This information will provide Extension development personnel with guidance and direction in implementing more effective training techniques to avoid computer anxiety in Extension personnel. The assessment of the Virginia Cooperative Extension current computer system will provide information on additional requirements needed to be more efficient.

Objectives of the Study

The objectives of this study were to:

1. Determine computer anxiety levels of Virginia Cooperative Extension field personnel consisting of agents, technicians, and secretaries;
2. Determine variance in the Extension field personnel's computer anxiety levels that could be explained by selected variables (age, gender, personnel type, time using a computer, and education); and
3. Identify ways in which Extension personnel use computer applications.

Significance of the Study

The information obtained by this study will be useful in designing and delivering in-service and pre-service Extension professional training activities. These activities will enhance job performance, increase the capacity for teamwork, strengthen the learning

process, and increase both agents and staff members' ability for working with and meeting the needs of diverse clientele.

With the increased use of computers by Extension personnel, it is possible that some will experience computer anxiety. Anxiety could cause personnel to curtail their educational program learning regarding how to use computers and new computer programs in an effective manner. This anxiety could restrict personnel in carrying out their assignments and providing needed information to their clientele.

One study was found that had investigated computer anxiety among Extension personnel and educators. The study was conducted by Smith and Kotrlik (1990) and dealt with computer anxiety among Extension agents A study of Virginia Extension personnel computer anxiety level is needed to provide knowledge about factors that may impede the agents' technological learning ability. Furthermore, information obtained from this study will determine if personnel are experiencing computer anxiety so that appropriate educational training interventions could be put in place. The study will assist the directors and administrators of Virginia Cooperative Extension to improve or change the training in computer skills. Recommendations will be made for the training staff as to possible techniques that may be used to eliminate some of the computer anxiety of individuals.

Limitations

This study was limited to Virginia Cooperative Extension agents, support staff, and technicians.

Assumptions

It was assumed that the responses given on the questionnaire reflected the true and honest perceptions of Virginia Cooperative Extension personnel.

Definitions of Terms

Anxiety. State of concern about an imminent danger. A thing that causes a state of excessive uneasiness (The Concise Oxford Dictionary of Current English, 1995).

COMPAS. Computer Anxiety Scale used to measure computer anxiety in a person (Oetting, 1983).

Computer Anxiety. Uneasiness that is conscious to a person while working with a computer.

Cyberphobia. Intense anxiety about computers that can produce physical symptoms ranging from sweaty palms to dizziness (Appelbaum & Primmer, 1990).

Electronic Bulletin Board. Computer-based system allowing a user to connect by telephone modem to a personal computer in order to receive and send messages (Frisbie & Repman, 1991).

Internet. The global connection of interconnected local, mid-level, and wide-area networks (FACT, 1991).

Technostress. "A computer-generated form of physical and emotional burnout" due to an inability to adapt to new technology, which threatens the performance and productivity of some of the workforce (Elder, Gardner, & Ruth, 1987, p. 17).

Summary

Chapter 1 contains the introduction, statement of problem, objectives of the study, significance of the study, limitations, assumptions, definitions of terms, and summary. To better serve its clientele, the Extension needs to effectively use computers. However, training in the use of computers and computer programs and the need to use new technology may cause agents and staff to experience some computer anxiety that could prevent them from learning. This study investigates the level of computer stress of staff and agents of Virginia Cooperative Extension. It will evaluate the current training programs to attempt to alleviate any computer anxiety to the trainees. An assessment will be done to evaluate the current computer training used and make suggestions for improvements.

Chapter 2, the literature review, contains information on previous research pertinent to this study. Chapter 3 contains the methodology, Chapter 4 contains the findings, and Chapter 5 has the summary, conclusions and recommendations of the study.

Chapter 2

LITERATURE REVIEW

Overview

After a thorough search of available literature, a great deal of information was found on computer anxiety; that information is shared here. The review of literature is organized into six separate sections: anxiety, self-efficacy**,** variables, computer training, keyboarding skills, instrument, and the chapter summary.

It is the responsibility of Extension staff development personnel to develop and maintain staff information technology and computer skills. Failure to acquire or maintain a technological level of computer competencies could result in a decline of job performance. Goode and Elliott (1992) conducted a study with Mississippi Cooperative Extension. The study consisted of 476 Extension personnel involved in computer technology training. The study revealed that 43% of the respondents thought that Extension administration should be responsible for keeping personnel current with computer technology. Respondents believed that providing training opportunities and time off the job to attend classes were the administration's responsibility. The study found agents used the computer an average of six hours per day. This time included one hour per day for software experimentation and one hour a week for reading computer related materials. The Mississippi study was general in content and could be applied to other state Extension services.

The Pennsylvania State University conducted a study to determine computer informational use by Extension agents in eight states. There were three objectives for the study: (a) Determine the agents search and use of information, (b) Identify information

sources used frequently, and (c) Determine differences of frequency of use and demographic information. A sample of 305 agents was drawn from a pool of 1,515 Extension agents in eight states. Findings revealed that the average agent was 43 years of age and their tenure averaged 13 years of service. Seventy-four percent of the personnel held a master's degree and were involved with agriculture. Seventy-three percent of the personnel indicated they needed information the same day to answer clients' inquiries. Some results were: 94% used information for training programs, 63% for reports, and 56% collected research information. The most frequently searched subject was county information. The results of this study informed staff development personnel as to the services used most often, type of agents using the majority of the information available, and type of information most often requested. This information enabled staff developers to make better decisions for developing publications and identifying the best way to deliver information (Radhakrishna & Thomson, 1996).

Anxiety

Emotional responses are generally learned from direct experiences. A person's fears come from indirect contact with a threatening object. Just hearing someone say they have problems working on a computer may trigger a fearful response in another person, causing them to have computer problems.

There are many definitions and interpretations of anxiety. A study by Caplan and Jones (1975), as cited in Howard (1986), stated that, "the anxious person sees the danger as a threat either in the near future or in the more distant future" (p. 17). Lagina (as cited in Howard, 1986) said anxiety is "a state of heightened tension or a feeling of apprehensive

expectation" (p. 18). Anxiety is an emotion and cognitive experience characterized by fear, uneasiness, concern, and worry. An association with an emotional or affective response to a situation can inhibit learning and cognitive development. A person with a high degree of computer anxiety usually exhibits a lower expectation of performance and takes longer to complete computer tasks. These types of people are less mechanically inclined and possess higher math anxieties (Glass & Knight, 1988).

Eysenck and Calvo (1992) said anxiety consisted of two parts, worry and cognitive arousal. Anxiety produces a tendency to cause worry, which decreases the ability of the mind to concentrate on a task. The Cognitive Arousal Affect influences a person's alertness and ability to do a task. Combining these effects yields processing efficiency. Processing efficiency is the mental performance of a person, on which anxiety has a main effect.

A lack of knowledge about computers can create a psychological fear. A few fears people can face in dealing with computers are: (a) losing control, (b) losing one's job to a younger person if not successful in learning the computer skills, (c) breaking the computer or losing important information, and (d) embarrassment of not being able to learn the computer jargon (Gardner, Render, Ruth, Ross, 1985). Weinberg's study (1984) of 439 people found a correlation between gender, prior computer training, math anxiety, and computer anxiety. The study found that older people who had math anxiety and little or no knowledge of computers were the most likely to harbor computer anxiety (Howard, 1986). Computer anxiety can be reduced by agents knowing computer and keyboard skills, using computers regularly, and having good mathematical ability (Smith & Kotrlik, 1990a).

Types Of Anxiety

There are three types of anxieties: trait, state, and concept-specific. Trait anxiety is defined as a general pervasive anxiety that is experienced by a person over the entire range of life experience. People who exhibit trait anxiety are chronically anxious and constantly under tension regardless of the their situation. This anxiety is frequently used as a construct for personality, learning theory, and psychopathology. Trait anxiety defines a personality characteristic and may be inherited. A measure of this anxiety would ask, "How do you feel generally or most of the time?" (Oetting, 1983, p. 2). Trait anxiety has been studied because of the possible correlation between it and computer anxiety. Studies found a significant correlation between math anxiety and trait anxiety; therefore, a possible correlation between computer anxiety. It is thought a high trait-anxious person will exhibit computer anxiety more than a low trait-anxious person (Howard, 1986). In Raub's 1981 study a significant correlation of $r = .32$ ($p < .001$) in males was found between trait anxiety and computer anxiety.

State anxiety is when a person experiences anxiety that fluctuates over time, and arises to a responsive situation. State anxiety is related to a person's learning background. A person may have experienced some anxiety in a situation and that anxiety is transferred to a similar situation.

Concept-specific anxiety is a transitory-neurotic type of anxiety. Concept-specific anxiety is the range between the trait and state anxieties. It is an anxiety that is associated with a specific situation. Therefore, computer anxiety is a concept-specific anxiety because it is a feeling that is associated with a person's interaction with computers (Oetting, 1983). Howard (1986) defined computer anxiety as "the tendency of a particular

person to experience a level of uneasiness over his or her impending use of a computer" (p. 18). An example of this anxiety would be anxiety of flying. A typical question associated with concept-specific anxiety is, "How do you feel when a specific type of situation occurs?" (Oetting, 1983, p. 2).

Computer Anxiety

A distinction among stress, tension, anxiety, fear, and phobias must be made due to the interchangeable uses without regard to the distinction of meanings. Stress occurs when a situation stimulus arouses an uneasiness in a person. Tension is a subconscious stress and it is referred to as a vague feeling of restlessness. When the uneasiness is conscious to a person it is referred to as "anxiety." Fear is the result of uneasiness to a specific, known, and immediate threat. A phobia comes from fear when a specific object or event is exaggerated to the probability of doing harm to a person (May 1977).

When a person is in a stressful situation, as in the use of a computer, stress can cause computer tension (subliminal), computer anxiety (conscious), computer fear (specifically connected to the use of a computer), or computer phobia (severe physical anxiety) (Howard, 1986). This study used the term computer anxiety.

A study conducted by Weinberg and Fuerst (1984) had a population of 400 students and 180 business people. The study found that 30% of the population had some computer fear. About 5% had serious physical reactions such as nausea, fainting, and stomach upset. About 25% felt mild anxiety, 5% were computerphobic, and 25% had mild computer anxiety.

Rosen and Maguire (1990) studied over 81 research reports to determine some causes of computerphobias. They found that between 25% and 50% of the studied

subjects had indications of computerphobia. The subjects were not "phobic" in the psychological sense, but they altered their work routine to avoid computer use. The study also revealed computerphobia people are generally not anxious in their personality type. It did find that people had limited mechanical interest and were less sociable. This finding concluded that no personality profile can determine as to who is or who is not going to be computer anxious.

There are limited studies on computer anxiety and Extension agents. A study by Smith and Kotrlik (1990b) conducted a study in 11 southern states with a population of 544 Extension agents. A return rate of 98%, representing 532 Extension agents, responded to the survey. The study was designed to determine the level of computer anxiety experienced by Extension agents, level of their computer use, and computer skills. The COMPAS questionnaire was used to collect data. The findings revealed more than 55% of the agents experienced some level of computer anxiety. Over 33% stated they used a computer, no agent expressed they were knowledgeable in the use of a computer, and only 8% had a computer in their office. An interesting finding was if an agent had use of a computer only 41% would use it. Agents who had a computer in their office would, on an average, use it only six and one half hours per week. If an agent did not have an office computer than a mutual computer was used less than two hours a week. Sixty-six percent of the agents had some type of computer training. Ninety percent of the agents received computer in-service workshop training. Half of the agents had received only eight hours of training. The study concluded that Extension agents did exhibit some computer anxiety. The study further indicated that the agents had lower anxiety levels if they knew keyboarding, possessed good math ability, and increased their interaction with the

computer. It was suggested that once an agent completed training they should be given a tangible reward, such as a pay bonus.

A study was conducted at George Mason University with a population of 462 professionals. The results showed 86% showed no computer anxiety, 11% were computer anxious, and 3% were computerphobic. This study found that persons over the age of 50 and females tended to be more anxious using computers (Gardner, Render, Ruth, & Ross, 1985).

The study reported by Elder, Gardner, and Ruth (1987) is of interest and of importance due to the mix of population and some of their findings. Their study had a population mix similar to what this study will contain, secretaries and professionals. The survey also contained items related to the instrument used for this study. The Elder, Gardner, and Ruth study used a population of 405, 53% female and 47% male. Twenty-two percent of the respondent were secretaries and clerks and the remainder were professionals. The ages of the respondents were: 15% under the age of 30, 40% in the 30-39 group, 27% in the 40-50 group, and 18% were over 50 years of age. Ninety percent had a college education. The researchers found that 82% of the respondents had normal anxiety levels and 18% had a higher level of computer anxiety. The findings indicated that 391 respondents, from the 405 population, had access to a computer at work, and 192 of the 391 respondents used the computer an average of three hours per day. It was interesting to note that 246 of the 391 respondents (61%) used word processing packages, 310 (77%) used other software packages such as Lotus 1-2-3, 165 (41%) used more than one package, and 137 (34%) knew how to program in a computer language. The most frequently used software package was Lotus 1-2-3. BASIC was cited as the most frequently used language,

and 18% used more than one language. The findings showed gender and age were significantly related to computer anxiety. More females (23%) had computer anxiety than males (14%). The percentage of respondents aged 50 and over who exhibited computer anxiety (32%) was more than double the percentage of respondents aged under 30 (15%) who were anxious about using computers. Sixty percent of the clerical personnel (secretaries and clerks) reported computer anxiety, while only 30% of the professionals did. This finding supported the conclusion by the Occupational Safety and Health Administration, that found clerical workers suffered higher levels of computer anxiety than any other occupational group (Elder, Gardner, Ruth, & Gender, 1987).

The study done by Kotrlik and Smith (1988) surveyed a population of 2,362 consisting of all secondary vocational teachers that included teachers in the fields of: agriculture, home economics, business, and industrial arts. A random sample of 367 teachers was chosen from the original population and given the COMPAS to determine the levels of computer anxiety. The study measured computer anxiety levels, using the COMPAS, and predetermined variables in explaining computer anxiety. The predetermined variables were: teacher's levels of computer skills, principal's support of computer use, computer availability at school, perceived mathematical ability, and receiving formal computer training. With the integration of computers into vocational areas it was necessary to determine if computer anxiety existed with vocational teachers and at what level. If computer anxiety did exist within the teachers, then determining the type of in-service training became an important issue. It was further important that teachers had to be comfortable using computers to teach their students. The study found all five of the predetermined variables to be significant and teachers exhibited a mild anxiety toward

computers. There were no significant computer anxiety level differences among the agricultural, home economics, business, and industrial arts teachers. The survey did reveal a difference in the level of anxiety between males and females for three of the seven COMPAS scales. The three scales on which differences were found were: data entry, word processing, and trust. Females recorded higher levels of anxiety than the males did on the three scales.

Other professional educators were studied in West Virginia (Gordon, 1993). Trainers designed techniques to eliminate problems in computer training classes. The Gordon study used the short form of the COMPAS with a population of 116 and a response rate of 91%. The sample was randomly chosen from a total population of all secondary technical teachers in West Virginia during 1992 and 1993 school years. The results indicated that 46% of the teachers showed some level of computer anxiety. There were no differences in computer anxiety between male and female subjects. Over 45% of the teachers considered themselves to be beginners or novices due to the lack of training. In-service workshops gave the most frequent formal computer training.

A study conducted by Gilroy and Desai (1986) included 270 college level subjects. For this study a review of three instruments concluded that the Oetting Scale, COMPAS, was the most appropriate for measuring computer anxiety. Significant factors in predicting computer anxiety were gender, experience, and course work. The study indicated age and race was not contributing factors. The combination of experience and formal education in computer training resulted in a reduction in computer anxiety. The study concluded that when an organization is planning computer training it would be advisable to first measure the trainees' computer anxiety level before training. This will distinguish persons who will

do well at the start of training and those who will require a more functional approach of training.

Math Anxiety

There is growing evidence that math anxiety has a relationship with computer anxiety. There is reason to believe that the general public, particularly women, who have problems with mathematics will have difficulties and intimidating situations with computers (Dambrot, Watkins-Malek, Silling, Marshall, & Garver, 1985).

There are a number of studies showing the correlation of math and computer anixety. Igbaria and Parasuraman's (1989) study concluded that math anxiety had a significant influence on computer anxiety ($r = .29$) at a level of alpha = .05. A study by Howard (1986) found $r = .19$ significance at a level of alpha = .05. He concluded that math and computer anxiety contained trait-like factors. Examples of trait-like factors are friendliness and conscientiousness. Morrow, Prell, and McElroy (1986) and Raub (1981) reported significant correlation between math to computer anxiety. Raub concluded that math anxiety is a good predictor of anxiety towards computers. Rosen and Maguire (1990) reported results of 10 research studies that found positive correlation between math and computer anxiety. There was a significant relationship found between math ability and knowledge of computers. A more positive attitude was associated with higher levels of math skills and knowledge of computers and their uses (Baker, 1995).

The study by Dambrot, et al. (1985) discovered that both males and females were afraid of computers and they believed that computers were masculine objects. The study showed males had a higher enrollment in computer classes, had worked more with a computer, and were more likely to own a computer than females. Tobais, 1978 and Tobais

& Weissbrod, 1980 study (as cited in Dambrot, Watkins-Malek, Silling, Marshall, and Garver, 1985) found that computer use involved math and females would avoid computers and computer classes because of the use of math

Summary

Anxiety is an emotional response elicited from a fear. A person with a high degree of computer anxiety takes longer to complete a task. This section included computer anxiety and math anxiety. Several studies indicated a relationship between math anxiety and the level of computer anxiety a person demonstrates.

Self-Efficacy

Self-efficacy is the belief that one can perform a particular action (Bandura, 1995). Efficacy beliefs are how people think, feel, and motivate themselves. Bandura stated that there are four main forms of efficacy influence: mastery experiences, vicarious experiences, social persuasion, and physiological and emotional states. Individuals who continually strive at difficult tasks and accomplish them build their efficacy level. Individuals who are unable to accomplish difficult tasks see themselves as failures and have a lower self-efficacy. The mastery of experiences is a combination of cognitive and behavioral tools to create a successful appropriate course of action to control a situation. If individuals believe they can succeed in a task then they will make every effort to do so.

Computer experiences have been associated with self-efficacy and computer anxiety (Igbaria, 1993). Computer anxiety is a form of state anxiety caused by a low self-efficacy of a person. Individuals with a high self-efficacy will interact with computers and be less anxious than a person with a low self-efficacy. If individuals believe they will have

problems using a computer then they will avoid them due to this fear. Self-efficacy was positively correlated with computer anxiety in Igbaria's 1995 study. His study found direct influence of computer experience on self-efficacy, computer anxiety, and perceived ease of use a computer.

Vicarious experiences occur when an individual sees another individual succeeding in a task then feels compelled to strive for the same mastery. On the other hand, if a person sees another failing at a task then it undermines the level of motivation and efficacy is harder to obtain.

Social persuasion can be accomplished by a superior giving praise to a worker for completing a task. This instills confidence and makes the person strive harder at more difficult tasks.

Physiological and emotional states of a person can be viewed by others as positive or negative. A person who perceives another person negatively while performing a task may harbor the emotion of low self-efficacy for that task. If a person performing a task, and being observed, looks physiologically tense or moody then the observer may avoid the same task for fear of the same tension and stress.

For individuals to remain task orientated in a stressful situation requires a strong sense of self-efficacy. How individuals cope with a stressful environment has to do with their level of motivation. If an individual believes the situation is unmanageable then the severity of the environment becomes overwhelming. The result is imagining stressful situations and becoming emotionally worse. Controlling a situation results in a person's self-efficacy level rising and the level of stress declining. In a training situation support from other members of the group can reinforce a positive self-efficacy thus reducing

tension. Less depressed individuals have a high self-efficacy, take adversity as a challenge, pride themselves on accomplishments, and do not look at failure as a setback. Of course the reverse is true of persons with low self-efficacy (Bandura, 1995).

Self-efficacy is associated with computer training and an individual's performance. Bandura's studies have shown that self-efficacy is influenced by the Social Cognitive Theory of Behavior. The Social Cognitive Theory is a widely accepted model of how individual behavior influences capabilities. It states that if individuals doubt their ability to succeed in an undertaken behavior, then success may be unattainable. The understanding of the Social Cognitive Theory and self-efficacy is important in understanding computer behavior. Social Cognitive Theory states that environmental situations, cognitive and personal factors, and demographic characteristics all influence individual's behavior. Bandura refers to the "triadic reciprocality." Triadic reciprocality occurs when an individual chooses an environment in which to exist. The chosen environment acts upon situations that affect the individual's behavior. It further influences behavior by cognitive and personal factors. Therefore, in the triadic reciprocality each factor affects the other. Bandura stated, "Individuals can believe that a particular course of action will produce certain outcomes, but if individuals entertain serious doubts about whether they can perform the necessary activities such information does not influence their behavior" (Bandura, 1977, p. 193). Social Cognitive Theory has two specific expectations: (a) outcome--individuals undertaking a behavior believed to become a value, and (b) self-efficacy--an individual's ability to perform a behavior (Igbaria & Iivari, 1995). Bandura (1977) stated that self-efficacy has a role in motivating the behavior of an individual. He

further stated that individuals who are easily discouraged will fail; whereas, individuals who fall short of their goal will increase their efforts and persevere resulting in attaining the goal.

Individuals' self-efficacy expectancies can vary with the task because of the magnitude, generality, and strength of the task to be done. The magnitude of the task may be beyond the limits of the individual, thus causing anxiety. Some tasks require a minor mastery causing an individual to falsely believe successes can come easily. This false believe causes individuals to become discouraged by failure when attempting a task they think is easy when in reality it is difficult. Setbacks in difficult efforts serve a useful purpose in teaching success by requiring sustained effort. Convincing individuals they can succeed by persevering in the face of adversity enables them to rebound from setbacks (Bandura, 1977).

Computer self-efficacy is the judgment of an individual's ability to use a computer. These judgments are applicable to skills such as preparing written reports and analyzing financial data (Compeau & Higgins, 1995). Generally self-efficacy is a degree of judgment in a particular domain, in this case a computer domain. If individuals have a high computer self-efficacy, then they will feel competent in using different computers and software. However, a low computer self-efficacy leads to the belief that individuals will encounter difficulty in using computers and software.

A study conducted by Drueckhammer, Kortlik, and Parton (1986) found a large majority of agricultural education teachers in Louisiana who had computers failed to use them. One reason may be a lack of training and another reason may be computer anxiety. Gephart in 1982 stated that the limited amount of computer use by teachers could be caused by three factors: fear of the unknown, fear of social problems, and math anxiety.

Fletcher and Deeds' (1994) study used the short form of the COMPAS scale with a population of secondary agricultural education teachers. The average age of the teachers was 36, 49% had a Masters degree, 90% were male, typing skills were minimal, keyboarding was slow, and 39% had above average math ability. The possible scores on the COMPAS scale ranged between 20 and 86, with score of 20 indicated no anxiety whereas a score of 86 indicated that a person is very anxious. The mean score for these teachers was 47.3, which indicated that they exhibited little computer anxiety. The results showed that math ability appeared to have no effect on anxiety. Although the teachers exhibited some computer anxiety it was within the normal range. Increasing knowledge about computers and keyboarding was found in this study to reduce a person's computer anxiety. Fletcher and Deeds (1994) concluded that teachers with 10 years of service or more needed training that is different from teachers who have less than 10 years of service. This was because teachers with less than 10 years of service had some exposure to the use of computers. Teachers with 10 years or more of service should be given a beginner's course.

Summary

Self-efficacy is the belief that a person has the ability to perform an action. It is how people feel, think, and motivate themselves. There are four main forms of self-efficacy: mastery experiences, vicarious experiences, social persuasion, and physiological and emotional states. Computer experiences are associated with self-efficacy. A person with a high self-efficacy level will be less anxious working with computers than a person with a low level. Reported evidence stated that self-efficacy influences computer anxiety and computer training accomplishment.

Variables Associated With Computer Anxiety

Age

A profile of a computer anxious person is difficult to determine since computer anxious people comprises a diverse group with diverse educational and computer training backgrounds. A common diversity is age. Most computer anxious people are over the age of 30. This may be due to the early exposure to computers that people age 30 and younger have had in school (Appelbaum, 1990).

Research by Gardner, Render, Ruth, and Ross (1985) came up with a general composite of a computer anxious person. A computer anxious person is most likely to be 50 years old, female, well-organized, poor in math, and feel able to function without a computer.

A study by Dyck and Smither (1994) was conducted with a population of 422. It included 203 older adults aged 55 and over from senior citizens' centers and continual education courses. There were 71 males (average age 67.53) and 132 females (average age 67.86). The population also included 219 younger adults under the age of 30 from universities and community colleges. In this group there were 77 males (average age 22.64) and 142 females (average age 21.06). The results showed older adults had a more positive attitude toward computers, exhibited less computer anxiety and confidence, and had less computer experience than the younger adults. This finding led Dyck and Smithers to suggest that older adults liked the idea of what a computer could do but had little experience with them. When the older adults decided to learn computer skills they did not interact as well as they anticipated.

Dyck and Smither (1996) conducted a study of 28 older adults, 12 males and 16 females, with an average age of 68.7 years. These adults were enrolled in a word-processing class. They were highly educated with a mean of 16.61 years of education and had little computer experience. The study found that older adults did not interact as well with computers as did younger adults. This confirmed their suggestions based on their 1994 study. The 1996 study showed older adults exhibited computer traits that younger adults did not. Older adults took longer to complete assignments, trained longer, and made more errors than younger people. A crucial factor identified in older adults was cognitive skills, which change with aging. Older adults have greater cognitive deficits when doing complex tasks such as working with new computer software. One goal of this study was to look at the relationship between cognitive skills and learning computer skills. Spatial ability involves the visual scanning of information. Spatial scanning was a significant predictor of computer performance. Older adults who scored high on visual scanning located keys better and faster. This study found older adults who had a higher spatial and visual scanning score seemed to master the computer better and showed a more positive attitude towards computers.

Igbaria's study (1993) consisted of 519 randomly chosen managers from 54 companies. There were 441 males and 78 females. The ages ranged from 21 to 63 years, with a mean age of 38.78 years. The majority of the managers, 70%, had a college education and 25% had some college education. The study results indicated age had a significant effect on computer anxiety. This conclusion was based on the idea that older managers had less knowledge or past use of computers; therefore, were resistant to change.

The study conducted by Rosen and Maguire (1990), however, reviewed 17 past research studies and none supported the contention that age was significant in correlation with computer anxiety. Age may foster avoidance to the use of a computer due to lack of knowledge, experience, and training of computer use.

Gender

There are a number of studies dealing with gender and computer anxiety. A study conducted at George Mason University of 378 business professionals, faculty, and graduate students reported that 64% of the females compared to 36% of the males were computer anxious. The 1996 Dyck and Smithers study concluded that gender did have some influence on computer apprehension and attitudes. Females showed a higher anxiety, less liking, less confidence, and less positive attitude toward computers than males. Gilroy and Desai (1985) conducted a study of 136 males and 190 females and found a difference in computer anxiety between males and females, with the females exhibiting more anxiety than males.

Rosen and Maguire (1990) reviewed 25 statistical and 13 non-statistical studies and concluded that gender only had a minimal influence on computer anxiety. The authors found that women showed a little more computer anxiety than men and stated that this may be due to the lack of interest women have in computers.

A study conducted by Howard (1986) had a population of 111 managers, including 90 males, 19 females, and 2 unknowns and concluded that gender was not a significant factor in computer anxiety. Research by Igbaria and Parasurraman (1989) studied a population of 166 managers, that included 115 males and 51 females, and found no significant correlation between gender and computer anxiety. The study by Morrow et al.

(1986) consisted of a population of 173 managers, including 108 males and 65 females, and found no differences with gender to computer anxiety. The Ray and Minch (1990) study consisted of 114 business professionals, that included 68 males and 46 females. The study found no differences between genders on computer anxiety. The study by Dambrot et al. (1985) included 599 female and 342 male introductory psychology student volunteers and found that females had more negative attitudes towards computers, had less math ability and background, and scored lower than males on computer aptitude tests.

The gender difference related to computer anxiety may be explained because females hold more negative attitudes about computers than men. Studies by Betz (1978), Tobias (1978), and Tobias and Weissbrod (1980) showed women had a prevalent fear, anxiety, and negative attitude towards math more than men (as cited in Dambrot et al., 1985). Ware and Stuck (1985) found another explanation of gender differences. The study showed females stereotyped as clerical and in supportive roles to males. Males where seen as decision makers and experts at what they did. The study found social norms about the female's role lead to different opportunities afforded females then males. This particularly was found in mathematics, science, and engineering. Computer science falls within these categories. Females view computer science as a male dominated field and this may be a cause for females exhibiting more computer anxiety than males (Ware & Stuck, 1985).

The Dambrot, et al. (1985) study found males scored significantly higher on computer aptitude, computer attitude, math aptitude, experiences in math courses, and experiences with computers than females. Females showed more negativity towards computers and scored lower on computer aptitude. The study found small but significant gender differences in computer aptitude. Math aptitude and computer experience were

related to computer aptitude, whereas in females only math aptitude was related. It concluded there was some support for a relationship between mathematics and computers.

The Oetting study (1983) found no statistical differences between computer anxiety levels of female and male subjects in the use of computers. The Kotrlik and Smith (1988) study supported Oetting's findings. The study also found no statistical difference between male and female vocational teachers anxiety levels.

Attitudes

There have been many reasons given for negativity towards computers. Nickerson (1981) stated a major reason a person fears computers is that of functional problems with computers. Problems include limited usefulness of the system, limited availability and access to a computer, sharing a computer terminal, start up and stopping problems, and downtime.

Inadequate training was another reason cited. Most people receive inadequate training on their initial contact with computers and, therefore, will avoid subsequent use of the computer (Rivizzigino, 1980). The learning of new computer system information is overwhelming to many people. They become uneasy, thus causing anxiety (Rubin, 1983). Many people are fearful of breaking or damaging the computer or destroying stored data (Anderson, 1983).

A third factor is a resistance to change. This includes feelings of stupidity, fear of obsolescence, fear of the unfamiliar, and a dehumanizing feeling (Nickerson, 1981). Adults facing new learning experiences harbor resistance. Placing older and younger people in separate learning environments lowers resistance. Each group can make mistakes in private, thus reducing resistance (Galagan, 1983).

A significant finding in the study by Igbaria and Parasuraman (1989) was that people who exhibit math anxiety also exhibit computer anxiety and have a stronger negative attitude toward computers. This was further substantiated by a study done by Howard and Smith (1986). Howard and Smith found a correlation of math anxiety and a relationship to computer anxiety. If an individual exhibits a math anxiety then the individual is likely to also exhibit computer anxiety.

The study conducted by Farina, Arc, Sobral, and Carames (1991) of 162 persons (81 males and 81 females) found that people who held a positive attitude toward computers felt computers could help them make their work easier. People who harbored a negative attitude toward computers felt computers were an "enemy" that had the capability of invading their privacy. This may be because of a bad experience with computers at some time.

Computer attitudes were measured in a study by Baker (1985) involving 96 Maine Cooperative Extension personnel. The majority (74%) had some experience with computers. There were no significant differences in attitudes found for the variables of age, education, years of service, and gender.

Education

Igbaria and Parasuraman (1989) referred to two studies (Gutek & Bikson, 1985; Raub, 1981) that showed education as having a negative relationship to computer anxiety, but a positive association with computer attitudes. Howard and Smith (1986) found the lack of education and knowledge of computers can cause operational fears about using computers and computer software. The study found an increase in education decreases computer anxiety and fosters a feeling of self-efficacy.

Bloom (1985) stated that trainers can provide an understanding of computer anxiety by introducing it into the course to be taught. This can be accomplished with education, skill building techniques, and practice. Trainers should be educated on why and how a person becomes anxious. The trainer should be able to deal with a person's uncomfortable feelings and respond positively to the individual. It is important that the trainer is able to explain to the trainee how the computer training program will help them improve their skills. The trainer is a key to reducing computer anxiety of a trainee.

Bloom (1985) stated that educational elements provide the trainee with self-insight regarding normal stress situations and reinforce the feeling that it is all right to become anxious. Bloom further stated that skill building techniques should include using physical relaxation skills when a trainee becomes frustrated or anxious working on the computer. Skills include deep breathing, distracting subjects' thoughts, and having them repeat positive thoughts. Skill building addresses worrisome thoughts and anxious feelings. Practice includes acquiring computer skills and interacting with the computer. Practice allows the trainee to accumulate successful computer experiences and builds self-confidence (Bloom, 1985).

Summary

Older people exhibit higher computer anxiety levels according to a number of studies. Studies have also indicated that females may exhibit more computer anxiety and negative attitudes towards computers then men. This apprehension may be caused by inadequate computer training, resistance to change, and stereotyping. Increased education has a positive effect on computer anxiety and computer attitudes. Therefore, additional computer education will help build skills, confidence, and lower computer anxiety.

Computer Training

Experiences with computers can produce anxiety, fear, resistance, and hostility. Computer functions that are intended to help a person may cause resistance to the computer. An example is computer language. Many computer languages can be arbitrary and cryptic. This leads to resistance to computers and computer anxiety.

Providing computer training to people in steps reduces computer anxiety. Training conducted in a friendly, non-threatening atmosphere decreases resistance and encourages computer use (Galagan, 1983).

Martocchio's 1992 study was designed to see if training context influenced training outcomes on computer anxiety. The study involved 79 clerical and administrative employees who had completed a two-month computer training course. The population consisted of 47 females and 32 males with an overall average age of 41.72. He used the labeling system model. Each trainee was given a card either labeled "neutral" or "opportunity." An opportunity suggestion projected a positive situation in which the trainee would gain something and had some control. An example of an opportunity labeling is to ask a trainee what they expect to gain for the computer training class. A neutral information suggested that was no threat or opportunity. An example of neutral labeling is: teaching a person the basic functions of a computer through lecture and hands-on experience. Martocchio's findings showed that training context labeling had a significant effect on computer anxiety. The trainees in the opportunity class were less anxious, had a high efficacy, and performed better than the people in the neutral class. The study concluded that training professionals should express the training received by the trainee as an opportunity rather than an intimidation. Trainers should express positive words in

training. The objective of training should be explained to trainees. If the training is for the trainee's career advancement, then trainers should emphasize characteristics associated with gain.

The study conducted by Rosen and Maguire (1990) showed that the use of the Computerphobia Reduction Program resulted in a successful decrease in computerphobia. Galagan (1983) suggested that additional training and educational programs would increase a person's knowledge about computers and therefore reduce their anxiety level toward computers (Galagan, 1983).

Computer-assisted instruction has proven useful in the Cooperative Extension Service and a benefit to in-service agent training. This type of instruction was used in the Makuch and Robillard (1993) study using 30 Extension agents who worked as pairs on 15 computers. The advantage is twice the number of agents can be trained with a given number on computers. An additional benefit is each person can help the other during the training process. Agents further stated that they enjoyed the interaction with the other agents and training in a group atmosphere. They believed it was more productive than independent study, and group training provided motivation and inspiration to achieve in their training.

The Igbaria and Iivari (1995) study concluded training must include the application of technology to actual work situations. They believed such training will increase a person's confidence and ability to master a task when using a computer. Trainers can overcome computer anxiety by providing adequate training at the person's comfort level of ability and confidence. A person who experiences anxiety can receive positive reinforcement. This can be accomplished by the training staff choosing software

comfortable for a person. As a person advances in training, additional software programs can be added. Thus, the training staff can control computer anxiety.

Appelbaum (1990) designed a computer training model to reduce computer anxiety. He suggested the first step to be one of grouping individuals as to their skills, computer knowledge, and ability. This grouping will enable everyone to work at the same level of training. Appelbaum designed a guideline for computer trainers to follow:

1. Present one topic at each training session.
2. Conduct classes with homogenous groups.
3. Customize and present material that is on the level of the group being trained.
4. Train computer anxious individuals together.
5. Account for individual learning curves.
6. Set a designated time for training.
7. Encourage practice and repetition.
8. Provide a well-designed learning environment.

Trainers should begin training with simple, non-threatening situations. Trainers should increase the difficulty of training only when anxieties have been met at the previous level. This enables individuals the opportunity to master a computer training level, reduce anxiety, and increase their self-efficacy.

Summary

Computer training should be viewed by a person as an opportunity rather than a threat. Trainers should stress that training received may help career advancement. Computer assisted instruction has proven useful in the Cooperative Extension Service and

a benefit to in-service agent training. Trainers should encourage and design training programs to help a trainee overcome computer anxiety.

Keyboarding Skills

To make computer use effective, operational skills are essential. The basic level is the learning of keyboard skills. This level must be learned to make entries, encoding, processing, and retrieval of information into a computer (Konar, 1986).

Keyboard use for computers requires knowledge of typing. It also forces people to perform keyboard activities that have an association of a low-status work performed by powerless people (Galgan, 1983).

According to Wentling (1990), keyboarding is an act of placing information into a computer by using a typewriter-like keyboard, placing fingers on designated keys, and moving the fingers as needed to depress other keys. The use of touch-keyboarding accelerates the computer's operation and enhances productivity. Error reduction occurs because the user can see what is being typed and can make corrections. Individuals using the hunt-and-peck method cannot view their errors and they will be difficult to find later thus causing added time to complete assigned work. Acquiring keyboarding skill enables a person to work more efficiently on a computer. Persons with adequate keyboarding skills can concentrate on problem solving rather than on the mechanics of typing.

A survey of 105 accounting graduates from Illinois State University by Wentling (1990) showed that 68% had some keyboard training acquired in high school. The accountants who had no keyboarding training indicated two major barriers to learning keyboarding. The first barrier was that keyboarding was not a requirement for their

program of study in high school or college. The second barrier was that students had no opportunity to learn keyboarding. Of those surveyed 93% thought keyboard skills should be acquired and would increase productivity and 88% said they would like to master keyboarding.

According to Keyboard Productivity Incorporated, a Los Angeles-based company, improving keyboarding skills is the solution for computer users (Wentling, 1990). Keyboarding Productivity Incorporated found the average person can increase their computer productivity 25% by learning keyboard skills.

Summary

Learning keyboarding skills enables a person to concentrate more on problem solving rather than the mechanics of typing. An average person can increase their production rate by 25% by learning keyboarding skills.

Computer Anxiety Instruments

There are five standard computer instruments that test for computer anxiety: Attitudes Toward Computers (ATC), Bloomberg-Erickson-Lowery Computer Attitudes Task (BELCAT), Computer Anxiety Index (CAIN), Computer Attitude Scale (CAS), and The Computer Anxiety Rating Scale (CARS). The CAS measures computer anxiety and attitudes. There are two other instruments that are used for computer anxiety but not as much as those above: the Computer Anxiety Factor (CAF) instrument and the Computer Anxiety Scale (COMPAS).

The Attitudes Toward Computers (ATC) was developed by Raub (1981) to measure attitudes towards computers. It is linked to a general anxiety and not specifically to computer anxiety. It consists of 25 Semantic differential -type items ranging from strongly agree to strongly disagree. Its reliability factor was not determined. A reliability check conducted by Howard (1986) on the subscales yielded a reliability coefficient of r = .87 (Dukes, 1989).

The Bloomberg-Erickson-Lowery Computer Attitudes Task (BELCAT) instrument is based on the Fennema-Sherman Mathematics Attitude Scale designed in 1976. The Fennema-Sherman Mathematics Attitude Scale measures mathematics anxiety that has been shown to be tied to computer anxiety. The BELCAT is designed to be used with students from the third grade through senior high school. It consists of a five-point Semantic differential -type scale with five subscales. It has a reliability range from r = .71 to r = .81 (Dukes, 1989)

The Computer Anxiety Index (CAIN) instrument focuses on a general anxiety and the respondent's intent to use computers. The index is intended for teachers. It contains 26 Semantic differential -type responses on a six-point scale. It has a range from strongly agree to strongly disagree. Its reliability is r = .90 and a correlation of r = .32 to general anxiety (Dukes, 1989).

The Computer Anxiety Rating Scale (CARS) instrument includes 54 items that measures the level of anxieties people report on a five-point Semantic differential scale. This scale was reported to be reliable (alpha = .97) and valid (Rosen, Sears, & Weil, 1993).

The Computer Attitude Scale (CAS) was developed by Loyd and Gressard in 1984 and updated in 1990 by Bandalos and Benson. The 1990 scale was designed to be used

with high school students. It is tied to mathematics. It was developed to measure the perception of an individual's anxiety in different situations related to computers. This scale is based on a six-point Semantic differential -type instrument consisting of 30 items chosen from 78 statements on attitudes towards computers and the use of computers. This scale contains three main subscales: (a) fear and anxiety about computers, (b) enjoyment of working with computers, and (c) confidence in using computers. The six responses range from strongly disagree to strongly agree. The three subscales consist of 10 items each, chosen from the remaining original pool of 78 items. The CAS can be used with any type of population. It is psychometrically sound, easily administered and scored, and time efficient (Dukes, 1989).

The Computer Anxiety Factor (CAF) instrument was identified by Kernan and Howard in 1990. This is a combination of four different computer anxiety and computer attitude instruments. It examines the potential differences in computer anxiety and computer attitudes. It contains 35 items on a five-point Semantic differential -type scale. The first set of 14 items relates to the fear of computers and the remaining items are related to computer attitudes. This instrument has a low reliability (Szajna, 1994).

The Computer Anxiety Scale (COMPAS) was designed by Oetting in 1983. It is a general measure of computer anxiety. This instrument contains a five-point semantic differential scale and seven subscales. Most of the subscales are related to the computer anxiety. There are two subscales, Trust and Hand Calculator, that are not scored but are part of the scale. They sometimes remain in the instrument because they define some specific anxieties that may be important in training. According to Dr. Benjamin Kleinmuntz, Professor of Psychology, University of Illinois at Chicago, (Measurement,

1984, p. 131), the Oetting instrument is the best to test computer anxiety. The manual is the best designed, psychometric, with two forms to choose from--long (48 items) and short (10 items). Items in the COMPAS are to the point, have high face validity, with clear descriptions and easy scoring and interpretation. A high reliability factor for the COMPAS was r =.88 for the short form and r=.96 for the long form (Conoley, Kramer, & Mitchell, 1988). Because the COMPAS is easily attainable, has a high reliability, and there have been studies conducted with Extension and agricultural groups, it was decided to use the COMPAS for this study.

Summary

A review of the instruments concluded the Oetting COMPAS instrument would be used for this research project. It was chosen because it measures only computer anxiety and not computer anxiety and attitudes. It has a high reliability, is easy to administer and score, and can be used for any population.

Chapter Summary

Chapter 2 contains a review of literature on anxiety, self-efficacy, variables related to computer anxiety, computer training, keyboarding skills, and computer anxiety scales. It is the responsibility of Extension staff development personnel to develop and maintain necessary informational technology and computer skills for all Extension personnel.

Anxiety is an uneasiness about something. A lack of knowledge about computers can produce a fear of using computers. There are three types of anxiety: trait, state, and concept-specific. Studies have shown a lack of adequate math ability will increase computer anxiety.

Self-efficacy is a belief that one has the ability to perform an action. A person with a high self-efficacy will do well using computers and has less computer anxiety than a person with a low self-efficacy. A relationship exists between computer training and a person's computer performance and self-efficacy.

Age, gender, use of computers, and education were variables discussed in this chapter. All of these are factors that have an effect on computer anxiety and the ability of a person to learn required computer skills and knowledge.

The different types of computer anxiety scales were discussed. The COMPAS scale was chosen because it is a test only of computer anxiety and not a combination of other factors. It has a high reliability, is easily administered and scored, and can be used for any population.

Cooperative Extension Services can improve their computer training by being aware of factors that cause computer anxiety. Their training staff can design programs to reduce the levels of computer anxiety among their personnel and increase productivity.

Chapter 3

PROCEDURES

This chapter presents the methods and procedures used to achieve the objectives of the study. The specific objectives of the study were to:

1. Determine computer anxiety levels of Virginia Cooperative Extension field personnel consisting of agents, technicians, and secretaries;
2. Determine variance in the Extension field personnel's computer anxiety levels that could be explained by selected variables (age, gender, personnel type, time using a computer, and education); and
3. Identify ways in which Extension personnel use computer applications.

Population and Sample

The beginning population for the study consisted of 510 Virginia Cooperative Extension field personnel. Usable responses were received from 402 Virginia Cooperative Extension personnel: 91 Agricultural and Natural Resources agents (ANR), 48 Family and Consumer Sciences agents (FCS), 68 4-H agents, 75 technicians and 120 secretaries. This population included all personnel as of July 1997.

Instrument Design

Oetting's Computer Anxiety Scale (COMPAS) is based on concept-specific anxiety. Concept-specific anxiety is a type of anxiety that is associated with a specific situation, in this case computers. The primary purpose of the COMPAS instrument is to

provide a general measure of computer anxiety that a person exhibits when thinking about or using a computer. The instrument contains a variety of interaction situations in which people are confronted with computer uses.

Oetting's COMPAS instrument (Appendix A) was obtained from its author and a license (Appendix B) to reproduce it for research purposes only was obtained by the researcher. Some of the terminology in the original COMPAS instrument had become dated, and the researcher was given permission by Oetting to alter the terminology and eliminate certain subscales. A copy of the instrument as revised was sent to the author. The revised survey instrument appears in Appendix C, including a demographic section which was added to obtain information about the agents and staff and their computer usage.

The new long version of the COMPAS was used. It contains 40 five-point semantic differential type items with five subscales (general attitude, data entry, word processing, business operations, and computer science), each of which has four items. A potential limitation is that an instrument with only four items per subscale may not be highly reliable. The original COMPAS version contained seven subscales, but for this study the hand calculator and trust subscales were eliminated. Each item has a positive side, negative side, and a mid-point. If a score is toward the positive side, the person is comfortable in using computers. If the score is toward the negative side, the person is expressing discomfort with computers. The overall computer anxiety score ranges from 40 to 200. The ranges and classifications determined by Oetting were: 40-79 relaxed and confident, 80-104 generally relaxed and comfortable, 105-129 some mild anxiety present, 130-149 anxious and tense, and 150-200 very anxious. The subscales describe different interactions a person can have with a computer. The subscales have a score range of 4-20.

Each subscale contains only four items. The score ranges and categories for the subscales are: 4-8 very relaxed and confident, 9-10 generally relaxed and comfortable, 11-12 some mild anxiety present, 13-14 anxious and tense, and 15-20 very anxious (Oetting, 1985).

Results of the COMPAS provide an assessment of an individual's self-reported feelings towards computers. It should be noted that this assessment is not an actual measure of anxiety.

Validity

Content validity is concerned with evidence that the contents of the COMPAS do contain items that are related to computer anxiety. Validity was determined by a panel of judges with knowledge about computer anxiety and computer use. The majority of the judges did agree that the items were appropriate and related to anxiety. However, there were questions as to the use of two subscales and if they were good measures of computer anxiety. The subscales in question were the "hand calculator" and "trust" scales. These do not measure computer anxiety and were eliminated, as stated previously, in the final version of the COMPAS for this study (Oetting, 1983, p. 15).

A second question about content validity deals with a person's response to a stated situation and if the response does measure anxiety. Oetting's study showed with experimental evidence that the COMPAS does measure anxiety. There is a very high internal consistency among the subscales of the COMPAS. Since the majority of the subscales are of very high consistency this is evidence that they are valid indicators.

The COMPAS showed that computer anxiety is highly related to test anxiety ($r = .70$) when using a computer to take a test. Oetting (1983) further showed that there was a relationship between math anxiety and computer anxiety with a moderately high correlation

(r = .42). Oetting concluded that there was a positive correlation between computer anxiety and math anxiety; however, they do not measure the same thing.

Reliability

The internal consistency reliability of Oetting's COMPAS for the long form was reported to be Cronbach's alpha r = .96. Using the same formula a reliability of r = .95 for the entire COMPAS resulted from this study. Oetting reported that reliability for his subscales ranged from .71 to .87, and for this study they ranged from .82 to .85.

Data Collection

A letter of waiver for doing Research Involving Human Subjects was obtained from the Virginia Polytechnic Institute and State University Review Board for this study.
A field test of 24 respondents from Craig, Giles, Montgomery, and Roanoke counties and Roanoke City was conducted before the final version was sent to the remaining Extension personnel. The purpose of this field test was to identify any necessary corrections in the wording of the directions or items on the final instrument. The field test instrument was mailed June 27, 1997. Analysis of field test data indicated that no revisions were necessary.

A questionnaire package (Appendix C) containing a cover letter, COMPAS instrument, additional items related to Extension computer use and demographics, and a stamped, self-addressed return envelope was mailed July 11, 1997 to all Virginia Extension agents and staff, excluding the field test group. A mailing was decided upon to eliminate bias because some personnel may not be knowledgeable in the use of e-mail surveys. The cover letter explained the purpose and instructions for completing the questionnaire. The

letter stated that all responses would be kept anonymous, and the code appearing on the questionnaire was strictly for follow-up purposes. Techniques listed by Isaac and Michael (1995) were used to enhance the response rate: (a) make the questionnaire objectives clear, state the importance of the instrument, make it look professional, and personalize the introduction letter; (b) send a follow-up letter to non-respondents after 10 days; and (c) place a phone call if necessary to non-respondents. Each survey was coded, mailed and returned by mail. Each code was assigned a respondent's name. The code consisted of a number and a letter: A for agent, T for technician, and S for secretary. As the surveys were returned the code were matched with the master code and the respondent's name removed from the outstanding respondents. A follow-up schedule was established and followed. A 67**%** response rate resulted from the first mailing.

On July 23rd, an e-mail letter was sent from Dr. Barrrett, Associate Director of Virginia Cooperative Extension, to all field personnel reminding them to complete the questionnaire. A phone call was made to each non-respondent on July 25 to remind them to fill out the questionnaire. Additional responses received after the calls and e-mail raised the response rate to 83**%**.

Data Analysis Procedures

Descriptive statistics such as means were used to report the collected data. Regression analysis was conducted for computer anxiety using each independent variable. The independent variables were: age, education, gender, length of service, and time using the computer per day.

Chapter Summary

This chapter described the procedures followed to conduct this study. A population of 402 Virginia Cooperative Extension personnel was represented in this study. The purpose of this study was to determine the computer anxiety level of these personnel.

Chapter 4

FINDINGS

Chapter three explained the sampling procedure, study design, instrumentation, data collection methods, and data analysis techniques. The purpose of this chapter is to report findings of the study and summarize the findings. This chapter has been organized around the main objectives for the study which were to:

1. Determine computer anxiety levels of Virginia Cooperative Extension field personnel consisting of agents, technicians, and secretaries;
2. Determine variance in the Extension field personnel's computer anxiety levels that could be explained by selected variables (age, gender, personnel type, time using a computer, and education); and
3. Identify ways in which Extension personnel use computer applications.

Survey Responses

The Computer Anxiety Scale (Oetting,1983) and a demographic section were sent to the remaining 486 Extension personnel in Virginia who did not participate in the field test. Combining the 486 with the 24 field testing group made a population of 510. The field test group was not surveyed again because there were no major changes in the questionnaire. The COMPAS was sent on July 11, 1997 by mail with a cover letter and a return envelope with a deadline of July 25 for responses. On July 23rd Dr. J. David Barrett, Associate Director of Virginia Cooperative Extension, sent an e-mail "thank you" letter to the respondents who had already responded and asked the remaining respondents to complete the survey (Appendix D). A follow-up phone call was made on July 25th to

county offices to remind non-respondent personnel to return the survey. A total response rate of 83% was achieved. Of this 83% or 424 responses, only 79% or 402 responses were useable. Of the 22 unusable surveys, there were 16 from personnel who declined to answer the questionnaire. Six surveys were classified as invalid because more than four questions were unanswered, which according to the instrument developer would make it unusable.

Phone survey

A random phone survey of 16% (14 respondents) was selected from the list of non-respondents. County or city units were chosen that had a high rate of non-respondents and then a subject was randomly chosen to be called. The person was asked only the first seven questions and the demographic section of the survey. The first five questions referred to the subscales and the remaining two referred to the COMPAS anxiety section. This random survey was analyzed and the results compared to those who responded by mail. A t-test was completed and no significant differences were found between the two groups.

Characteristics of the Respondents

Characteristics of the respondents regarding time in current position, gender, age, and level of education are described in the following sections. This discussion is intended to assist the reader in interpreting the results of the study.

The population for the study consisted of 510 Virginia Cooperative Extension personnel. The 402 respondents were composed of 91 (22.6%) Agricultural and Natural Resources (ANR) agents, 48 (11.9%) Family and Consumer Sciences (FCS) agents, 68 (16.9%) 4-H agents, 75 (18.7%) technicians, and 120 (29.9%) secretaries.

Table 1 exhibits the years Virginia Cooperative Extension personnel have been in their current positions. The results indicated the largest number of ANR agents had between six and 10 years in their present positions. The largest category for FCS agents was between 16 and 20 years while the largest category for 4-H agents was between one and five years. The largest category for technicians was between one and five years and for the secretaries it was six to 10 years. Overall the table shows that more respondents had been in their current position for one to five years.

Table 2 presents the years personnel have been with the Virginia Cooperative Extension. The largest response for ANR agents was 21 to 25 years. The FCS agents had the largest percentage of their respondents in the 16 to 20 and 21 to 25 year categories, while the 4-H agents' largest category was the 16 to 20 year range. The largest category for technicians was one to five years. The secretaries' largest categories were in the six to 10 and 11 to 15 year ranges. Overall the table shows the largest numbers of respondents were in the one to five and 16 to 20 year ranges.

The amounts of time each personnel type reported using computers on a daily basis are reported in Table 3. The largest number of personnel used the computer between one and three hours per day. The exception were the secretaries, most of whom used computers between three and five hours per day.

Table 4 shows the results of gender crosstabulated with personnel type. This table indicates that more males than females hold ANR positions. The FCS agents, 4-H agents, and technicians were mostly females, and the secretaries were all females.

Table 5 presents the highest educational levels attained by Extension personnel, which ranged from high school graduate to doctoral level. The respondents wrote their highest level of educational attainment on the survey instrument. The educational levels were converted to a nominal scale with one as high school graduate to five for a doctoral

Table 1

Respondents' Years in Current Position by Personnel Type (n = 402)

Years	Personnel Type: Agricultural & Natural Resources	Family & Consumer Sciences	4-H	Technician	Secretary	Total
Less than 1 year	9 9.9%	4 8.3%	7 10.3%	15 20.0%	7 5.8%	42 10.4%
1-5 years	17 18.7%	8 16.7%	16 23.5%	36 48.0%	21 17.5%	98 24.5%
6-10 years	20 21.9%	5 10.4%	7 10.3%	12 16.0%	23 19.3%	67 16.7%
11-15 years	8 8.8%	7 14.6%	9 13.2%	4 5.3%	21 17.5%	49 12.2%
16-20 years	18 19.8%	11 22.9%	14 20.6%	5 6.7%	19 15.8%	67 16.7%
21-25 years	14 15.4%	10 20.8%	11 16.2%	1 1.3%	9 7.5%	45 11.2%
26-30 years	5 5.5%	3 6.3%	4 5.9%	2 2.7%	9 7.5%	23 5.7%
31-35 years	--	--	--	--	7 5.8%	7 1.7%
36-50 years	--	--	--	--	3 2.5%	3 .7%
51-55 years	--	--	--	--	1 .8%	1 .2%
Total	91 100%	48 100%	68 100%	75 100%	120 100%	402 100%

Table 2

Respondents' Years With Virginia Cooperative Extension by Personnel Type (n = 402)

	Personnel Type					
Years	Agricultural & Natural Resources	Family & Consumer Sciences	4-H	Technician	Secretary	Total
Less than 1 year	7 7.7%	3 6.25%	7 10.3%	13 17.3%	5 4.2%	35 8.7%
1-5 years	15 16.5%	3 6.25%	15 22.0%	36 48.0%	21 17.5%	90 22.4%
6-10 years	12 13.2%	6 12.5%	7 10.3%	10 13.3%	22 18.3%	57 14.2%
11-15 years	6 6.6%	5 10.4%	6 8.8%	5 6.7%	22 18.3%	44 10.9%
16-20 years	17 18.7%	11 22.9%	17 25.0%	5 6.7%	20 16.8%	70 17.4%
21-25 years	24 26.3%	11 22.9%	11 16.2%	3 4.0%	10 8.3%	59 14.7%
26-30 years	10 11.0%	9 18.8%	5 7.4%	3 4.0%	16 13.3%	43 10.7%
31-35 years	--	--	--	--	3 2.5%	3 .8%
36-50 years	--	--	--	--	--	--
51-55 years	--	--	--	--	1 .8%	1 .2%
Total	91 100%	48 100%	68 100%	75 100%	120 100%	402 100%

Table 3

Time Using Computer Per Day by Personnel Type (n = 373)

Time	Personnel Type: Agricultural & Natural Resources	Family & Consumer Sciences	4-H	Technician	Secretary	Total
None-1.0 hour	32 36.3%	12 25.5%	21 31.3%	19 36.5%	2 1.7%	86 23.0%
1.1-2.9 hours	41 46.6%	24 51.1%	33 49.3%	20 38.5%	13 10.9%	131 35.1%
3.0-4.9 hours	13 14.8%	9 19.1%	11 16.4%	9 17.3%	59 49.6%	101 27.1%
5.0-8.0 hours	2 2.3%	2 4.3%	2 3.0%	4 7.7%	45 37.8%	55 14.8%
Total	88 100%	47 100%	67 100%	52 100%	119 100%	373 100%

Table 4

Virginia Cooperative Extension Personnel Type by Gender (n = 402)

	Gender		
Personnel Type	Female	Male	Total
Agricultural & Natural Resources	11 12.1%	80 87.9%	91 100%
Family & Consumer Sciences	47 98.0%	1 2.0%	48 100%
4-H	54 79.4%	14 20.6%	68 100%
Technician	71 94.7%	4 5.3%	75 100%
Secretary	120 100%	--	120 100%
Total	303 75.4%	99 24.6%	402 100%

Table 5

Virginia Cooperative Extension Personnel by Education Level (n = 393)

Personnel Type	Education Level						
	High School	Some College	Associate Degree	Bachelor's Degree	Master's Degree	Doctoral Degree	Total
Agricultural & Natural Resources	--	--	--	41 45.6%	47 52.2%	2 2.2%	90 100%
Family & Consumer Sciences	--	--	--	12 25.0%	35 72.9%	1 2.1%	48 100%
4-H	--	--	--	30 44.1%	35 51.5%	3 4.4%	68 100%
Technician	18 25.0%	10 13.9%	20 27.8%	18 25.0%	5 6.9%	1 1.4%	72 100%
Secretary	45 39.0%	31 27.0%	31 27.0%	8 7.0%	--	--	115 100%
Total	63 16.0%	41 10.4%	51 13.1%	109 27.7%	122 31.0%	7 1.8%	393 100%

graduate. Some respondents did not mark their educational level; therefore, there were only 393 responses to this question. A high percentage of the secretaries had a high school diploma or some college education. The largest percentage of the technicians had associate degrees. All of the ANR, FCS, and 4-H agents had at least a bachelor's degree. Larger numbers of each of the groups of agents held master's degrees, with the percentage of master's degrees highest for the FCS agents. Seven individuals held doctoral degrees, and three of these were 4-H agents. The level of attained education may not reflect the level of education required for the position held.

Table 6 displays the age levels of Extension personnel. There were only 388 responses to this item from the 402 surveys received. For all of the personnel types, the largest percentage of responses were in the 40 to 49 age group. The second largest percentage was the 50 to 59 age group.

Computer Anxiety

The first objective was to determine the computer anxiety levels of Virginia Cooperative Extension field personnel, which consisted of agents, technicians, and secretaries. This objective was met by analyzing the overall anxiety scale and the five subscales: general attitude, data entry, word processing, business operations, and computer science.

Table 7 presents the summarized scores for the COMPAS and subscales. The mean score for the Extension personnel on the overall COMPAS instrument was 101.68 (SD = 31.79). Based on the interpretation from the COMPAS manual, this mean is near the upper end of the "generally relaxed/comfortable" range. When the top two anxiety ranges are combined, only about 20% of the personnel exhibited these levels of anxiety on

Table 6

Virginia Cooperative Extension Personnel by Age Level (n = 388)

Personnel Type	Age Level						Total
	20-29 years	30-39 years	40-49 years	50-59 years	60-69 years	70+ years	
Agricultural & Natural Resources	8 8.9%	17 18.9%	47 52.2%	16 17.8%	2 2.2%	--	90 100%
Family & Consumer Sciences	1 2.1%	6 12.5%	27 56.2%	14 29.2%	--	--	48 100%
4-H	11 16.7%	12 18.2%	32 48.5%	9 13.6%	2 3.0%	--	66 100%
Technician	4 5.6%	14 19.7%	33 46.5%	18 25.4%	2 2.8%	--	71 100%
Secretary	5 4.4%	23 20.4%	49 43.4%	29 25.6%	6 5.3%	1 .9%	113 100%
Total	29 7.5%	72 18.5%	188 48.5%	86 22.2%	12 3.1%	1 .2%	388 100%

Note: Mean was found to be 43.9 years of age.

Table 7

COMPAS Scores for Extension Personnel (n = 402)

Scale	M	SD	% experiencing anxiety[a]
Overall computer anxiety[b]	101.6861	31.7936	20.3%
Subscales[c]			
General attitude	11.4254	3.7716	47.5%
Data entry	10.9801	3.8024	46.0%
Word processing	10.4677	3.4849	36.9%
Business operations	9.7836	3.5439	29.4%
Computer science	9.4726	3.1789	26.7%

[a]Percentages in this column represent the percentages of the total respondents whose scores were at least 130.
[b]Overall anxiety was computed using all 40 questions. Ranges and categories for the overall computer anxiety scale were: 40-79, very relaxed/confident; 80-104, generally relaxed/comfortable; 105-129, mild anxiety; 130-149, anxious/tense; and 150-200, very anxious (Oetting, 1983).
[c]Ranges and categories for the subscales were: 4-8, very relaxed/confident; 9-10, generally relaxed/comfortable; 11-12, mild anxiety; 13-14, anxious/tense; and 15-20, very anxious (Oetting, 1983).

the overall scale. This table also shows the subscale means, all of which were in the "generally relaxed/comfortable" or "mild anxiety" ranges.

Overall Computer Anxiety Scale

The scores from questions 6-10, 16-20, 26-30, and 36-40 (Appendix C) were added to the scores from the subscales to derive the overall anxiety score. This score was compared to the anxiety ranges determined by Oetting (1983) to determine the anxiety level of the respondents in this research. In order to better understand the results of this study, the percentages of personnel whose scores were in the anxious and very anxious ranges will be added together for purposes of comparison and discussion. When making this comparison, Table 8 indicates that the technicians are the more anxious and the secretaries are the least anxious of all personnel in regard to overall computer anxiety.

Table 9 reports the crosstabulation of overall computer anxiety and age. Again, if the percentages of personnel in the anxious and very anxious ranges are combined, this table indicates that the personnel in the 50-59 age group were the most anxious. This table further indicates that the personnel in the age group 30-39 were the least anxious. There were too few people in the 60 to 69 age group for comparison.

The results of the overall computer anxiety scale by gender are presented in Table 10. The results indicate that the males were somewhat more anxious than the females.

Reported on Table 11 are results for overall computer anxiety by time per day spent using a computer. Personnel who use the computer more than three hours per day were less anxious than those who used the computer for lower amounts of time.

Table 8
Overall Computer Anxiety by Personnel Type (n = 402)

Personnel Type	Overall Computer Anxiety Level					Total
	Very Relaxed 40-79	Generally Relaxed 80-104	Mild Anxiety 105-129	Anxious 130-149	Very Anxious 150-200	
Agricultural & Natural Resources	28 30.8%	22 24.2%	20 22.0%	16 17.6%	5 5.5%	91 100%
Family & Consumer Sciences	16 33.3%	10 20.8%	13 27.1%	6 12.5%	3 6.3%	48 100%
4-H	15 22.1%	18 26.5%	21 30.9%	9 13.2%	5 7.4%	68 100%
Technician	13 17.3%	16 21.3%	21 28.0%	11 14.7%	14 18.7%	75 100%
Secretary	40 33.4%	46 38.3%	21 17.5%	10 8.3%	3 2.5%	120 100%
Total	112 27.9%	112 27.9%	96 23.9%	52 12.9%	30 7.4%	402 100%

Table 9

Overall Computer Anxiety by Age (n = 387)

Age	Overall Computer Anxiety Level					Total
	Very Relaxed 40-79	Generally Relaxed 80-104	Mild Anxiety 105-129	Anxious 130-149	Very Anxious 150-200	
20-29 years	13 44.8%	7 24.1%	4 13.8%	4 13.8%	1 3.5%	29 100%
30-39 years	24 33.8%	16 22.5%	24 33.8%	2 2.8%	5 7.1%	71 100%
40-49 years	47 25.0%	57 30.3%	42 22.3%	31 16.5%	11 5.9%	188 100%
50-59 years	21 24.4%	23 26.7%	19 22.1%	14 16.3%	9 10.5%	86 100%
60-69 years	1 8.3%	6 50.0%	4 33.4%	--	1 8.3%	12 100%
70 + years	--	--	1 100%	--	--	1 100%
Total	106 27.4%	109 28.1%	94 24.3%	51 13.2%	27 7.0%	387 100%

Table 10

Overall Computer Anxiety by Gender (n = 402)

	Overall Computer Anxiety Level					
Gender	Very Relaxed 40-79	Generally Relaxed 80-104	Mild Anxiety 105-129	Anxious 130-149	Very Anxious 150-200	Total
Female	86 28.4%	89 29.4%	72 23.8%	31 10.2%	25 8.3%	303 100%
Male	26 26.3%	23 23.2%	24 24.2%	21 21.2%	5 5.1%	99 100%.
Total	112 27.9%	112 27.9%	96 23.9%	52 12.9%	30 7.4%	402 100%

Table 11

Overall Computer Anxiety by Time Using Computer Per Day (n = 372)

Time	Overall Computer Anxiety Level					Total
	Very Relaxed 40-79	Generally Relaxed 80-104	Mild Anxiety 105-129	Anxious 130-149	Very Anxious 150-200	
None-1.0 hour	5 5.8%	22 25.6%	30 34.9%	16 18.6%	13 15.1%	86 100%
1.1-2.9 hours	40 30.5%	30 22.9%	35 26.7%	18 13.8%	8 6.1%	131 100%
3.0-4.9 hours	41 40.6%	37 36.6%	14 13.9%	9 8.9%	--	101 100%
5.0-8.0 hours	23 42.6%	20 37.0%	8 14.8%	3 5.6%	--	54 100%
Total	109 29.3%	109 29.3%	87 23.4%	46 12.4%	21 5.6%	372 100%

Results for Subscales

The original COMPAS was designed to include seven subscale categories. This study used only five of those subscales: general attitude, data entry, word processing, business operations, and computer science. Response categories on the five point type Semantic differential scale ranged from one (very relaxed) to five (very anxious). A response of three indicated mild anxiety toward a computer situation. All the scores for the four items on a subscale were added to derive a subscale score. From a possible range of 4 to 20, Oetting (1983) determined these subscale ranges: very relaxed, 4-8; generally relaxed, 9-10; mild anxiety, 11-12; anxious, 13-14; and very anxious, 15-20.

General Attitude Subscale. Questions 1, 11, 21, and 31 on the COMPAS composed this subscale (Appendix C). These questions are related to how a person thinks of computers, hearing the word computer, seeing more computers emerging in the work place, and feelings toward computers. Table 12 displays the results for this subscale by personnel type. The overall results indicate that the technicians were the most anxious and the secretaries were the least anxious.

Table 13 indicates there were 303 females and 99 males responding to the question on the gender variable. Combining the anxious and very anxious ranges indicates that the males seem to be more anxious than the females. Analysis of the age variable indicates that the personnel in the 40 and over groups tended to be more anxious than those in the 20 to 39 age groups. Anxiety on this subscale tended to increase with age.

Data Entry Subscale. Questions 2, 12, 22, and 32 on the COMPAS composed this category (Appendix C). These questions referred to using, performing tasks, learning about, and correcting data entries on spreadsheets. As is indicated in Table 14, combining

Table 12

General Attitude Subscale Scores by Personnel Type (n = 402)

	General Attitude Subscale Level					
Personnel Type	Very Relaxed 4-8	Generally Relaxed 9-10	Mild Anxiety 11-12	Anxious 13-14	Very Anxious 15-20	Total
Agricultural & Natural Resources	17 18.7%	13 14.3%	17 18.7%	14 15.4%	30 33.0%	91 100%
Family & Consumer Sciences	5 10.4%	10 20.8%	11 22.9%	5 10.4%	17 35.5%	48 100%
4-H	10 14.7%	9 13.2%	14 20.6%	15 22.1%	20 29.4%	68 100%
Technician	9 12.0%	10 13.3%	8 10.7%	14 18.7%	34 45.3%	75 100%
Secretary	29 24.2%	22 18.3%	27 22.5%	17 14.2%	25 20.8%	120 100%
Total	70 17.4%	64 15.9%	77 19.2%	65 16.2%	126 31.3%	402 100%

Table 13

General Attitude Subscale Scores by Gender (n = 402) and Age (n =388)

Variable	General Attitude Subscale Level					Total
	Very Relaxed 4-8	Generally Relaxed 9-10	Mild Anxiety 11-12	Anxious 13-14	Very Anxious 15-20	
Gender						
Female	53	51	61	45	93	303
	17.5%	16.8%	20.1%	14.9%	30.7%	100%
Male	17	13	16	20	33	99
	17.2%	13.1%	16.2%	20.2%	33.3%	100%
Total	70	64	77	65	126	402
	17.4%	15.9%	19.2%	16.2%	31.3%	100%
Age						
20-29 years	8	7	4	5	5	29
	27.7%	24.1%	13.8%	17.2%	17.2%	100%
30-39 years	15	11	14	10	22	72
	20.8%	15.3%	19.4%	14.0%	30.5%	100%
40-49 years	25	33	34	35	61	188
	13.3%	17.6%	18.1%	18.6%	32.4%	100%
50 + years	17	11	24	14	33	99
	17.2%	11.1%	24.2%	14.2%	33.3%	100%
Total	65	62	76	64	121	388
	16.8%	16.0%	19.6%	16.5%	31.1%	100%

Table 14

Data Entry Subscale Scores by Personnel Type (n = 402)

Personnel Type	Data Entry Subscale Level					Total
	Very Relaxed 4-8	Generally Relaxed 9-10	Mild Anxiety 11-12	Anxious 13-14	Very Anxious 15-20	
Agricultural & Natural Resources	24 26.4%	7 7.7%	16 17.6%	21 23.0%	23 25.3%	91 100%
Family & Consumer Sciences	9 18.8%	10 20.8%	8 16.7%	9 18.8%	12 24.9%	48 100%
4-H	15 22.1%	11 16.2%	10 14.7%	16 23.5%	16 23.5%	68 100%
Technician	11 14.7%	8 10.7%	12 16.0%	12 16.0%	32 42.6%	75 100%
Secretary	28 23.3%	23 19.2%	25 20.8%	27 22.5%	17 14.2%	120 100%
Total	87 21.6%	59 14.7%	71 17.7%	85 21.1%	100 24.9%	402 100%

the top two anxiety ranges shows that the technicians are the most anxious followed by the ANR agents. The least anxious were the secretaries and the FCS agents. Table 15 presents the results for the data entry subscale by gender and age variables. For the gender variable the females showed less anxiety than the males. Combining the two top anxiety groups, anxious and very anxious, the indication is that personnel in the age groups 20 to 39 are less anxious than those in the older groups.

Word Processing Subscale. Questions 3, 13, 23, and 33 on the COMPAS composed this category (Appendix C). These questions referred to correcting, using word processing "tools," entering text, and taking a word processing class. Table 16 indicates that the technicians are more anxious and the secretaries and FCS agents are the least anxious when performing word processing tasks.

Table 17 displays the results for this subscale by gender and age variables. For the gender variable, it is indicated that the males were more anxious than the females. The age variable indicated that, as with other subscales, anxiety tended to increase with age. Those in the 40 and over age groups were more anxious than those aged 20 to 39.

Business Operations Subscale. Questions 4, 14, 24, and 34 on the COMPAS composed this category (Appendix C). These questions referred to making a budget, record keeping, figuring profits and losses, and trying new ideas. Table 18 shows that the the largest percentages of responses were in the relaxed ranges for all personnel types except technicians. The FCS agents and the secretaries seemed to be the most relaxed and the technicians the most anxious when performing business operations tasks on a computer. The technicians were predominately in the very anxious level.

Table 15

Data Entry Subscale Scores by Gender (n = 402) and Age (n = 388)

	Data Entry Subscale Level					
Variable	Very Relaxed 4-8	Generally Relaxed 9-10	Mild Anxiety 11-12	Anxious 13-14	Very Anxious 15-20	Total
Gender						
Female	63 20.8%	53 17.5%	54 17.8%	60 19.8%	73 24.1%	303 100%
Male	24 24.2%	6 6.1%	17 17.2%	25 25.2%	27 27.3%	99 100%
Total	87 21.6%	59 14.7%	71 17.7%	85 21.1%	100 24.9%	402 100%
Age						
20-29 years	8 27.7%	9 31.0%	3 10.3%	5 17.2%	4 13.8%	29 100%
30-39 years	23 31.9%	10 14.0%	14 19.4%	11 15.3%	14 19.4%	72 100%
40-49 years	34 18.1%	25 13.3%	37 19.7%	40 21.3%	52 27.6%	188 100%
50 + years	18 18.2%	12 12.1%	15 15.1%	27 27.3%	27 27.3%	99 100%
Total	83 21.4%	56 14.4%	69 17.8%	83 21.4%	97 25.0%	388 100%

Table 16

Word Processing Subscale Scores by Personnel Type (n = 402)

	Word Processing Subscale Level					
Personnel Type	Very Relaxed 4-8	Generally Relaxed 9-10	Mild Anxiety 11-12	Anxious 13-14	Very Anxious 15-20	Total
Agricultural & Natural Resources	23 25.3%	20 22.0%	15 16.5%	17 18.7%	16 17.6%	91 100%
Family & Consumer Sciences	11 22.9%	10 20.8%	12 25.0%	7 14.6%	8 16.7%	48 100%
4-H	14 20.6%	11 16.2%	16 23.5%	15 22.1%	12 17.6%	68 100%
Technician	12 16.0%	8 10.7%	15 20.0%	11 14.7%	29 38.6%	75 100%
Secretary	31 25.8%	29 24.2%	27 22.5%	18 15.0%	15 12.5%	120 100%
Total	91 22.6%	78 19.4%	85 21.1%	68 16.9%	80 20.0%	402 100%

Table 17

Word Processing Subscale Scores by Gender (n = 402) and Age (n = 388)

Variable	Word Processing Subscale Level: Very Relaxed 4-8	Generally Relaxed 9-10	Mild Anxiety 11-12	Anxious 13-14	Very Anxious 15-20	Total
Gender						
Female	71 23.4%	58 19.2%	68 22.4%	49 16.2%	57 18.8%	303 100%
Male	20 20.2%	20 20.2%	17 17.2%	19 19.2%	23 23.2%	99 100%
Total	91 22.6%	78 19.4%	85 21.1%	68 16.9%	80 20.0%	402 100%
Age						
20-29 years	11 37.9%	8 27.7%	3 10.3%	2 6.9%	5 17.2%	29 100%
30-39 years	16 22.2%	16 22.2%	19 26.3%	11 15.3%	10 14.0%	72 100%
40-49 years	40 21.3%	34 18.0%	40 21.3%	37 19.7%	37 19.7%	188 100%
50 + years	18 18.2%	20 20.2%	22 22.2%	14 14.2%	25 25.2%	99 100%
Total	85 21.9%	78 20.1%	84 21.6%	64 16.5%	77 19.9%	388 100%

Table 18

Business Operations Subscale Score by Personnel Type (n = 402)

	Business Operations Subscale Level					
Personnel Type	Very Relaxed 4-8	Generally Relaxed 9-10	Mild Anxiety 11-12	Anxious 13-14	Very Anxious 15-20	Total
Agricultural & Natural Resources	26 28.6%	19 20.9%	21 23.1%	10 11.0%	15 16.5%	91 100%
Family & Consumer Sciences	15 31.3%	11 22.9%	11 22.9%	2 4.2%	9 18.7%	48 100%
4-H	17 25.0%	16 23.5%	15 22.1%	10 14.7%	10 14.7%	68 100%
Technician	15 20.0%	11 14.7%	12 16.0%	13 17.3%	24 32.0%	75 100%
Secretary	38 31.7%	34 28.3%	23 19.2%	13 10.8%	12 10.0%	120 100%
Total	111 27.6%	91 22.6%	82 20.4%	48 11.9%	70 17.5%	402 100%

Table 19 presents the results for the business operations subscale by the variables of gender and age. The gender comparison indicates that for both females and males the largest percentage of responses were in the relaxed ranges. The age comparison indicated that the younger groups (20 to 39) were clustered in the most relaxed ranges. As ages increased so did anxiety related to this subscale.

Computer Science Subscale. Questions 5, 15, 25, and 35 on the COMPAS composed this category (Appendix C). These questions referred to interpreting a computer printout, knowing language about computers, discussing computers with others, and taking a course in computer applications. Table 20 indicates that combining the top two anxiety ranges shows that the technicians and the ANR agents were more anxious than other personnel types when performing computer science tasks, while the FCS agents and secretaries were the least anxious. The variables gender and age for this subscale are presented in Table 21. The gender analysis indicates that both genders were primarily in the relaxed ranges, with the males slightly more anxious. The age variable indicated that all age groups had the largest percentages of responses in the relaxed ranges, but again there was some increase in anxiety as age increased.

Summary of Subscale Analyses

Table 22 indicates that personnel as a total were in the generally relaxed to mild anxiety ranges for all subscale categories. The technicians had higher levels of anxiety than other personnel groups. If the technicians' means are rounded off they are in the anxious range for the general attitude subscale and the mild anxiety range for all other subscales.

Table 19

Business Operations Subscale Scores by Gender (n = 402) and Age (n =388)

	Business Operations Subscale Level					
Variable	Very Relaxed 4-8	Generally Relaxed 9-10	Mild Anxiety 11-12	Anxious 13-14	Very Anxious 15-20	Total
Gender						
Female	86 28.4%	70 23.1%	59 19.5%	37 12.2%	51 16.8%	303 100%
Male	25 25.2%	21 21.2%	23 23.2%	11 11.1%	19 19.3%	99 100%
Total	111 27.6%	91 22.6%	82 20.4%	48 11.9%	70 17.5%	402 100%
Age						
20-29 years	14 48.3%	7 24.1%	4 13.8%	1 3.5%	3 10.3%	29 100%
30-39 years	25 34.7%	18 25.0%	14 19.5%	7 9.7%	8 11.1%	72 100%
40-49 years	47 25.0%	44 23.4%	40 21.3%	28 14.9%	29 15.4%	188 100%
50+ years	21 21.2%	20 20.2%	22 22.2%	10 10.1%	26 26.3%	99 100%
Total	107 27.6%	89 22.9%	80 20.6%	46 11.9%	66 17.0%	388 100%

Table 20

Computer Science Subscale Scores by Personnel Type (n = 402)

Personnel Type	Computer Science Subscale Level					Total
	Very Relaxed 4-8	Generally Relaxed 9-10	Mild Anxiety 11-12	Anxious 13-149	Very Anxious 15-20	
Agricultural & Natural Resources	28 30.8%	21 23.1%	16 17.6%	12 13.2%	14 15.4%	91 100%
Family & Consumer Sciences	17 35.4%	12 25.0%	14 29.2%	2 4.2%	3 6.3%	48 100%
4-H	20 29.4%	10 14.7%	16 23.5%	17 25.0%	5 7.4%	68 100%
Technician	16 21.3%	15 20.0%	12 16.0%	13 17.3%	19 25.4%	75 100%
Secretary	43 35.8%	35 29.2%	20 16.7%	15 12.5%.5	7 5.8%	120 100%
Total	124 30.8%	93 23.1%	78 19.4%	59 14.7%	48 12.0%	402 100%

Table 21

Computer Science Subscale Scores by Gender (n = 402) and Age (n = 388)

Variable	Computer Science Subscale Level: Very Relaxed 4-8	Generally Relaxed 9-10	Mild Anxiety 11-12	Anxious 13-14	Very Anxious 15-20	Total
Gender						
Female	99 32.7%	71 23.4%	57 18.8%	42 13.9%	34 11.2%	303 100%
Male	25 25.3%	22 22.2%	21 21.2%	17 17.2%	14 14.1%	99 100%
Total	124 30.8%	93 23.1%	78 19.4%	59 14.8%	48 11.9%	402 100%
Age						
20-29 years	14 48.3%	5 17.2%	4 13.8%	2 6.9%	4 13.8%	29 100%
30-39 years	25 34.7%	19 26.3%	12 16.7%	9 12.5%	7 9.7%	72 100%
40-49 years	52 27.7%	42 22.3%	43 22.9%	36 19.1%	15 8.0%	188 100%
50 + years	27 27.3%	25 25.2%	17 17.2%	11 11.1%	19 19.2%	99 100%
Total	118 30.4%	91 23.5%	76 19.6%	58 14.9%	45 11.6%	388 100%

Table 22

Means and Standard Deviations for Subscale Categories by Personnel Type

	Personnel Type					
	Agricultural & Natural Resources	Family & Consumer Sciences	4-H	Technician	Secretary	Total
Task	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
General Attitude	11.41 (3.72)	11.91 (3.67)	11.63 (3.44)	12.67 (4.02)	10.36 (3.63)	11.42 (3.77)
Data Entry	10.85 (3.66)	11.08 (3.86)	11.07 (3.92)	12.37 (4.31)	10.12 (3.24)	10.98 (3.80)
Word Processing	10.11 (3.47)	10.23 (3.14)	10.69 (3.49)	12.00 (3.94)	9.75 (3.05)	10.47 (3.48)
Business Operations	9.71 (3.38)	9.54 (3.74)	9.82 (3.36)	11.1 (4.06)	9.08 (3.14)	9.78 (3.54)
Computer Science	9.49 (3.15)	8.73 (2.83)	9.71 (3.11)	10.8 (3.67)	8.79 (2.78)	9.47 (3.18)

Note: The possible range of means was 4 to 20: 4-8 very relaxed, 9-10 generally relaxed, 11-12 mild anxiety, 13-14 anxious, and 15-20 very anxious.

Computer Anxiety as Related to Variables

The second objective was to determine the variance in the Extension field personnel's computer anxiety levels that could be explained by selected variables which may affect computer use. Table 23 describes the results of a multiple regression analysis on the variables. A regression was conducted using the dependent variable long form. The long form is the total of all scores recorded by respondents for the COMPAS. Only the questions 1 through 40 of the COMPAS were used. Questions 41-44 referred only to the Extension work. The table exhibits that the t values for time spent using a computer, age, and years with the Extension were significant. The probabilities for these variables were the top two anxiety ranges shows that the technicians and the ANR agents were more anxious all less than the alpha level of .05 established a priori. The negative t values indicate that the more education and time spent using a computer, the lower the anxiety levels. The positive t values for age and years in Extension indicate more anxiety as these variables increased. The positive t-value for gender reflects the fact that females were coded as 1 and the males as 2 and males had higher anxiety levels. The time spent using a computer explained 13% of the variance in the overall COMPAS score. Age and years with the Extension service accounted for a total of 3.5% of the variance. It would be logical that these variables would be highly intercorrelated. The remaining variables accounted for less than 1%.

Table 23

Multiple Regression Analysis of Selected Variables On Computer Anxiety Scores (n = 402)

Source of Variation	SS	df	MS	F	Probability
Regression	59814.9	5	11963.0	15.694	.000
Residual	266028	349	762.257		
Total	325843	354			

Variables in the Equation

Variables	R^2	F	t	Probability
Time using the computer	.130	55.365	-7.441	.000
Age	.024	9.649	3.106	.002
Years in Extension	.011	4.534	2.129	.034
Education	.004	1.551	-1.245	.214
Gender	.003	1.104	1.051	.294

Computer Applications

The third objective was to identify ways in which Extension personnel used computer applications. These findings are reported in Table 24. E-mail was the most used application with 89% of Extension personnel indicating usage. The usage breakdown showed that secretaries and 4-H and FCS agents used this application the most and technicians the least.

Word processing was a close second with 88% usage. The largest percentages of the secretaries and 4-H and FCS agents used word processing, while the technicians reported the least use.

The Internet results indicated an overall usage of 80.1%. Only 48% of the technicians used the Internet, but over 85% of each of the other personnel types used it.

Presentation software was used by only 45% of the total personnel. The ANR and FCS agents used this application the most and the technicians used it the least.

The spreadsheet application was used most by the secretaries and least by the technicians. Financial management software (such as Quicken) was used by 39.1% of the respondents. The secretaries used it the most and the technicians the least.

Database computer programs were used by 29.1% of the personnel. The secretaries had the highest usage rate, while technicians and FCS agents had the lowest rates.

Secretaries used graphics computer programs the most and the technicians and ANR agents reported the lowest usage. Only 16.9% of the respondents used desktop publishing programs, with secretaries and 4-H agents using this application the most.

Table 24

Applications Used by Personnel Type (n = 402)

Application	Personnel Type: Agricultural & Natural Resources (n = 91)	Family & Consumer Sciences (n = 48)	4-H (n = 68)	Technician (n = 75)	Secretary (n = 120)	Total (n = 402)
E-mail	82 90.1%	46 95.8%	66 97.0%	47 62.7%	117 97.5%	358 89.0%
Word processing	77 84.6%	45 93.8%	65 96.6%	49 65.3%	118 98.3%	354 88.1%
Internet	79 86.8%	43 89.6%	58 85.3%	36 48.0%	106 88.3%	322 80.1%
Presentation	63 69.2%	29 60.4%	31 45.6%	9 12.0%	48 40.0%	180 44.8%
Spreadsheet	49 53.8%	11 22.9%	21 30.9%	10 13.3%	80 66.7%	171 42.5%
Financial	37 40.7%	13 27.1%	14 20.6%	3 4.0%	90 75.0%	157 39.1%
Database	22 24.2%	6 12.5%	16 23.5%	8 10.7%	65 54.2%	117 29.1%
Graphics	16 17.6%	12 25.0%	18 26.5%	13 17.3%	54 45.0%	113 28.1%
Desktop Publishing	13 14.3%	7 14.6%	13 19.1%	10 13.3%	25 20.8%	68 16.9%
Others	7 7.7%	3 6.3%	2 2.9%	6 8.0%	13 10.8%	31 7.7%

Respondents were given an opportunity to list the other computer applications they used. The 31 responses included items such as WordPerfect, Calendar Creator, Print Artist and Print Shop, some of which were actually examples of the applications listed in the survey.

Purposes for Computer Use

Question 10 in the demographic section of the instrument asked Extension personnel how they used computers to aid them in their work. Table 25 indicates that the most responses from personnel related to the preparation of educational materials. Slightly more than half of the technicians used the computer for this purpose and over 90% of each of the other personnel types did. Communications was the second most common purpose for using a computer. The FCS and 4-H agents had the highest rate of usage for communications while technicians had the lowest.

Using a computer to respond to clients' requests was reported most frequently by the ANR and FCS agents. The group that used the computer the least for this purpose were the technicians.

Secretaries reported the highest rate of use for record keeping, and the technicians again had the lowest usage. When asked to report other purposes for computer use, respondents listed such things as dairy programs, 4-H enrollments, budgets and cash flow for farmers, mailing lists, label making, making pamphlets and camp books, newsletters and flyers, and ordering supplies.

Table 25

Purposes for Computer Use by Personnel Type (n = 402)

Purposes for Computer Use	Personnel Type: Agricultural & Natural Resources (n = 91)	Family & Consumer Sciences (n = 48)	4-H (n = 68)	Technician (n = 75)	Secretary (n = 120)	Total (n = 402)
Educational Material	83 91.2%	45 93.8%	64 94.1%	41 54.7%	110 91.7%	343 85.3%
Communications	78 85.7%	46 95.8%	64 94.1%	31 41.3%	94 78.3%	313 77.9%
Clients' requests	72 79.1%	35 72.9%	32 47.1%	24 32.0%	77 64.2%	240 59.7%
Record keeping	54 59.3%	21 43.8%	32 47.1%	20 26.7%	105 87.5%	232 57.7%
Others	10 11.1%	3 6.3%	8 11.8%	9 12.0%	24 20.0%	54 13.4%

Specific Extension Applications

Questions 41, 42, 43, and 44 on the survey related to question 10 of the demographic section of the instrument. The questions were asked in order to measure the computer anxiety levels that personnel may have in handling situations in their daily work. Table 26 displays a summary of the means and standard deviations for specific tasks for which Extension personnel use the computer. The results are based on a five-point Semantic differential scale with one being confident or comfortable and five anxious or scared. Reviewing the results indicates an overall mean of 2.16 for all four questions asked. This suggests that Extension personnel feel somewhat confident when performing any of the tasks. The overall average for the standard deviation average was 1.13, which is interpreted that the majority of responses fall within one standard deviation of the mean. As with the computer anxiety overall and subscale results, the technicians were most anxious and the secretaries the least anxious of the personnel types.

Chapter Summary

This chapter describes the results of the data collection and analysis. Percentages derived from crosstabulations were analyzed. The largest percentage of Virginia Cooperative Extension personnel have been with the service and in their current position for one to five years. Educationally, the secretaries had high school diplomas, the technicians held associate degrees, agents held bachelor's or master's degrees, and seven persons held doctoral degrees. In comparing computer anxiety levels, the personnel in the 20 to 29 age group were the most relaxed. Males were somewhat more anxious about computer use than females. Generally the technicians were more anxious than other

Table 26

Means and Standard Deviations for Specific Extension Applications (n = 402)

	Personnel Type					
	Agricultural & Natural Resources	Family & Consumer Sciences	4-H	Technician	Secretary	Total
Task	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Researching clients' requests	2.16 (1.02)	2.29 (1.18)	2.46 (1.19)	3.05 (1.32)	2.16 (1.17)	2.39 (1.22)
Communications with colleagues	1.89 (.936)	1.77 (1.10)	1.82 (1.04)	2.52 (1.30)	1.73 (.88)	1.93 (1.07)
Preparing educational materials	2.23 (1.11)	1.77 (.88)	2.07 (1.03)	2.63 (1.27)	1.84 (.98)	2.11 (1.10)
Keeping records	2.18 (1.04)	2.29 (1.11)	2.38 (1.18)	2.60 (1.31)	1.68 (.87)	2.16 (1.13)

Note: The possible mean range was 1 to 5 where 1 is confident or comfortable and 5 is anxious or scared. The average mean for all four items was 2.16 and the standard deviation was 1.13.

personnel and the secretaries were the least anxious when performing computer tasks. The overall and subscale computer anxiety mean levels indicated personnel were generally relaxed to mildly anxious toward the use of computers. The Extension personnel were generally confident about performing tasks related to Extension, with the technicians again showing the highest anxiety levels. In the multiple regression analysis, the education, position, and gender variables were not significant, but the variables of time using the computer, age, and years with the Extension were significant. The most used computer application was e-mail, the least used was desktop publishing, and personnel used the computer mostly for preparation of educational materials and communications.

Chapter 5

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

This chapter contains a summary of the study. Discussion and implications are provided, and recommendations for practice and further research are included.

Summary

The purpose of this study was to determine the computer anxiety level experienced by Virginia Cooperative Extension personnel and their use of computer applications. This information will aid Extension professional development personnel in implementing more effective training techniques to diminish computer anxiety in Extension personnel. The assessment of the current computer uses will provide information on additional training needed.

The objectives of this study were:

1. Determine computer anxiety levels of Virginia Cooperative Extension field personnel consisting of agents, technicians, and secretaries;
2. Determine variance in the Extension field personnel's computer anxiety levels that could be explained by selected variables (age, gender, personnel type, time using the computer, and education); and
3. Identify ways in which Extension personnel use computer applications.

This study used a descriptive survey design to gather information to fulfill its objectives. A modified version of the Computer Anxiety Scale (COMPAS) by Oetting

(1983) was designed to collect information on computer anxiety. A mailed questionnaire was used to collect data for this study. The questionnaire included sections on general attitude towards computers, data entry, word processing, business operations, computer science, four questions related to specific uses for Extension personnel, and demographic items. The population for this study consisted of 486 Extension agents including Agricultural and Natural Resources (ANR) agents, Family and Consumer Sciences (FCS) agents, 4-H agents, technicians, and secretaries.

The instrument was sent July 21, 1997, and had a return response rate of 83%. A random phone survey was conducted with 16% of the non-respondents (14 persons). The follow-up phone survey and the mailed survey responses were analyzed using the Statistical Package for the Social Sciences (SPSS) and the results compared. The results found no significant differences between the two groups. The internal consistency reliability of Oetting's COMPAS was reported to be Cronbach's alpha r =.96. Using the same formula a reliability of r =.95 for the COMPAS resulted from this study. The study found that the ANR agents, FCS agents, and 4-H agents had at least a bachelor's degree or higher and used the computer less than the secretaries on a daily basis. The mean age of the field personnel was 43.9 years of age and there were three times as many female personnel as males.

The following section provides a summary and discussion of the results related to the objectives of this study.

Objective 1: Determine computer anxiety levels of Virginia Cooperative Extension field personnel consisting of agents, technicians, and secretaries.

This study found that Virginia Cooperative Extension personnel had a mean score of 101.68 on the overall computer anxiety scale. This mean is lower than mean scores reported in earlier studies. Extension agents in the southern region of the United States had a mean score of 110.86 (Smith & Kotrlik, 1990b) and vocational teachers had a mean score of 104.4 (Kotrlik & Smith, 1988). However, both of these studies are over eight years old. Since the time these studies were conducted more people are using computers in their home and work place, which may be a factor in why the current study found a lower level of computer anxiety.

The overall computer anxiety analysis indicated technicians and the 4-H agents showed some anxiety towards computers and their uses. Personnel 40 years and older were more anxious than younger age groups, and males showed somewhat more anxiety than females. This may be because nearly a third of the females were secretaries, who used the computer more and had lower anxiety levels than other personnel types.

Analysis of the COMPAS subscales provided the following results. On the general attitude subscale, the secretaries were generally relaxed and the other groups indicated mild anxiety. Male personnel were somewhat more anxious than the females. The 20-29 year old age group felt relaxed and the other age groups showed more anxiety. Results indicated the more time a person spent on the computer the less anxious they were. On the data entry subscale, only the ANR agents and the secretaries were relaxed and the other personnel were somewhat anxious. Both genders and the age groups over 40 were found to exhibit more anxiety performing operations in this category. On the word processing subscale the personnel ranged from very relaxed to mild anxiety. The males were found to be more anxious than the females and as age increased so did the anxiety levels. On the

subscale for business operations, only the technicians and the age group over 50 showed anxiety and both genders were relaxed. On the computer science subscale, again the technicians were the only personnel to show anxiety.

Objective 2: Determine variance in the Extension field personnel's computer anxiety levels that could be explained by selected variables. The selected variables used were age, education, time per day using a computer, and years with the Extension service.

A regression analysis was conducted with the results showing that time using the computer, age, and years with the Extension Service were the only significant variables. The other variables, gender and education, were not significant. The multiple regression analysis indicated that time using the computer accounted for 13% of the COMPAS score variance while an additional 4.2% of the variance came from the other variables.

In contrast to this research, Gilroy and Desai (1986) indicated that gender was significant while age was not a factor in computer anxiety. Rosen and Maguire's 1990 study of computer anxiety also found that age was not a factor. The Applebaum (1990) n study, however, reported that persons over the age of 30 showed more computer anxiety than younger individuals. This study disagrees somewhat with Applebaum in that persons in the age groups of 40 and over exhibited more anxiety than younger age groups. This could be because Applebaum's study was conducted eight years ago, so that many of the respondents who were over 30 then are now 40.

Objective 3: Identify ways in which Extension personnel use computer applications.

The most adopted computer applications were e-mail with 89.0% use, word processing 88.1%, and the Internet with 80.1% usage. Secretaries and 4-H agents used e-mail and word processing the most. The FCS agents mostly used the Internet. The

desktop publishing application was used by only 17.0% of the respondents. The secretaries generally used all the applications more than other personnel. This relates to the fact that secretaries used the computer more hours per day than other personnel types. The technicians used all the applications the least.

Recommendations

This section contains suggestions for practice that might be considered by the Virginia Cooperative Extension and other agencies seeking to increase computer confidence among personnel. Also included are recommendations for further research.

Practice

Considering the level of computer usage, it is advisable to continue the present staff development training efforts for the Virginia Cooperative Extension personnel. Computer training which is targeted to the personnel 40 years of age and older may help alleviate their concerns. A review of position description for technicians should be done to see if computer usage is required. If the position description does require computer usage, then additional training should be given to the technicians.

It was indicated in this study that many computer applications were used by personnel but only a few were used by the majority. It is suggested that the Extension training staff review the applications to determine which are necessary in the daily work of various personnel categories and provide training specific to these applications.

According to J. David Barrett, Associate Director of the Virginia Cooperative Extension (personal interview, 1998), all field personnel have access to computers and have received computer training. This may be a factor as to why personnel were generally

confident when using computers. He further stated that personnel use computers extensively in their work. As new computer programs are developed additional training will naturally be required. Personnel should be encouraged to complete computer training that benefits their position.

The Extension training staff should continue to provide personnel with training in new technologies. This can be accomplished more effectively when the staff understand the needs of the personnel. A profile of a computer-relaxed respondent would be a younger employee who is a secretary and uses a computer more than three hours per day. A profile of a computer-anxious person would be a middle-aged respondent who is a technician and uses the computer less than two hours per day. The largest number of personnel used the computer to produce educational materials and to communicate with colleagues. Personnel used computers least for record keeping.

Research

Additional research should be conducted to identify why technicians are more computer anxious than other personnel types. It would be useful to investigate the position requirements of a technician to determine what contributes to their higher anxiety levels. It may be that they are not provided sufficient access to a computer to develop a level of comfort through consistent use. Additional study could be conducted to identify if the needs of Extension clients related to computer usage are being addressed. There may be computer programs available to personnel that would assist the clients, but personnel may lack skills in using these programs. If so, additional training should be provided relative to specific programs. Focus groups could be held for personnel to suggest ways their

positions could be improved with new computer programs or additional computer training. This study accounted for 17% of the variance in computer anxiety. Additional research is needed to identify variables which could explain the remaining variance.

Summary

This chapter contains a summary of a computer anxiety study conducted with Virginia Cooperative Extension field personnel. The study found that the personnel exhibited some level of computer anxiety. Of the selected variables, time using the computer, age, and years with the Extension service were significant factors in determining computer anxiety.

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APPENDIX A

ORIGINAL OETTING'S COMPUTER ANXIETY SCALE (COMPAS)

DIRECTIONS

Read each statement and mark the space between the lines to show how you feel about that situation. Look at the following item. If driving in heavy traffic made you feel very nervous, you would mark the item like this:

Driving in heavy traffic

relaxed ==== ==== ==== ==== ==== nervous

If it made you somewhat nervous, you would mark the item like this:

relaxed ==== ==== ==== ====== ==== nervous

Of course, if you were comfortable driving in heavy traffic, you would mark on that side of the scale. If you can't decide, or if you feel midway between the two adjectives, you should mark the middle space.

In the following questions, a "small computer" would be a desk top unit that can be programmed by the operator. It would include a video-screen, a keyboard, and possibly a printer.

Try to answer every question. Some questions may ask about things that you do not know about, or things that you have never actually done. But you can usually figure out what the item means and/or can imagine what it would be like to be in that situation. Then mark the item according to how it would make you feel if YOU were in that situation.

The overall computer anxiety score scale ranges are from 40 to 200. The range begins at 40 because two items on each page are used only for subscale scoring and are not included in the total computer anxiety score.

ATTITUDES TOWARD COMPUTERS

1. Using a hand calculator to add a long list of numbers

   confident ==== ==== ==== ==== ==== worried

2. Having a hotel or motel bill worked out by a computer

   distrust ==== ==== ==== ==== ==== trust

3. I generally think of computers as

   friendly ==== ==== ==== ==== ==== unfriendly

4. Trying to use a small computer to balance a checkbook would usually be

   frustrating ==== ==== ==== ==== ==== comfortable

5. Correcting an error on the screen

   easy ==== ==== ==== ==== ==== tricky

6. Learning to use a small computer to do a budget

   comfortable ==== ==== ==== ==== ==== scared

7. Interpreting a complicated computer printout

   worried ==== ==== ==== ==== ==== secure

8. Computers give me

   more control ==== ==== ==== ==== ==== less control

9. Making a mistake when entering data for analysis because of nervousness

   likely ==== ==== ==== ==== ==== unlikely

10. Trying to write a program in BASIC as part of a class

    worried ==== ==== ==== ==== ==== secure

11. Deciding which type of personal computer to buy

    secure ==== ==== ==== ==== ==== insecure

12. Explaining a problem that you have not been able to solve to a computer consultant

    frightened ==== ==== ==== ==== ==== fearless

13. Using a hand calculator to multiply or divide

    confident ==== ==== ==== ==== ==== worried

14. Voting using a computer

    distrust ==== ==== ==== ==== ==== trust

15. Just hearing the word "computer" makes me feel

    interested ==== ==== ==== ==== ==== nervous

16. Taking a job where you have to regularly enter data into a computer

    concerned ==== ==== ==== ==== ==== unconcerned

17. Typing on a word processor instead of a typewriter

    less nervous ==== ==== ==== ==== ==== more nervous

18. Learning to keep records for a small business on a computer

    confident ==== ==== ==== ==== ==== anxious

19. Knowing the right words or "language" when talking about using a computer

    insecure ==== ==== ==== ==== ==== safe

20. Reading a book about how computers can be used

    enjoy it ==== ==== ==== ==== ==== avoid it

21. Looking at the keyboard of a small computer

anxious ==== ==== ==== ==== ==== comfortable

22. Trying to use a small computer to solve math problems

frustrating ==== ==== ==== ==== ==== useful

23. When a message appears on the screen that you have not seen before

confident ==== ==== ==== ==== ==== worried

24. Trying to operate a small computer when you are all alone

worried ==== ==== ==== ==== ==== unworried

25. Using a hand calculator to balance a checkbook

relaxed ==== ==== ==== ==== ==== nervous

26. Getting a bank statement printed by a computer

distrust ==== ==== ==== ==== ==== trust

27. Watching computers appear in more and more places

exciting ==== ==== ==== ==== ==== frightening

28. Learning how to enter long lists of data into a computer

scared ==== ==== ==== ==== ==== comfortable

29. Typing on a word processor instead of a typewriter

easier ==== ==== ==== ==== ==== harder

30. Figuring out profits and losses by using a small computer

comfortable ==== ==== ==== ==== ==== scared

31. Discussing computers with a group of people who know a lot about using them

insecure ==== ==== ==== ==== ==== safe

32. Learning a new programming language

safe ==== ==== ==== ==== ==== unsafe

33. When the computer says "INCORRECT ADDRESS"

anxious ==== ==== ==== ==== ==== confident

34. Taking a test that requires writing a fairly simple program on a computer

worried ==== ==== ==== ==== ==== secure

35. Deciding what software to buy for a small computer

confident ==== ==== ==== ==== ==== insecure

36. Consulting a computer manual to find out what you did wrong

anxious ==== ==== ==== ==== ==== relaxed

37. Using a hand calculator to calculate a percentage

relaxed ==== ==== ==== ==== ==== nervous

38. Having your vote counted by computer

distrust ==== ==== ==== ==== ==== trust

39. In general computers are

exciting ==== ==== ==== ==== ==== frightening

40. Correcting a mistake you made when typing information into a computer

concerned ==== ==== ==== ==== ==== unconcerned

41. Taking a class that requires using a word processor

    unworried ==== ==== ==== ==== ==== worried

42. Using a computer to try out different ideas (What would costs and profits be if ?)

    comfortable ==== ==== ==== ==== ==== anxious

43. Taking an advanced course in computer programming

    unsafe ==== ==== ==== ==== ==== safe

44. Reading a technical book about programming small computers

    enjoy it ==== ==== ==== ==== ==== avoid it

45. Playing a game on a computer where you have to type in answers to questions

    trained ==== ==== ==== ==== ==== relaxed

46. Solving simple problems on a small computer with someone nearby to help

    anxious ==== ==== ==-= ==== ==== confident

47. When the keyboard stops working

    confident ==== ==== ==== ==== ==== anxious

48. Knowing what to do with a small computer

    confused ==== ==== ==== ==== ==== clear

APPENDIX B

LICENSE TO USE OETTING'S COMPUTER ANXIETY SCALE (COMPAS)

APPENDIX C

COVER LETTER, COMPAS INSTRUMENT AND QUESTIONNAIRE ITEMS ADDED FOR THIS STUDY

June 24, 1997

As a doctoral student at Virginia Tech, I am conducting a study of Virginia Cooperative Extension staff computer uses. **Your** response is **essential** for the study to be valid and meaningful. It would be best if you could set a side 15 minutes of uninterrupted time, sitting at your desk, to complete this survey. This will give the survey a semi-controlled situation. There is no way to obtain the needed information without **your** response to the questionnaire.

All responses will be kept confidential. All data reported will be treated in terms of group information. No individual will be identified in the study. Please do not write your name on the questionnaire. The code number on the survey will be used **only** to facilitate the follow-up of non-respondents.

Should you have any questions, feel free to contact me, Brenda Martin, coordinator for this study, at (540) 953-5090, or e-mail blm@vt.edu. I will be happy to advise you of the results of the study if you are interested. A stamped, self-addressed envelope is provided for your convenience in returning the completed material. I would greatly appreciate the return of the survey by July 10, 1997.

Thank you,

Brenda Martin

Code #

DIRECTIONS

Read each statement and mark the space between the dotted lines to show how you feel about that situation. Look at the following item. If driving in heavy traffic made you feel very nervous, you would mark the item like this:

Driving in heavy traffic

relaxed ==== ==== ==== ==== ==== nervous

If it made you somewhat nervous, you would mark the item like this:

relaxed ==== ==== ==== ===== ==== nervous

Of course, if you were comfortable driving in heavy traffic, you would mark on that side of the scale. If you can't decide, or if you feel midway between the two adjectives, you should mark the middle space.

Try to answer every question. Some questions may ask about things that you do not know about, or things that you have never actually done. But you can usually figure out what the item means and/or can imagine what it would be like to be in that situation. Then mark the item according to how it would make you feel if YOU were in that situation.

1. I generally think of computers as

   friendly === === === === === unfriendly

2. Trying to use a computer to do a spread sheet

   frustrating === === === === === comfortable

3. Correcting an error on the computer screen

   easy === === === === === tricky

4. Learning to use a computer to do a budget

   comfortable === === === === === scared

5. Interpreting a complicated computer printout

   worried === === === === === secure

6. Computers give me

   more control === === === === === less control

7. Making a mistake when entering data for analysis because of nervousness

   likely === === === === === unlikely

8. Trying to setup a home page

   worried === === === === === secure

9. Deciding which type of computer to buy

   secure === === === === === insecure

10. Explaining a problem that you have not been able to solve to a computer consultant

    frightened === === === === === fearless

11. Just hearing the word "computer" makes me feel

    interested ====== === === === nervous

12. Performing a job where you have to regularly enter data into a computer

    concerned === === === === === unconcerned

13. Using word processing “tools” such as spell check

    less nervous === === === === === more nervous

14. Learning to keep records for a small business on a computer

    confident === === === === === anxious

15. Knowing the right words or "language" when talking about using a computer

    insecure === === === === === safe

16. Reading a book about how computers can be used

    enjoy it === === === === === avoid it

17. Looking at the keyboard of a computer

    anxious === === === === === comfortable

18. Trying to use a computer to solve a math problem

    frustrating === === === === === useful

19. When a message appears on the screen that you have not seen before

    confident === === === === === worried

20. Trying to operate a computer when you are all alone

    worried === === === === === unworried

21. Seeing computers appear in more and more places

exciting === === === === === frightening

22. Learning how to enter long lists of data into a computer

scared === === === === === comfortable

23. Entering text on a computer

easy === === === === === hard

24. Figuring out profits and losses by using a computer

comfortable === === === ==== === scared

25. Discussing computers with a group of people who know a lot about them

insecure === === === === === safe

26. Learning a new computer program

comfortable === === === === === frustrating

27. When the computer says "Error"

anxious === === === === === confident

28. Taking a test on a computer

worried ===== === === === secure

29. Deciding what software to buy for a computer

confident ===== === === === insecure

30. Consulting a computer manual to find out what you did wrong

anxious === === === === === relaxed

31. In general computers are

exciting === === === === === frightening

32. Correcting a mistake you made when typing data into a computer

concerned === === === === === unconcerned

33. Taking a computer class on word processing

unworried === === === === === worried

34. Using a computer to try out different ideas such as: What would costs and profits be if changes were made

comfortable === === === === === anxious

35. Taking an advanced course in computer applications

unsafe === === === === === safe

36. Reading a technical book about computers applications

unworried === === === === === worried

37. Playing a game on a computer

tense === === === === === relaxed

38. Solving simple problems on a computer with someone nearby to answer questions

anxious === === === === === confident

39. When the keyboard stops working

confident === === === === === anxious

40. Knowing what to do with a computer

confused === === === === === clear

41. Researching a client's request

confident === === === === === anxious

42. Communicating with colleagues

comfortable === === === === === scared

43. Preparing educational material

confident === === === === === anxious

44. Keeping records

comfortable === === === === === scared

Please answer each item.

1. Present city or county of assignment_____

2. Indicate your current position from the following choices: (check one)

a. Extension agent
_____Agricultural and Natural Resources
_____Family and Consumer Sciences
_____4-H

b. _____Extension Technician or Program Assistant

c. _____Extension Secretary

3. How many years have you worked in the above position
_____years and _____months

4. Total years worked for Virginia Cooperative Extension
_____years and _____months

5. Your gender _____male _____female

6. Age _____

7. Highest level of education _____

8. What applications do you use in your work? (check all that apply)

_____ Microsoft Word or other word processing
_____ E-mail
_____ Excel or other spreadsheet
_____ Internet_____
_____ PowerPoint

_____ Desktop publishing
_____ Graphics
_____ Access or other data base
_____ Others (please list)

9. How much time do you use a computer on a typical day?

_____hours or _____minutes

10. How are you presently using the computer? (Check all that apply.)
_____ Researching a client's request
_____ Communicating with colleagues
_____ Preparing educational material
_____ Keeping records
_____ Other (specify) _____

APPENDIX D

LETTER FROM J. DAVID BARRETT

BRENDA MARTIN

PO Box 12 **(540) 953-5090**
Blacksburg, VA. 24063 **E-Mail: blm@vt.edu**

Education:

Doctor of Philosophy, Vocational and Technical Education, May 1998, Virginia Polytechnic Institute and State University, Blacksburg, VA
Cognate: Agricultural Education

Master of Science, Adult Education and Economics, May 1995
North Carolina A&T State University, Greensboro, NC
Cognate: Rural Development Economics and Adult Education

Bachelor of Science, Business Administration
University of Dayton, Dayton, OH
Major: Marketing Minor: Economics

Experience:

Virginia Polytechnic Institute and State University
Project Coordinator (7/95-7/96). Developed and wrote a Ecology/Conservation and Natural Resources Management curriculum guides for the secondary schools in Virginia. Used knowledge of environmental concepts, procedures, analytical techniques, research methods, field testing, computer skills, writing and communication skills. An advisory committee of educators and state representatives was established.

North Carolina A&T State University
Graduate Research Assistant (1/95-5/95). Assisted principal investigator on a $600,000 safety and health project. Used knowledge of business concepts, procedures, analytical techniques, statistical research methods and writing and communication skills, computers and statistical packages. Obtained and guided others in proper collection of qualitative and quantitative data, analysis and interpreted economic and social data needed to develop results of field surveys. Established advisory board.

Building Maintenance Service Owner (10/79-9/92). Administered organization and departmental objectives. Responsible for marketing research and analysis of sales areas and consumers needs. Negotiated contracts with businesses and local, state, and federal government agencies. Designed, implemented and evaluated sales and promotional programs to increase sales volume. Developed and formulated policies, business plans, resources use and personnel

utilization. Worked with Chamber of Commerce assisting small businesses. Ability to structure, organize, evaluate and managed economic data and analysis procedures. Improved efficiency and increased productivity and profits. Ability to communicate in writing and orally with clients and personnel. Supervised hiring, training, evaluating of personnel and set performance levels for thirty-five employees. Developed quality control methods, sales programs, and employee development and educational programs.

Computer Skills: Languages: SPSS 3 years. Operating Environments: MVS: 3 years, Windows 95: 3 years, Microsoft Word: 5 years, Microsoft Excel: 6 months, Power Point: 6 months. Software: SPSS for Windows: 3 years, Mintab: 1 year, NCSS: 1 year.

Honors: Member of three Honor Societies: Gamma Sigma Delta, Omicron Tau Theta, Alpha Tau Alpha (past Vice President). Judge on the Graduate Virginia Tech Honor Code Board, 1995-1998. Economics Association (past Treasurer), International Student Association (past honoree President)

Professional Associations: American Vocational Association, Agricultural Education Association, Agricultural Research Association.