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BIOGRAPHICAL SKETCH ................................................................................................................189
The purpose of this study was to examine the use of information technology (IT) amongst county Extension agents of the University of Florida’s Florida Cooperative Extension Service. Four objectives delineated the research: Describe county Extension agents’ demographics, and use of IT vis-à-vis those demographics; determine how county Extension agents are using hardware and software on the job; determine county Extension agents’ perceived level of skills with regard to a specific set of IT tasks; and lastly recommend future IT training by describing the relationship between agents’ perceived importance of and self-assessed knowledge about specific IT skills.

The entire population of 331 county Extension agents was considered for this study. A mixed-mode methodology, which employed an electronic survey instrument and a traditional paper survey instrument, was used to collect the data. Agents were given three weeks to complete the electronic version of the survey, and thereafter
mailed the paper version. Respondents were subsequently categorized according to what methodology they chose to use. Additional categorization was performed on the electronic respondents according to when they submitted a completed survey. Of the 331 individuals in the population, 278 responded electronically, and 21 via paper for an overall response rate of 90.3%.

Information collected by the survey was subjected to a battery of statistical analyses. Summary statistics and ANOVA were used to compare and contrast patterns of IT use among agents of different gender, age, area of programmatic concentration, and response category. A weighting formula, based on a series of questions asked within the survey, was employed to derive agents’ future training needs.

County Extension agents painted a picture of an information technology savvy organization accommodating its clientele through Web sites, e-mail, and other sophisticated forms of information delivery. This current state of affairs is contrasted to findings from a similar study conducted ten years ago on Florida county Extension agents’ use of information technology. Key findings and associated implications, and recommendations for future research are then offered from the study at hand.
CHAPTER 1
INTRODUCTION

Background

The Cooperative Extension Service is a public, non-formal education system established by the Smith-Lever act of 1914. Charged by congress to diffuse “useful and practical information on subjects relating to agriculture and home economics” among the people of the United States, Extension evolved from the farmer’s institutes of the late 1800s and early 1900s. The organization was originally designed as a partnership of the land-grant universities and the U.S. Department of Agriculture, but provisions of the Smith-Lever act enabled a third legal partner, the counties of the states, to be included in the venture. Each partner, though having considerable independence in staffing, funding, and developing programs, nevertheless contributes functions essential to the whole system (Rasmussen, 1989). Extension in the United States and its protectorates is believed to be the largest such organization in the world, utilizing the resources of 67 land-grant universities, certain community colleges, and thousands of county agents (Seavers, Graham, Gamon, & Conklin, 1997).

An administrator appointed by the secretary of agriculture leads the federal Extension partner. This individual reports to the undersecretary of science and education, and strives to accomplish Extension’s mission “to assure an effective nationwide Cooperative Extension Service that is responsive to priority needs and the federal interests and policies with quality information, education, and problem-solving programs” (Rasmussen, 1989, p. 5). Over the years Extension has responded well to
“federal interests.” During both world wars the organization spurred increases in agricultural production and engaged in service functions such as soliciting for Liberty Bonds, and serving on local draft boards. During the depression Extension participated in many New Deal programs including the Farm Credit Administration, the Rural Electrification Administration, the Tennessee Valley Authority, and the Soil Conservation Service (Rasmusen, 1989). Today the federal partner directs special attention and funding to the state partners through “National Initiatives” in such areas as water quality, food safety, and workforce preparation (Cooperative State Research, Education, and Extension Service, (CSREES), 2001).

The state Extension partners are located at Land Grant universities, and are headed by a director or dean selected by the university with the concurrence of the secretary of agriculture (Rasmussen, 1989). An annual plan of work is submitted by the state Extension director for approval by the federal secretary of agriculture. The state partner is also responsible for the administrative oversight of the county partner.

Individuals at the university or research center level who conduct research or who specialize in disseminating research-based information are called “state Extension specialists.” Most state specialists are members of an academic department associated with the sponsoring Land-Grant institution, and are available to county Extension agents to help apply university-based research to solve local problems.

It is primarily at the county level, thorough the county Extension agent, that the university meets the people. Described variously as an “Extension educator, change agent, teacher, or social activist,” the county agent “serves as an educational broker for the community” (Seevers et al., 1997, p. 52). “County Extension agents constantly live
amid and encourage change in people and their surroundings” (Rasmussen, 1989, p. 7). They provide leadership and expertise, and extend knowledge needed to solve local problems (Seevers et al., 1997). The county Extension agent participates in a storied profession of dedication, long hours, and of gaining the trust of people in order to help them improve their lives through education based on scientific knowledge (Rasmussen, 1989).

**The Florida Cooperative Extension Service**

Extension work in Florida effectively began in 1909 with a $7,500 a year appropriation from the Florida State Legislature. This legislative action enabled federal authorities to send Florida its first state demonstration agent, A.S. Meharg, who developed a successful program before his resignation in 1913. Extension proper began on May 25th, 1915, when Florida accepted the provisions of the federal Smith-Lever Act. Peter H. Rolfs was its first director (Cooper, 1976).

Today the Florida Cooperative Extension Service operates as part of the University of Florida’s Institute of Food and Agricultural Sciences, and has a presence in each of the state’s 67 counties. The organization conducts educational programming in areas such as agriculture, food safety, energy conservation, family economics, and youth development (University of Florida, Institute of Food and Agricultural Sciences, 2001).

**Information Technology and the Cooperative Extension Service**

In the early 1920s the Cooperative Extension Service adopted two new innovations, the radio and the telephone, to keep rural people informed of Extension activities and, with radio, to deliver educational programming (Rasmussen, 1989). The next significant innovation in electronic communications, television, was also used by the organization to work with clientele (Rasmussen, 1989). When the personal computer
began its widespread diffusion in the early 1980s, Extension, along with the rest of the world, was introduced to a new technology that would quickly evolve into a revolutionary means of communication. During the early days of the personal computer’s diffusion Cantrell (1982) reported that Extension educators, lacking computer competencies, were in jeopardy of becoming less computer literate than their clientele – thus evidencing a slowness by agents to adopt the innovation. Ten years later Ruppert (1992) stated “Extension educators cannot escape the computer revolution and will be challenged in their roles with the responsibility of helping people understand and make the best use of such technology” (p. 4). Eight years thereafter, and after monumental technological progress in personal computing, Albright (2000) stated that knowledge had become the central focus of the global economy, and that a transition to “incorporate the technology required for the dissemination of knowledge” (p. 11) is nowhere more important than within organizations that have always produced knowledge (i.e. Extension). Furthermore Albright states that the organization’s leadership must “consider societal, global, and demographic changes and effectively embrace information technology as an impetus to further the mission of CES” (Albright, 2000, p. 16).

The capability, then, for Extension agents to learn and to apply the use of computers, software and associated peripheral devices (collectively, information technology) for purposes of serving clientele and in support of Extension’s administrative infrastructure, has become an essential job-related skill. Albright (2000), addressing the need for organizations to “adapt to the technology explosion” (p. 3) states: “It is critical that Extension re-invest in employees and train them in the necessary skills to remain competitive and serve a dynamic community” (p. 4). Martin (2001) echoes this: “With
more clients using computers to obtain information, it will be critical for agents and other field staff to gain the computer skills necessary to use computers as a means for gaining greater efficiency in obtaining and sharing educational information” (p. 1).

To measure the ability of Extension professionals to use information technology, Albright, in her 2000 study of Texas county Extension agents asked agents to self-rate their computer skills in eight areas ranging from word processing to the use of peripheral devices. Albright also sought to determine future training needs by asking agents to rank each of the eight specific information technology skill areas according to the importance the agent ascribed to a skill area, the agent’s knowledge of the skill area, and the agent’s ability to apply the skill area to their job. These three constructs were operationally defined in the following manner: “Importance” described the importance of a particular skill to an agent’s job function; “knowledge” measured the ability to accurately recall or summarize information associated with a skill; and “application” measured the ability of the agent to use specific skills on the job. Albright found that the general population of Extension agents indicated that their strongest skills were in word processing, e-mail, Internet use, and file management, respectively (Albright, 2000). Older agents in the study self-reported fewer information technology skills than younger ones, and indicated that their primary source of IT knowledge stemmed from on-the-job training. Younger agents were found to be “more self-directed in their technology learning” (Albright, 2000, p. 94). Both younger and older agents reported having participated in little IT training within the two years prior to the study (Albright, 2000). Usage of the Internet was seen by agents as being a “very critical” means of program delivery, and, by younger agents in the survey, a potential means to receive training (Albright, 2000, p. 95).
Based on her research, Albright concluded that agents from the general population of Texas Extension agents that were studied needed training in the following areas: Web page development, peripheral device management, presentation software, file management, E-mail, word processing, Internet, and spreadsheets. She also found that agents who had taught themselves computer skills self-reported lower computer skills ability. Thus do different employees have different training needs, and should learn skills commensurate to their current level of expertise: “The literature supports that it is counterproductive to design one training plan for all agents and expect learning to occur” (Albright, 2000, p. 106). Albright also states that developing a set of “specific skill standards or competencies” would provide “benchmarks” for employees to meet when developing their computer skills (Albright, 2000, p. 104). This would establish expectations for specific levels of employee computer competencies, with the implication that training needs could be differentiated and addressed.

Need for the Study

The last systematic study of general computer use amongst county Extension agents of the Florida Cooperative Extension Service (FLCES) was conducted by Kathleen C. Ruppert in 1992. Her objective was to “determine whether county extension agents use computers, to what extent they use computers, and what factors may be inhibiting or encouraging their use” (Ruppert, 1992, p. vi). The factors “inhibiting or encouraging” computer use “were operationally defined as subscales of the Computing Concerns Questionnaire (CCQ)”¹ which, along with a battery of questions about

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¹ The 32-item Computing Concerns Questionnaire was developed and verified by Martin, and based on the Concerns Based Adoption Model developed by Hall and colleagues as a means to identify and explain discrete stages of concern that individuals progress through (and express) as they adopt an innovation (Ruppert, 1992).
“personal and situational factors,” was used in a census study of FLCES county agents (Ruppert, 1992, p. vi). Ninety-four percent of the population responded. After subjecting her data to a battery of statistical procedures, Ruppert found that “almost half” of the agents had a computer on their desk, and that one-third of them made use of a computer at home. Of computer skills, agents “were most adept at computer word processing,” followed by VAX (computer network), databases, the IFAS CD-ROM, spreadsheets, and computer graphics (Ruppert, 1992, p. 101).

Agents associated with the Agriculture, 4-H, and Marine program areas had “significantly higher” computer use mean scores\(^2\) than agents in other areas (Ruppert, 1992, p. 101). Of the eight subscales of the Computing Concerns Questionnaire, those concerns which focused “either on the individual or the client and how the agents interact with the computer and how their computer work effects their clientele” were found to be statistically significant (Ruppert, 1992, p.102). Ruppert also found that “age, program area, typing, computer training, and computer resource contact were all significant demographic and situational independent variables that affected the overall computer use mean score of county agents” (Ruppert, 1992, p.102).

Since the Ruppert study many technological advances have occurred including faster machines, widespread connectivity to the Internet, use of graphical user interfaces in software, and use of the World Wide Web to retrieve and disseminate information. These developments have, over the past 10 years, changed the nature of workplace computer use among FLCES county Extension faculty. The following questions thus arise: Have county agents kept abreast of the manifold technological changes of the past

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\(^2\) This mean is computed from a linear model relating computer use to agent’s “personal and situational factors.” A model was also constructed using the responses from the Computing Concerns Questionnaire.
10 years? Are they utilizing the Web for information to fulfill client need? Are they disseminating information to clientele through Web sites or e-mail? Are agents using e-mail to exchange information, and can they attach a file to such messages? And finally, to what degree of sophistication do agents use everyday office software products such as word processors, or a spreadsheet?

There was a need, then, to investigate the current use of information technology, level of information technology skills, and the workplace application of modern information technology among county Extension agents of the Florida Cooperative Extension Service. Ultimately, Extension administrative entities, and other parties interested in this issue, will be provided with objective, research-derived information that should provide an understanding of county agents’ IT use, and consequently enable the specific IT training needs of county faculty to be addressed.

The objectives of this study were therefore

1. Describe county Extension agents’ demographic characteristics and, based on those characteristics, determine their use of information technology, including self-assessed level of overall computer skills.

2. Determine how county Extension agents are using information technology on the job in terms of hardware and software use.

3. Determine county Extension agents’ perceived level of skill with regard to a specific set of information technology tasks.

4. Recommend future information technology training by describing the relationship between agents’ perceived importance of, and self-assessed knowledge about specific information technology skills.

**Definition of Terms**

For purposes of this study, the following terms are defined:

1. Information Technology refers to computers, computer software, and peripheral devices connected to computers such as modems, scanners, Ethernet, digital television, etc.
2. Office-type software products refers to software that performs such tasks as word processing, spreadsheets, browsing the World Wide Web, electronic mail, etc.

3. The FLCES is the Florida Cooperative Extension Service.

Limitations of the Study

A census of the population of county Extension agents of the FLCES was conducted using an instrument accessible via the World Wide Web. Those agents not responding to the on-line instrument after three weeks duration of time were sent a traditional paper instrument. Due to the nature of a census study, the specific IT infrastructure in place within the FLCES, and the specific IT knowledge and skills that might be possessed by FLCES county agents, the findings of the study cannot be generalized to Extension organizations elsewhere, though they are likely to offer insight to those organizations.

Assumptions

It was assumed that the county agents of the Florida Cooperative Extension Service who responded to the survey did so with truthfulness and honesty.

Significance of the Study

The level of skills and workplace application of information technology by county Extension agents of the FLCES is presently under-researched. This situation is significant to Extension because the ability to effectively use IT in a current, up-to-date manner bears directly on the organization’s operational effectiveness in two fundamental areas: Its internal functioning, and its mission to serve the needs of its clientele. Studying patterns of county Extension agents’ IT skills will help paint a clearer picture of the strengths and weaknesses faced by the organization in this important area. Recommendations addressing specific needs for agent computer training will follow from
the findings of this study. Such information may be important to FLCES administrators, particularly in light of the potential for enhanced organizational efficiencies.

Organization of the Remainder of the Chapters

This thesis is presented in five chapters. Chapter 1 introduces the study, and proceeds to Chapter 2, a review of the literature. Chapter 3 discusses the study’s methodology, including research design and procedures followed. A detailed report on the data collected is provided in Chapter 4, and Chapter 5 engages in a summary of the study, conclusions, and recommendations based on the study’s results.
CHAPTER 2
REVIEW OF THE LITERATURE

Introduction

This review of literature encompasses three parts. Part 1 engages in a broad historical perspective of the development of computers that has lead to today’s modern information technology. The intent of the section is to impart to the reader a distinct feel for the profound impact that the computer and its peripheral devices have had on societies throughout the world. Part 2 discusses the application and use of information technology, establishing why its use is an advantageous, if not necessary skill in this day and age. Shown here is the extent of information technology’s penetration into the workplace, school, and home. Both the present and potential impact of information technology on higher education, with considerations specific to Extension, is discussed. Part 3 establishes the theoretical aegis under which this study functions.

Part 1-A Historical Perspective of the Computer’s Technical Development

A Look at Related Innovation from Ancient Times to 1950

Today’s computer is a fusion of innovations, having evolved from many and varied calculating devices – some dating to antiquity. Perhaps the modern computer’s most distant progenitor is the abacus, a counting device comprised of beads strung on rods. The abacus widely diffused among the merchants of ancient Asia and is still used in parts of the world today (Ross, 1986).
The next significant innovation in calculating devices occurred in the 1640s when nineteen-year-old French mathematician Blaise Pascal invented a gear-driven machine that could add and subtract. Some thirty years later the German mathematician Gottfried Wilhelm von Leibnitz extended the capacity of Pascal’s machine to include multiplication and division. Another widely used calculating device, the slide rule, also stems from this era (Ross, 1986).

In the 1830s an Englishman named Charles Babbage theorized an “analytical engine” which foretold of modern computers. The “engine” incorporated a programming component based on Joseph Jacquard’s system of using punched cards to operate weaving looms in a prescribed manner. This innovative feature represented a distinct break from processing immediate input, and can be seen as the progenitor of modern, stored computer programs (Ross, 1986).

American engineer Herman Hollerith ushered in the next significant step towards modern computers. Responding to a competition held by the U.S. Census Bureau to find the best means to tabulate the 1890 census, Hollerith invented an electromechanical tabulating machine that successfully automated the census counting process. Based on punched cards, the machine more than halved the time it took to tabulate the previous (1880) census, saving the government an estimated five million dollars. In 1896 Hollerith founded the Tabulating Machine Company that, for the better part of the next century, would play a pivotal role in the development and diffusion of computing devices (Campbell-Kelly and Aspray, 1996; Ross, 1986). A short examination of this company’s emergence follows: McKinley’s assassination in 1901 brought about a change in the leadership of the Census Bureau. The Bureau’s
new leader soon ended the business relationship with Hollerith’s Tabulating Machine Company, which forced the company to focus on diffusing its tabulating machine into new markets. With the introduction of an improved “automatic” version of the machine, adoption of punch card tabulating spread rapidly throughout many diverse corporate and governmental entities. In 1911 Hollerith sold the company, which was merged with two other businesses to become the Computing Tabulating and Recording Company (CTR). The new company’s president, Thomas J. Watson, Sr., established a highly effective sales force that facilitated the diffusion of the tabulating machine throughout the world. In 1924 the CTR Company re-name itself the International Business Machines Corporation (IBM) (Campbell-Kelly and Aspray, 1996).

The War Years: Calculating Needs drive Innovation

In the early 1940s the Moore School of Electrical Engineering at the University of Pennsylvania possessed a Bush Differential Analyzer (a large mechanical calculating machine). In proximity to this school was the Army’s Ballistics Research Laboratory (BRL) at the Aberdeen (Maryland) Proving Grounds. This laboratory, which also had a Bush Differential Analyzer, was responsible for creating firing tables for each new ballistic weapon fielded by the United States military. With use of the differential analyzer, a firing table containing data on up to 3,000 trajectories could be completed in about a month. A team of 100 human calculators (characteristically young women) working with desktop calculators took approximately the same amount of time to complete a table. As the war progressed the BRL fell behind schedule in completing firing tables, thus creating a bottleneck to the deployment of new weapons. It turned to the Moore School for help, but even
with this assistance the deployment of new weapons fell farther behind. The need for effective calculating technology thus became urgent, and this spurred applied research into a solution for the problem (Campbell-Kelly and Aspray, 1996).

In August of 1942 John Mauchly of the Moore School proposed to build an electronic computer to expedite the calculation of firing tables, thus relieving the bottleneck. Initially ignored, the proposal was revisited in the spring of 1943 and approved shortly thereafter. Mauchly then teamed with a 24-year-old electrical engineer named Presper Eckert, eventually devising an electronic computing machine called ENIAC (Electronic Numerical Integrator and Computer).

A chance meeting on a railway platform between the BRL/Moore School liaison officer, Herman H. Goldstein, and mathematics genius John von Neumann of Princeton’s Institute for Advanced Study lead to von Neumann’s involvement with the Moore School’s electronic computer project. By this time ENIAC was at such a stage of completion that its design had been frozen. It had three major shortcomings: Too little storage, too many tubes, and it took a prodigious amount of time to reprogram. These deficiencies lead to the development of the EDVAC (Electronic Discrete Variable Automatic Computer), which, associating many of von Neumann’s theoretical insights, pioneered aspects of electronic computing that hold to this day (Campbell-Kelly and Aspray, 1996).

EDVAC was a “stored program” computer that consisted of an input device, memory, a control unit, an arithmetic unit, and an output device. In the spring of 1945 von Neumann published “A First Draft of a Report on the EDVAC” which detailed “the complete logical formulation of the new machine,” a formulation which
“ultimately was the technological basis for the worldwide computer industry” (Campbell-Kelly and Aspray, 1996, p. 94). This document, though intended only for internal use, was rapidly disseminated around the world. In the meanwhile, shortly after the end of the war, Mauchly and Eckert’s ENIAC computer came to life. Its intriguing physical appearance, and its 5,000 operations per second speed generated tremendous coverage in mass media channels, thus attracting public and scientific interest. Responding to the publicity, the Moore School sponsored a series of lectures in 1946 specifically to diffuse information on the stored-program computer. The lectures established a link between the school, and the many governmental, university and industrial entities working on computers in the late 1940s (Campbell-Kelly and Aspray, 1996).

ENIAC and EDVAC are but two examples of the “first generation” of fully electronic computational devices. The British COLOSSUS, developed in secrecy to break the infamous Nazi Enigma cipher, and the German Z1 developed by Konrad Zeuse were similar devices. Based on vacuum tubes, this “first generation” of computers were very large in size and consumed prodigious amounts of electricity. Each was a unique creation dedicated only to solving mathematical problems.

Re-invention, Public Attention, and Diffusion: The 1950s

The end of the war allowed the once secret digital computation techniques to quickly diffuse into the civilian arena. This brought roughly thirty firms in the United States into the computer business. About ten were established in Great Britain. Office machine manufacturers, electronics and control equipment suppliers, and entrepreneurial start-ups were the three types of companies attempting to capitalize on the new technology (Campbell-Kelly and Aspray, 1996).
During the 1950s the computer, hitherto a mathematical instrument with limited application, was re-invented as a data-processing machine (Campbell-Kelly and Aspray, 1996). Leading the way, in early 1951, was the Electronic Control Company whose UNIVAC system was geared specifically towards business. IBM, after initially committing the company’s resources to develop a scientific computer called the “Defense Calculator,” quickly realized that it should focus its efforts on developing machines for civilian business. The wake up call for IBM occurred when the U.S. Census Bureau adopted the UNIVAC system to address the bureau’s computational needs (Campbell-Kelly and Aspray, 1996).

Popular excitement about computers in the early 1950s was reflected in mass media channels such as business magazines, which fanned interest with sanguine predictions of a paperless revolution driven by sophisticated automata. Many business establishments were thus spurred to adopt the computer at this early date regardless of cost effectiveness (Campbell-Kelly and Aspray, 1996).

New technical innovations continued to provide improvements to the nascent computer industry’s product. Out of MIT’s Project Whirlwind, a contract to build a flight simulator for the military, came the inventions of magnetic core memory and “real time” operation. The core memory innovation alone would quickly replace all other types of memory, reaping MIT large royalty payments. Real time operation, in which a computer immediately responds to external input, enabled new military and business applications. Stemming directly from Whirlwind’s technological breakthroughs came the military’s SAGE early warning air defense system. Although IBM was the primary contractor for the project and gained tremendous technological
advantage in the industry as a result, SAGE nevertheless spun off key technological innovations such as printed circuitry, mass-storage devices, graphical displays, digital communications, and core memory to a host of different companies. The project also trained a large cadre of software engineers. At the end of the 1950s only about 6,000 computers were installed worldwide, but a critical mass of technological innovation was in place to begin intense commercial exploitation of the machine (Campbell-Kelly and Aspray, 1996).

Two high level programming languages were introduced in the 1950s that endure to the present day: FORTRAN, for scientific applications, and COBOL for business. These innovations facilitated further adoption of the computer because of their similarity to natural, spoken language, and because they had built-in algorithms that clearly spelled out errors in newly written code.

Programming costs constituted the largest expense associated with a computer installation, and thus companies preferred to obtain ready-made applications written by outside vendors rather than develop them on their own. Recognizing this, the computer manufacturers began to bundle software that had specific application, be it banking, insurance, manufacturing, etc., to their computers. Libraries of existing programs were included with systems, and the free exchange of code was facilitated through user groups like SHARE (Campbell-Kelly and Aspray, 1996).

It should be noted that by the end of the 1950s the British computer industry, though it was first to market a computer (the Ferranti Mark I), was struggling for survival. Campbell-Kelly and Aspray attribute this situation to a lack of enthusiasm amongst Britain’s “old fashioned businesses” to adopt the innovation (Page 106).
The social consequence of the British establishment’s non-adoption was to effectively stifle a new, innovative industry that was trying to take hold – thus insuring American dominance in the arena for years to come.

The 1960s: Refinement, more Innovation, and more Adoption

Replacing the vacuum tube in the late 1950s, the discrete transistor ushered in the second and third generations of fully electronic computers. These new machines were much more compact in size, consumed less power, and did not generate nearly as much heat (Ross, 1986). This spurred further adoption of the innovation, and by the end of the decade there was a tenfold increase in the number of installed systems - to almost 80,000 in the United States, and 50,000 elsewhere (Campbell-Kelly and Aspray, 1996, p. 130).

Transistors, however, were soon obsolete, being replaced by a truly revolutionary innovation called the integrated circuit. Invented by Jack S. Kilby of the Texas Instruments Corporation, the integrated circuit readily lent itself to miniaturization and sophistication. Its introduction in the late 1960s ushered in the beginning of a fourth generation of digital computational devices, which would steadily increase in power and speed while dropping in size and price (Ross, 1986).

Rapidly increasing numbers of computers created a demand for application programs that, by 1965, supported 40-50 large software contractors and approximately 2,750 smaller ones. By the end of the decade these services were in greater demand because the average size company was unable to develop software in-house that could effectively exploit modern computing power. It simply cost too

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1 Kilby was awarded the 2000 Nobel Prize in Physics for his role in the invention of the monolithic integrated circuit.
much money. Custom-designed applications purchased from outside contractors, however, were also prohibitively expensive. This problem opened the door to “packaged software,” which effectively distributed development costs across a whole market (Campbell-Kelly and Aspray, 1996).

Some other notable technological developments in the computing arena hail from the 1960s era: Time-sharing, the BASIC programming language, and the minicomputer. Computer time-sharing systems, developed through large grants from the U.S. Advanced Research Projects Agency, enabled multiple parties, even at divergent locations, to simultaneously use a large computer. This innovation markedly increased computer efficiency, and spawned what would be known as the “computer utility” industry, a short-lived phenomena that envisaged “piping computer power into homes” (Campbell-Kelly and Aspray, 1996, p.217). It should be noted that whereas the popular marketplace application of time-sharing failed, it remains an instrumental part of most all mainframe computing today.

The BASIC (Beginners All-purpose Symbolic Instruction Code) computer language emanated from the Dartmouth (College) Time-Sharing System, and was devised with simplicity in mind. It diffused rapidly through the educational establishment, making it de rigueur for manufacturers to include it on any new system designated for this market. Though some criticized its simplicity, BASIC emerged as a user-friendly language that made it possible for a wide spectrum of people to adopt the use of computers. It was to be the first widely available programming language for the forthcoming personal computer and “laid the foundations of Microsoft” (Campbell-Kelly and Aspray, 1996, p. 211).
Towards the Personal Computer

Minicomputers emerged from MIT’s Whirlwind project to become a product of the electronics industry (as differentiated from mainline computer manufacturers such as IBM). They were part of the revolution that miniaturized electronics, an effort that brought the world pocket calculators, digital watches, and ultimately the personal computer. Minicomputers enjoyed two distinct attributes that lead to their widespread adoption by scientific, academic, and engineering entities: They were far less expensive than a mainframe (having no bundled software, peripheral devices, or marketing overhead built into its price), and they allowed for “hands-on computing” like unto the early 1950s.

Minicomputer use, especially the Digital PDP-8, spawned interest in computing amongst the students, experienced engineers, and young technicians who used them, and from this interest a “strong computer hobbyist culture” emerged (Campbell-Kelly and Aspray, 1996, p. 225). In 1966 the Amateur Computer Society was founded, and through its “ACS Newsletter” publication a network of like-minded individuals was formed.

The microprocessor arrived in 1971. Developed over the course of two years by Intel Corporation, it was designed as a general-purpose logic chip that could be programmed for specific applications such as a calculator. In fact the first Intel microprocessor was sold in early 1971 to Busicom, a Japanese calculator manufacturer. This chip, however, was soon to be re-invented.

Precipitous declines in the price of electronic calculators soon lead Busicom to relinquish the marketing rights to the general-purpose logic chip back to Intel, who, in November of 1971 began marketing it as a “computer on a chip.” This was the
Intel 4004 microprocessor. A low-powered device capable of processing only four bits of information at a time, it nevertheless sold for $1,000 a copy. Competition from such companies as Motorola, Zilog, and Mostek would soon drive the price of microprocessors much lower (Campbell-Kelly and Aspray, 1996).

**Personal Computing: Technology Fuses with Latent Desire**

Two distinct groups played a role in the eventual inception of the personal computer: Computer hobbyists and those involved with “computer liberation” movement. The hobbyists were concentrated in the Silicone Valley region, around Massachusetts’ Route 128 corridor, and in lesser numbers through the country. Resembling, if not out rightly stemming from the “ham” radio culture, these individuals were characteristically young male “technophiles” often with some professional association with the electronics industry. They were likely to read such mass media publications as “Popular Electronics” from which kits to build such things as stereos and television sets could be obtained. Minicomputers were too costly for these individuals, as was computer use by way of time-sharing computer utilities. This then sparked a desire for economical computer hardware that could be readily owned by an individual (Campbell-Kelly and Aspray, 1996).

Congruent to the desire for personally owned hardware, and hailing from the anti-establishment culture of the 1960s, the computer liberation movement espoused the “radical idea called hypertext,” a vision whereby common people could economically access a “universe of information held on computers” (Campbell-Kelly and Aspray, 1996, p. 239). Inhibiting this vision was the fact that most all computers were “rigidly controlled in government bureaucracies or private corporations”
In January of 1975 the first microprocessor-based computer was offered as a $397 kit. Called the Altair 800, its availability was announced exclusively on the cover of Popular Electronics magazine. Though it had no keyboard or monitor, and unto itself did nothing other than light up a few small light bulbs, it generated a million dollars worth of orders in the first three months it was offered. Soon other companies were marketing add-on components for the system such as additional memory, storage devices and software. The Altair 800 galvanized the attention of Bill Gates and Paul Allen who formed a company named “Micro-Soft” and quickly developed a BASIC programming system to accompany this fledgling personal computer (Campbell-Kelly and Aspray, 1996). New communication channels dedicated to the innovation opened up practically overnight – from “The Homebrew Computer Club” near Silicone Valley, to “Byte,” and “Popular Computing” magazines. By 1977 a chain of stores, ComputerLand, would sell machines and software nationwide (Campbell-Kelly and Aspray, 1996).

Key items such as screens and keyboards, which existed from the evolution of mainframe computers, contributed to the rapid development of the personal computer away from its simplistic beginnings. By 1977 there were three leading manufacturers of personal computers whose products each appealed to a different segment of the market. For Apple, the Apple II machine was a “home/personal computer,” an attempt to position it beyond the hobby market. Tandy’s TRS-80 machine appealed to Radio Shack’s clientele of hobbyists and video game enthusiasts. For Commodore,
the personal computer was conceived as an extension of its line of calculators (Campbell-Kelly and Aspray, 1996).

Software drove adoption of the personal computer (PC). Computer games, simulation programs for education, and perhaps most importantly business applications transformed the machine from the realm of the hobbyist to a utility. Leading this transformation was the VisiCalc spreadsheet that, coupled with the (relative) speed and flexibility of the PC, allowed businesses to easily model various financial scenarios. “Suddenly it became obvious to businessmen that they had to have a personal computer. VisiCalc made it feasible to use one. No prior technical training was needed to use the spreadsheet program. Once, both hardware and software were for hobbyists, the personal computer a mysterious toy, used if anything for playing games. But after VisiCalc the computer was recognized as a crucial tool” (Slater, as quoted by Campbell-Kelly and Aspray, 1996, p. 251). The software evidently had copious relative advantage over analogous mainframe software in its speed and flexibility, and because it could be used virtually for free after a modest purchase expense. VisiCalc certainly was compatible with business’ existing values, especially if they had been using similar software on a mainframe. Given that VisiCalc needed “no prior technical training,” its complexity was such that it could be easily adopted. Evidently it was easy to try, and furthermore the success of those trials was very obvious to businesses. Thus this innovation was readily adopted.

By 1980 there were many spreadsheets on the market, along with word processing software and first of the database products. The PC itself was sporting new monitors that displayed 80 columns of text in both upper and lower case, and
printers were quite affordable. Its potential as a business machine had clearly arrived (Campbell-Kelly and Aspray, 1996).

IBM’s entry into the personal computer business had the instantaneous effect of casting a seal of approval on the PC technology. The IBM badge was an emphatic statement that the PC was legitimate technology compatible with business everywhere – and business responded, in a big way. Launched in New York City on August 12th, 1981 the IBM Personal Computer generated “intense” interest from mass media, thus diffusing knowledge of the innovation far and wide. This attention was in addition to IBM’s own memorable advertising campaign that featured a Charlie Chaplin look alike designed to humanize the PC machine (to make it seem compatible to those considering adoption). At a price of $2,880 there was soon a waiting list for the product, and IBM quickly quadrupled production (Campbell-Kelly and Aspray, 1996).

Software Diminishes Complexity, Enhances Compatibility

The IBM personal computer architecture with its Intel 8088 processor, 64 kilobytes of RAM, and floppy disk drive quickly became an industry standard. All computer manufacturers either switched to the new standard or suffered the consequences. A notable exception was Apple Computer, whose business approach to the IBM competition was to design a better operating system, and resultantly, better application software. Apple’s president, Steve Jobs had seen the future, so to speak, when he had accepted an invitation to visit the Xerox Corporation’s Palo Alto research laboratories in 1979. (The visit was in response to an invitation extended by Xerox, who was an early investor in Apple.) During his visit Jobs witnessed, amongst other things, the mouse and the graphical user interface (GUI). Clearly
amazed, he commented that Xerox could “blow away” the competition with the technology. Taking his observations back to Apple headquarters in Cupertino, California, Jobs convinced his colleagues that what he had seen at Xerox was the technological way to go. In May of 1983 Apple launched the “Lisa” computer that incorporated the GUI operating system and mouse innovations. At $16,995 the Lisa was a commercial failure. In January 1984 Apple introduced another computer, the Macintosh, which also incorporated the GUI and the mouse. Though described as making “every other personal computer appear old-fashioned and lackluster” (Campbell-Kelly and Aspray, 1996, p. 276), the Macintosh, priced at $2,200, failed to garner much adoption outside of the computer enthusiast market, education, and printing and media companies. Regardless of Apple’s failure to gain widespread adoption of its products, the GUI was an innovation that would eventually propel adoption the personal computer throughout society – and one company, Microsoft, having written much of the software for the Macintosh, had gained intimate knowledge of how the GUI technology worked (Campbell-Kelly and Aspray, 1996).

Responding to the very apparent advantage of the Apple operating system, other firms launched similar GUI products. The first was VisiCalc, which introduced VisiOn in October of 1983. Soon thereafter, in early 1994, Digital Research launched GEM. Microsoft, having licensed characteristics of the Macintosh operating system, released Windows in late 1985, and IBM, initially partnered with Microsoft, began work on OS/2 in 1987. Sooner or later each of these operating systems would fail to be commercially viable, except Windows (Campbell-Kelly and Aspray, 1996).
Buoyed by royalties generated from its Disk Operating System (DOS), a copy of which was installed on every IBM PC sold, Microsoft had the resources to develop and effectively market software – and weather to marketplace failures when they occurred. The first version of Windows saw only little adoption. It was “unbearably slow” even on machines running the latest Intel 286 microprocessor, and was perceived as a “gimmick” with little advantage over DOS (Campbell-Kelly and Aspray, 1996, p. 278). Yet Microsoft persisted, developing a base of Windows applications for the IBM PC. When the second version of Windows was released it sold over 2 million copies. By the third release of Windows in May of 1990 microprocessor power had been enhanced to the point where the Windows GUI operated with reasonable alacrity. This was the era of the Intel 386 and 486 microprocessors. At this time Microsoft chairman Bill Gates, presiding over a $10 million worldwide media spectacular at the launch the new GUI, proclaimed Windows 3.0 “puts the personal back into millions of MS-DOS-based computers” (Campbell-Kelly and Aspray, 1996, p.281). Five years later even more extravagant media events heralded the August 1995 release of Windows, now renamed “Windows95.” Further releases of the software occurred in 1998, 2000, and 2001. The Windows GUI along with a diverse array of sophisticated software sporting a Windows-based commonality in design, fueled adoption of the personal computer across society to the greatest numbers ever.

Part 2-The Application and Use of Information Technology

General Use of Information Technology in Today’s Society

“At work, school, and home, the personal computer has become a basic tool” (U.S. Commerce Department, U.S. Census Bureau, 1999). By October of 1997, 37.4
million or 36.6% of American households had acquired a computer. More than 80% of the children living in a household with a computer used it – primarily for education and games, but also for word processing, graphics and design, and e-mail. Boys and girls use computers almost equally, but for different purposes. In 1997 almost half of American adults used a computer at work, home or school. Half of all employed adults used a computer on the job, a greater degree of use than at home or at school. The fraction of adults using computers on the job increases to 75% if they have a college education. Women, because they hold primarily technical or administrative jobs within industry, tend to have higher levels of computer use than men. Men and women also use computers differently at work (U.S. Commerce Department, U.S. Census Bureau, 1999).

This “basic tool” in the employment setting is used primarily for word processing. Other uses, in order of frequency, are keeping customer records and accounts, e-mail and communications, calendar/scheduling, databases, spreadsheets, and bookkeeping. Of less common use is inventory control, analysis, invoicing, sales and marketing, graphics and design, desktop publishing and newsletters, and programming (U.S. Commerce Department, U.S. Census Bureau, 1999).

For many Americans use of the Internet is becoming an increasingly common daily activity. Business transactions, personal correspondence, research and information gathering, and shopping are now routinely conducted via computers connected to the Internet. In August 2000, 41.5% of American households had Internet access, and 116 million Americans were online at some location. This figure is projected to grow substantially by the middle of 2001. Adoption of Internet
technology, and thus the use of computers, is occurring amongst most all Americans regardless of demographic characteristics. Even groups that traditionally have been lagging behind the national trend are now making dramatic gains. This includes rural households whose rate of Internet penetration is now 38.9%, a percentage far closer to the national rate than in the past (U.S. Department of Commerce, 2000).

Underscoring the growing importance of Internet activity to all Americans, the Commerce Department states: “Each year, being digitally connected becomes even more critical to economic, educational and social advancement. Now that a large number of Americans regularly use the Internet to conduct daily activities, people who lack access to those tools are at a growing disadvantage. Therefore, raising the level of digital inclusion – by increasing the number of Americans using the technology tools of the digital age – is a vitally important national goal” (U.S. Department of Commerce, 2000, p. 1).

The significance of digital inclusion, and thus the need to adopt the innovation has not escaped the notice of industry, as evidenced by Chase Manhattan Bank’s (CMB) recent commitment to a multi-year, multi-million dollar grant to develop an extensive home-school computer network at an inner-city school in Brooklyn New York. Included in the grant is state of the art equipment to be given away free to students and staff, a new school website, and the volunteered time of 1500 CMB employees (Chase Manhattan Bank, 2000).

The Federal government is also catalyzing building the nation’s Internet framework through a key component of the 1996 Telecommunications Act. Called the “E-Rate,” the legislation allows school districts and libraries to purchase
telecommunication services at significant discounts. The result has been nearly $6 billion expended toward improving telecommunications infrastructure, and Internet access, at predominately needy schools and libraries (Benton Foundation, 2000).

**Information Technology in Primary and Secondary Education**

During the 1950s computing power was used almost exclusively to develop new technology. In spite of this “preoccupation,” the emergence of computer-based education took form in flight simulation and various industry-based employee-training programs. By the early 1960s computing power had tentatively reached the mainstream (K-12) education establishment, which lead to the programmed-instruction movement (as exemplified by the Stanford Project and PLATO). Adoption of computers, however, was stymied by their large cost and a lack of individuals who knew how to operate them (Ross, 1986). Regardless of these difficulties, the stage was being set for the further integration of computing power into the mainstream education establishment.

Writing in the second half of the 1960s, Loughary indicated that in society at large “computers and sophisticated communication devices” had become accepted “as natural parts of our environment” (Loughary, 1966). Mainstream education, he indicated, was not excluded: “The concepts underlying systems and electronic communications devices are playing increasingly important roles in education and, if the thinking and planning of some educational leaders is valid, are destined to become basic and necessary to education in the not too distant future” (Loughary, 1966, p. xi). Loughary is auguring the increased use of computers for instructional purposes, as he goes on to observe that the machine was evolving from “the garage and workshop of education” (metaphorically, administrative/bookkeeping functions), to “the kitchen
and living room” (metaphorically, the classroom) (Loughary, 1966). Capping off the thought he states: “The resulting potential for change in our educational institutions are overwhelming” (Loughary, 1966, p. xi). Change as predicted by Loughary would indeed take place, though at a much slower pace than thought at the time. Both technological, and perhaps more significantly, sociological hurdles still needed to be overcome before widespread adoption of the technology took place.

One can imagine the reaction of a professional educator to a “man-machine” system that performed many of their traditional functions. Such a system, postulated by Loughary, integrated the storage, retrieval, and high-speed printing of indexed reference material along with diagnostic testing of students and the ability to produce cumulative student progress reports (Loughary, 1966). Of the possible teacher reaction to computers being used as a means to aid instruction (and having to learn how to use them in this manner), Loughary writes: “While anticipating the possibilities for individualizing and enriching instruction, he is reluctant to part with the professional methods developed over the years and in which he has a real personal investment. Few people after having gained professional status enjoy returning to the role of novice. Nevertheless, the extent and rapidity with which man-machine systems and new technology are implemented in education will depend upon the willingness of professional, experienced teachers at all levels – kindergarten through college – to experience some basic re-education in machine and systems technology” (Loughary, 1966, p. 6).

Regardless of the reluctance of mainstream professional educators, the use of computers to instruct pupils was gaining momentum. “Throughout the 1960s,
corporations and universities initiated projects to develop and evaluate programmed instruction” (Ross, 1986, p. 7). Evidencing the lack of involvement of mainstream educators, Loughary indicates that discoveries stemming from the new field were reported primarily in industry and agency publications, with little information to be found in professional educational research journals (Loughary, 1966). Certain educators, however, did fathom the implications of computers in instruction, and engaged in speculation about what the future might hold: “Computers will play an increasingly major role. It does not take much imagination to envisage increasing individual study as a lifelong effort, conceivably occurring in one’s home via individual consoles connected to large computers by way of telephone lines or electron beams. As with today’s soft drink and candy-vending machines, we may live with ‘quick learning’ machines capable of rapidly updating an individual in specific skills. One can go on and on with speculation of the details of tomorrow. However, the demands of today make it abundantly clear that radical changes in the concepts and operation of education must come, and come soon” (Tondow, writing in Loughary, 1966, p. 80).

Twenty-some years later in the late 1980s, when microcomputer use was burgeoning in all areas of society, the computer’s role in education was only just beginning: “Although the use of computers was introduced into the educational systems of some OECD\(^2\) countries in the late 1960s and early 1970s, the major developments in the use of computers in schools have taken place in the 1980s since the advent of the microcomputer” (Winship, 1989). As was the case in the 1960s,

\(^2\) Organization for Economic Co-operation and Development – Membership as of 1989 included all major European democracies, the United States, Japan, Australia and New Zealand.
access to computer hardware in the late 1980s was a factor inhibiting its widespread adoption and use in education. Even though education systems had made relatively large investments in computer equipment, the average ratio of computers to pupils in secondary schools in the United States was shown to be 1:27, which meant that, on average, a student was receiving only five to seven minutes of direct computer contact per day (Winship, 1989). Revealing that this situation had not much changed half way through the next decade, diSessa indicates that in 1995 there were about three computers per “average” 30-student classroom in the United States. By 1999 only 10 percent of U.S high schools had a student/computer ratio of 1:10, and the rest had less (diSessa, 1999).

Software issues also slowed adoption. In contrast to the 1960s when the availability of software products was limited, the 1980s saw an estimated 1,500 to 2,400 new packages published per year in the U.S. alone. Of all these titles, however, only 12 percent was deemed of good quality, with another eighteen percent being of tolerable quality (Winship, 1989).

The role of the teacher in adopting computer technology appears as pivotal in the 1980s as it was in the 1960s. “Teachers in general seem to resist technological progress and may appear to be the biggest stumbling block inhibiting changes in the way computers are used in schools” (Winship, 1989, p. 29). Gilbert De Landsheere reasons why this resistance occurs: “The methods that teachers use are governed by beliefs and attitudes that have been deeply and unconsciously absorbed during their school career, which in some countries begins at the age of three in the case of more than 90 percent of children and thus lasts at least 15 years up to the end of
compulsory education. That is why, when they themselves become teachers, they tend to copy the teaching techniques advocated by the more recent teaching theory. Before training anyone to use new technologies, or, more accurately, concurrently with this training, the underlying attitudes and habits of educational practice need to be thoroughly reformed. This will be a complex and costly operation and will only be achieved by working together with the teachers over a long period of time and by endeavoring to resolve jointly the problems that they have decided to tackle” (Winship, 1989, p. 29). Lerner, citing Papert says that primary and secondary schools resist change because educational policy is dominated by bureaucracies at all levels of government. Furthermore the intellectual establishment, which dominates educational thinking, stems from a culture where change is extremely slow. Another inhibitor of change is that school, as we know it today, is deeply imbued in both individual and societal consciousness (Lerner, 1997).

That computers will have profound impact on society and educational institutions is a philosophical theme that threads its way from 1960s to the present. Writing in 1966, Tondow suggested that an “information explosion” as lead by the computer was bringing “profound” change to society (Tondow, writing in Loughary, 1966). Elaborating further he says, “It is apparent that the computer represents one of the major social as well as technological changes of our times. It is equally apparent that we have not yet learned to fully utilize this equipment and have a limited sense of its ultimate impact” (Tondow, writing in Loughary, 1966, p. 30). Writing in 1986, Ross, citing a 1981 article by Johnson, states: “As you glance at this page, a revolution is taking place around you. Signs of it can be seen everywhere – on T.V.,
in magazines, and in offices, homes and schools. The computer age has arrived, and in the opinion of some, it will be significant enough to be labeled that by historians” (Ross, 1986, p. 1). Quoting Herbert Simon that the computer is a “once in several centuries” innovation, diSessa intones in 1999 that, “Computers are incontestably transforming our civilization. Comparisons of our current information revolution to the industrial revolution are commonplace and apt. Almost no corner of society is untouched by computers” (diSessa, 1999, p. 3). She goes on to hypothesize computers can be the technical foundation of a new and “dramatically enhanced literacy” the influence and scope of which will rival the current text-based literacy (diSessa, 1999). This thinking appears to clearly establish a dynamic link between human cognitive activity and modern computer technologies.

**Information Technology in Higher Education**

From administrative functions to academics, information technology has become an integral part of higher education. A 2000 survey conducted by The Campus Computing Project (CCP) reported that two-fifths of the participating colleges (42.7%) have courses that use Web resources as a component of the syllabus, and three-fifths (59.3%) of the participating colleges have courses that use electronic mail. Many campus services, from undergraduate admission applications, checking grades, to paying tuition, are becoming available online. Perhaps a more portentous development is that over half of the colleges participating in the CCP survey report offering one or more full college courses online (Campus Computing Project, 2000). In fact, Fairleigh Dickinson University of Hackensack, New Jersey has mandated that students take one online course per year during their matriculation (School to Require One Online Course, 2000).
All of the above means that college students have to know how to use computers. Florida State University prefers students to fulfill computer competency requirements in their freshman year. The university states: “Regardless of the vehicle used to satisfy the computer competency requirement, students must demonstrate: 1. Basic familiarity with computer hardware, operating systems, and file concepts; 2. Working knowledge of a word processor or text editor and at least one other software application (e.g., spreadsheet, database, etc.); 3. Working knowledge of the World Wide Web (WWW) and electronic mail” (Florida State University, College of Arts and Sciences – Department of Computer Sciences Academics, 2000). The College of Agriculture and Life Sciences at Cornell University has similar requirements, mandating that their students graduate with a working knowledge of word processing, presentation tools, spreadsheet analysis, database management, graphics, the World Wide Web, e-mail, and the ability to make effective use of information on the Internet (Johnson et al., 1999).

A demonstrable level of student computer competency serves not only to facilitate the processes of higher education, but also responds to the technology demands of prospective employers. A study conducted by Cornell University lead its investigators to conclude that agricultural employers “have a high expectation of computer literacy in recent college graduates” (Johnson et al., 1999). Computer competency requirements such as those of FSU and Cornell, and presumably many other universities, help students to succeed both at the university and in the job market.
Certain observers feel that the World Wide Web is bringing dramatic change to academia. Duderstadt states: “There is an increasing sense that information technology will have an even more profound impact in the future on educational activities of colleges and universities and on how we deliver our services. To be sure, there have been earlier technology changes, such as television, but never before has there been such a rapid and sustained period of change with such broad social applications (Katz & Associates, 1999, p. 5). Richard N. Katz, using a hypothetical entering freshman at the University of California Santa Cruz as an example, augurs a very technologically driven campus in the year 2010. It is at this time that the first class of students to have grown up with the Web will enter college. His hypothetical student would have been solicited to enroll at UCSC as early as the 10th grade, based on PSAT test scores and transcripts that were made available to college officials electronically. By the beginning of their actual college experience, this individual will have completed two semesters of collegiate work by way of the Web and appearances by a UCSC professor at their high school location. Once on campus, Katz’s hypothetical freshman would be issued a “personal digital assistant” allowing them to select from a variety of online courses offered by numerous UCSC “academic partners,” which include the seven other members of the UC system. Katz’s student would also benefit from the UCSC campus being equipped with wireless technologies, allowing for very easy connectivity to such services as “virtual bookstore,” and so forth (Katz & Oblinger, 2000). “Preposterous? Yes, the scenario no doubt understates the likely student expectations and campus capabilities of a decade from now by an order of magnitude” (Katz & Oblinger, 2000, p. xv).
Distance learning, or distributed education, is bringing new and significant competition to traditional academic organizations. Entities such as the University of Phoenix, WebCT, and Eduprise.com are offering Web-based products and services in what Katz calls the “e-learning ‘marketspace’” (Katz & Oblinger, 2000). In this “marketspace” commercial entities compete with traditional academic organizations, which likely could begin to compete with themselves. As distance learning becomes more common, students might soon have the option of obtaining the classroom experience of renowned instructors located anywhere in the world (Katz & Associates, 1999). Furthermore, the distributed learning environment appears to converge with the psychological nature of students raised in an era of interaction with electronic devices. “They approach learning as a ‘plug and play’ experience: they are unaccustomed and unwilling to learn sequentially – to read the manual – and instead are inclined to plunge in and learn through participation and experimentation” (Katz & Associates, 1999, p. 7).

On a broadly philosophic note, Katz states that education, and thus knowledge, has become the determining factor in the wealth of nations and the key to individuals’ standard of living. He posits that democratic societies bear a responsibility to their citizenry to provide them with affordable, and moreover, accessible, high-quality education. This, he says, has long been the theme of higher education in America, which over time has encompassed more and more individuals from a broader segment of society. The new and increasingly powerful technologies associated with computers are seen by Katz as an opportunity for U.S. higher education to capitalize on its global preeminence – perhaps some day meeting the
demands of not only the domestic population, but also of a global educational
“channel surfer” who carefully selects courses based on such criteria as content and
price. Revenues generated from such ventures could conceivably subsidize
traditional modes of instruction found on campus, which are not as remunerative
(Katz & Associates, 1999).

Information Technology and the Cooperative Extension Service

Extension, along with the rest of the world’s societies, is now living in age of
rapid change brought about by information technology. In this environment county
agents must possess up-to-date IT skills to effectively meet the demands placed on
them by the increased use of IT by both clientele and Extension administrative
entities. Ladewig states: “Face-to-face communication with clientele is a very
important method that we will always rely on to bring timely information to our
clientele. However, we must also examine how computer technology can help county
Extension agents deliver relevant information and support educational programs”
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” (p. 3). Echoing this, Rasmussen states: “Communication is the key to the
operations of the county Extension office. More and more county Extension offices
are turning to computers and other electronic technology to improve the
communications with the state offices and with university specialists, as well as with
the people they serve” (1989, p. 8).

Inextricably tied to today’s information technology, and of clear importance to
furthering Extension’s mission, is the Internet. “There are tremendous opportunities
for Cooperative Extension (CE) on the Internet. These opportunities are for improved functionality of the CE system, and new opportunities for communities that sustain the CE system” (Tennessen, PonTell, Romine, & Motheral, 1997). Bamka (2000) states that it is important for Extension professionals to teach agriculture professionals to become familiar with the Internet in order to take advantage of its use in developing markets for, and promoting agricultural products. Sherfey, Hiller, Macduff, and Mack (2000) describe an Internet-based system designed by Extension that assists professionals in developing their volunteer management skills. Clientele, some with Extension’s assistance, and some without, are using the Internet to acquire information and also to market agricultural goods. New Jersey hay producers have found marketing success over the Web (Bamka, 2000), and Iowa farmers, with a 33% Internet penetration rate, are using a net-based service to price commodities: “‘To be successful in the 21st century, you have to have access to better information and sophisticated tools,’ said David Lyons, director of business development for the Iowa Farm Bureau Federation” (Bohrer, 2000, p. 6G). Baker (1998) reported that 46% of Florida Farm Bureau County Directors surveyed felt the Internet helped them do well in their jobs.

The Internet has also enabled the creation of new ways that Extension professionals can receive in-service training. Lippert, Plank, and Camberato (1998) and Lippert, Plank, and Radhakrishna (2000) described in-service training for Extension professionals in the Southeast that used a listserv and a Web site. The authors investigated two different in-service trainings that used this method, and
reported that the participants broadly accepted it, and demonstrated suitable
knowledge retention of the subject matter studied.

Internal accountability of Extension activity, especially planning and reporting
needs, is increasingly being done over the Internet by way of Web-based applications.
This is the case with the FLCES, the North Carolina Cooperative Extension Service,
and the Clemson University Cooperative Extension Service in South Carolina.
Radhakrishna and Pinion (1999) stated that accountability is becoming more important
because of stricter mandates legislated by federal, state, local and university
authorities. Web based accountability systems are helping to accommodate these new
demands.

The World Wide Web, Internet mail, modern GUI operating systems, and a
suite of office software now challenges the Extension professional on a daily basis.
Internal administrative needs and clientele needs both increasingly call for the use of
this modern information technology. A demand is thus placed on the organization to
ensure that its professionals obtain the necessary skills to function in this modern
context: “Knowledge has been the product of Extension since its inception. As CES
embraces the knowledge economy, leadership must find ways to insure that their
employees become knowledge workers in the information age” (Albright, 2000, p.
17). Employee training established from a clear understanding of the workforce’s
present information technology skills, is a clear-cut way of ensuring that Extension
professionals are using information technology in an effective manner.

Information Technology and the Florida Cooperative Extension Service

The information technology (IT) revolution ushered in by the microcomputer
is now slightly over twenty years old. Use of the technology has progressed within
the Florida Cooperative Extension Service Extension (FLCES) to the point where every county Extension agent has an up-to-date personal computer on his/her desk that is equipped with a suite of current or near-current “office-type” software products (L. Arrington, private communication, 2000). Additionally, the FLCES provides all county offices with the resources to connect to the Internet. Serving clientele needs, in-service training for Extension faculty, and administrative applications such as information gathering, communication, and planning and reporting are all present or potential uses of the organization’s IT infrastructure.

Part 3-Theoretical Aegis of the Study

Training Needs

Albright states: “Before training programs are undertaken by organizations, there should first be a front-end analysis to determine why the training is needed” (Albright, 2000, p. 41). Training needs might stem from employees not knowing how to perform a task, from something preventing employees to do the task, or a lack of incentive to perform the task (Albright, 2000). When it is determined that training is needed, a needs analysis should be performed to assess what may be causing a deficit in employee performance (Albright, 2000). This analysis should reveal employee competencies, and in so doing establish the objectives of the training (Albright, 2000).

Determining Training Needs

Albright, in her 2000 study of Texas county Extension agents, developed an instrument called the “Computer Technology Skills and Training Needs.” This instrument, designed to assess agents’ IT training needs, used the Borich Needs Assessment Model as its basis. The Borich model, later confirmed by Barrack,
Ladewig, and Hedges, functions by having respondents self-assess their knowledge about a competency, the importance of a competency to their job, and to what degree of skill are they able to apply a competency to their job (Albright, 2000). Albright states: “The strength of Borich’s model allows for finer judgments in rating each competency and allows for a more relevant evaluation of the response” (Albright, 2000, p. 64).

The Borich model predicts that differences will occur between the rankings (importance, knowledge, and application) for each competency considered. Therefore a respondent might give a high rank to the importance of a skill, but give a low rank to their knowledge and/or application of that same skill. Thus are training needs more appropriately chosen by comparing mathematical combinations of the rankings for each of the competences, rather than from a single ranking (e.g., importance) of one competency alone (Albright, 2000). Ultimately Albright used the formula \((\text{Importance mean} - \text{Knowledge mean}) \times \text{Importance Mean}\) to derive a hierarchy of training needs. She states: “Knowledge and application should be considered in determining relationships; however, the knowledge factor, when weighted and applied to the importance factor becomes the most appropriate measurement to determine ranking” (Albright, 2000, p. 87).

**Summary**

From its ancient beginning in Mesopotamia as a series of beads situated on string or shaft to its modern inception with miniaturized circuitry, the computer is a device conceived by man to transmute the complex into the simple. It has been employed to preserve the world’s democracies in time of great peril, to further science in its quest to explain natural phenomena, and to aid medicine in its fight
against disease. Computing devices and their peripherals, collectively termed “information technology,” have enabled complex and large businesses such as the airline industry to grow, and in so doing have fostering unprecedented levels of economic prosperity around the globe. In educational settings information technology is having a significant impact, changing longstanding teaching methodology and holding the promise to distribute education to those who previously may have been excluded.

Modern information technology - powerful personal computers running sophisticated, easy-to-use software products and integrated with communication technologies enabling access to the World Wide Web, have revolutionized the way individuals can accrue and disseminate information. Certain thinkers propose that this is the basis of a new form of literacy (diScessa, 2000). Others indicate that the power of information technology transforms organizations into highly competitive, agile entities whose workers use information to produce new knowledge (Albright, 2000).

The Florida Cooperative Extension Service is an organization whose technological infrastructure is suitably developed to participate in the information revolution at hand (L. Arrington, private communication, 2000). Spurring the modern, effective use of information technology for its own internal functioning, and for the benefit of its clientele, is an effort that the organization needs to pursue. To what degree county Extension agents are able to use modern information technology to meet this need is presently under-researched. What is known, however, is that
Extension, the great system of education beyond the classroom, must be prepared to take advantage of the still unfolding revolution in information technology.
CHAPTER 3
METHODOLOGY

Introduction

The following objectives were established in Chapter I to guide the study:

1. Describe county Extension agents’ demographic characteristics and, based on those characteristics, determine their use of information technology, including self-assessed level of overall computer skills.

2. Determine how county Extension agents are using information technology on the job in terms of hardware and software use.

3. Determine county Extension agents’ perceived level of skill with regard to a specific set of information technology tasks.

4. Recommend future information technology training by describing the relationship between agents’ perceived importance of, and self-assessed knowledge about specific information technology skills.

Research Design

This study uses applied research methodology in that it seeks to answer practical questions associated with an immediate problem (Ary et al., 1996). It is quantitative research, having collected observations that readily lend themselves to numerical representation (Rossi & Freeman, 1993). Furthermore, the study’s underlying research design is primarily descriptive in nature, revealing the existing state of IT use amongst FLCES county agents vis-à-vis various demographic variables measured. Some inferential statistical procedures were utilized. T-tests were performed to examine for the existence of significant differences between the means of certain variables of interest. ANOVA was employed similarly. In conjunction with the training needs analysis, correlations between the “knowledge,”
and “application” constructs were conducted. Both Ruppert (1992), and Albright (2000) employed similar survey-based research in their respective studies of information technology use amongst county Extension agents.

**Population**

The population for this study was county Extension agents in the employ of the Florida Cooperative Extension Service. At the time the study was initiated, during the summer of 2002, this population numbered 331. Due to the relatively small population size, and also due to the need to accurately capture demographic differences within the population, a census was conducted. Ruppert (1992), and Albright (2000) both used a census in their respective studies of county Extension faculty.

County Extension agents possess unique characteristics based upon formative experiences (age, social class, gender), educational experiences (university attended, undergraduate and graduate programs), and other factors such as intelligence, motivation, and personality traits (Baker et al., 1997). Accordingly, the population of FLCES county agents displays a diversity of demographic features – features that this study wishes to describe in conjunction with the agents’ use of information technology, including self-assessed level of overall computer skills.

**Instrumentation**

Data for this study was collected by way of an instrument adapted from Albright’s 2000 survey of Texas county Extension agents. The on-line version of this adaptation is provided as Appendix A, and the paper version is provided as Appendix B. Albright’s instrument, the “Survey of Computer Technology Skills and Training Needs” (SCTS), is based on the methodological framework of the (1980) Borich
Needs Assessment Model as verified by Barrick, Ladewig, and Hedges in 1983 (Albright, 2000). The list of computer competencies used in the SCTS were derived from two documents: The Texas Education Agency’s Texas Essential Knowledge and Skills (for Texas teachers, and Texas students in grades K-12), and the Texas Technology Essential Knowledge and Skills (for Texas teachers, and Texas students as of the 8th grade), a document developed by “business, industry, and educational professionals” (Albright, 2000, p. 38). Albright reports the Texas Technology Essential Knowledge and Skills document as having “quickly become a national standard among educational institutions” (Albright, 2000, p. 38). The SCTS instrument was subjected to expert review, and furthermore, was compared to similar national tests of computer competency for content and quality of the technology competencies it addressed. These competencies were found to be “…as or more complete and comprehensive than each of the other assessments reviewed (Albright, 2000, p. 60). In addition, the SCTS instrument was subjected to a pilot study.

Reliability of the SCTS instrument was established during data analysis by examining internal consistency of each scale of computer competency using statistical procedures. As Albright puts it: “Cronbach’s Alpha using summated scale scores completed for each respondent was used on ratings of importance, knowledge and application. Questions were grouped to address specific goals of the study and were assessed for consistency using this procedure” (Albright, 2000, pg. 65).

Albright administered the SCTS survey to two groups via the World Wide Web. Group one was “a purposive sample of 44 CEAs who are high users of computer technology as identified by a TAEX Computer Information Technology
workgroup” (Albright, 2000, p. 58). The second group was the general population of county Extension agents in the employ of the Texas Agricultural Extension Service. The response rate to the SCTS survey for the first group was 95%, for the second group it was 64%. No comparison was made between the groups.

Albright’s survey, and consequently the study at hand, asked “agents to report self-perceived technology skills, their ability to apply the skills to their work and their perception of the importance of the technology skills” (Albright, 2000, p. 59). Three constructs, “importance,” “knowledge,” and “application” were assessed by way of three questions which were asked for each area of computer skills the survey considered. These constructs were “operationalized” as follows:

- **Importance**: Importance of this skill to your job function.
- **Knowledge**: Your knowledge of this topic (your ability to accurately recall or summarize the subject matter).
- **Application**: Your ability to use this skill in your job.

(Albright, 2000, p. 62).

The SCTS functions by soliciting response to a series of questions designed to reveal specific demographic characteristics associated with the respondent, including information on prior computer training. The instrument then asks the respondent if they can perform specific computer technology skills associated with whichever of the eight types of computer software (i.e., e-mail, word processing, etc.) the instrument is presently considering. Within consideration of one of these specific types of software, the three construct questions are then posed. Here the respondent self-assesses their knowledge of the software, the importance they ascribe to the
software, and their ability to apply skills using the software to their job. Immediately thereafter respondents are given the opportunity to add, in their own words, any additional skills associated with the software they feel are needed for successful employees.

A review of this study’s adaptation of the SCTS instrument was conducted by a panel of experts chosen for their knowledge of Florida Cooperative Extension Service county Extension agents and/or information technology. The panel included representative(s) from the Dean for Extension’s Office, the District Extension Director’s Office, the Department of Agricultural Education and Communication, and the University of Florida’s administrative computing department (Information Systems). As a result of this review many changes were made to the adapted instrument, including enhanced content, scales, and readability. The changed instrument, however, retained the fundamental underpinnings necessary to analyze training needs according to the Borich et al. model. This instrument was then subjected to a pilot test involving 20 agents chosen at random from the general population of FLCES county agents. This is described in more detail below.

Data Collection

Data collection followed a “mixed-mode” approach as described by Ladner, Wingenbach, and Raven (2001). This approach gives individuals a period of time (in the case of this study, 3 weeks) to complete a Web-based survey instrument, but then sends a paper copy of the survey instrument to those individuals who have not completed the Web-based version. It is believed that this method accommodates those individuals who do not have access to the Web, or who prefer not to use the Web, or those who prefer not to perform the survey via the Web. This study also
took into consideration methodology for electronic surveys as described by Dillman (2000) in his book *Mail and Internet Surveys*. Content of the reminder messages sent by the researcher followed recommendations set forth by Glenn D. Israel (Israel, 2000).

The Web-based pilot test of the study’s survey instrument involved 20 randomly chosen county Extension agents from the population of agents, and commenced on June 24th, 2002. On that day an e-mail message introducing the study was sent to the pilot population from the researcher. This message contained a link to the Web site that hosted the study’s survey instrument, and provided a unique, individualized access code for each potential participant to gain access (to the instrument). A reminder message was e-mailed to non-responding individuals 3 days later. Thereafter the researcher telephoned non-respondents with a personal appeal to participate. The messages transmitted by the researcher for all phases of the study are included as Appendix E – Appendix O.

The full Web-based survey was introduced on July 5th, 2002 by a message e-mailed to all county agents from Dr. Christine T. Waddill, Dean for Extension. On July 7th, 2000 the study commenced when the researcher e-mailed a message containing specific information on the survey’s rationale, a hyperlink to the World Wide Web site hosting the survey instrument, and the agent’s unique, individualized access code. Included in this message were e-mail addresses and telephone numbers to contact the researcher or his faculty advisor if need be. Reminder messages containing the hyperlink to the survey and the agent’s unique access code were sent July 12th, July 16th, and July 22nd to those agents who had not yet completed the
Web-based study. Reminders were also sent out via e-mail on July 11th, and July 25th, by way of the Dean’s “Comings and Goings” bi-monthly electronic publication. The District Extension Directors were each asked by the researcher to encourage participation, which resulted in additional e-mail reminders sent to specific segments of the population. Dillman’s (2000) assertion that multiple contacts with potential respondents are as important to electronic surveys as regular mail surveys was readily confirmed by this study.

On August 1st, 2000 the population of agents who had not filled in the Web-based instrument was sent a packet via conventional mail that included the introductory letter from the researcher and his faculty advisor, a paper version of the survey instrument, and a self-addressed stamped return envelope with which to return the completed instrument. The introductory letter in this package contained language indicating that the survey could alternately be filled out on-line, and provided the URL to the site and the individual’s unique access code. A single reminder message was sent by post on August 14th to those agents who had not returned the paper survey, or who had not completed it on-line. This reminder letter also included language indicating that the survey could alternately be filled out on-line, and provided the URL to the site and the individual’s unique access code. The survey concluded on September 1st, 2002.

On Web-based Surveys

The first electronic surveys conducted via the Internet were predominately done through e-mail (Solomon, 2001). With the advent of the World Wide Web and its enabling hypertext markup language (HTML), electronic surveys soon became ensconced in this new venue – and became known as “Web-based surveys”
This methodology began to occur in approximately 1996-1997 (Dilman & Bowker, 2001; Solomon, 2001). Due to their low cost relative to conventional surveys (paper-based, face-to-face, computer assisted telephone surveys, etc.), and their ability to quickly return copious amounts data from the tremendous populations they reached, Web-based surveys experienced explosive growth (Dilman & Bowker, 2001; Yun & Trumbo, 2000; Solomon, 2001). Writing from a market research perspective, Jeavons (1999) reported that “fashion” played a role in making web-assisted interviewing “a booming industry,” and that the ability to perform some sort of Web-based data collection has become “almost mandatory” for market research companies (p. 69). Coomber (1997), who made novel use of the Web to perform a sociological survey on a specific population, suggests that the Internet “presents enormous possibilities” to reach individuals that are desired as research subjects.

Leadership for Web-based social (and market) survey procedures came not from the “survey methodology community” but rather stemmed in large part from computer programmers (Dilman & Bowker, 2001, p. 1). This produced a situation where technological innovation in survey design and implementation, as performed by the programmers, proceeded without the methodological rigor practiced by survey methodologists (Dilman & Bowker, 2001). Two such cases involving “highly visible” Web-based sample surveys purporting to have yielded scientifically viable results are shown by Dilman and Bowker as having practiced questionable methodology that did not take into account the presence of certain types of error. Just like other types of sample surveys, those conducted via the Web are also subject to
four distinct types of error: Coverage error, sampling error, measurement error, and non-response error (Dilman & Bowker, 2001).

Of the above, coverage error, or the error resulting from drawing a sample that does not adequately represent a population, is of particular concern in Web-based surveys – especially those of the general public (Coomber, 1997; Dilman & Bowker, 2001; Solomon, 2001). Though this situation is seen as mitigating in the future as more individuals use the Web (Coomber, 1997), currently not everyone has access. Under certain circumstances, however, Web-based surveys can be conducted in a scientifically valid manner. Dillman and Bowker (2001) state: “Some populations – employees of certain organizations, members of professional organizations, certain types of businesses, students at many universities and colleges, and groups with high levels of education – do not exhibit large coverage problems. When nearly all members of a population have computers and Internet access, as is already the case for many such groups, coverage is less of a problem” (p. 5). It would appear that county Extension faculty of the FLCES is such a population, and thus the issue of coverage error is averted.

Non-response error, though, remains a concern for all surveys, both Web-based and conventional. As Bosnjak and Tuten (2001) put it: “Non-response is of particular importance to researchers because the unknown characteristics and attitudes on non-respondents may cause inaccuracies in the results of the study in question” (p. 2). The authors then identify three traditional types of response to requests to participate in a survey: Unit non-response – where an individual does not have access to the survey, refuses to respond, or is unable to respond; item non-
response, where only certain items in a returned survey are answered; and, lastly, complete response.

Dillman and Bowker (2001) indicate that response to Web-based surveys is likely to be low, and can potentially cause non-response error. Computer programs running in the background of Web-based surveys have, however, enabled researchers to identify respondent behavior, including modes of non-response. Bosnjak and Tuten (2001) have classified the following patterns: Complete responders; Unit non-responders; Answering drop-outs (individuals who answer some questions, but then drop out of the survey before its end); Lurkers (individuals who view all of a survey’s questions, but answer no questions); Lurking drop-outs (individuals who only view a fraction of the questions, then drop out); Item non-responders; and Item non-responding drop-outs (individuals who view some question, answer some, and then leave the survey before its end) (p.6). Understanding these patterns might aid in ameliorating non-response error in Web-based surveys.

In addition to low response rates, poor questionnaire design and a respondent’s lack of computer skills can lead to “premature termination of the survey,” with the implication of introducing non-response bias (Dillman & Bowker, 2001, p. 6). The authors illustrate this by identifying seven different scenarios ranging from respondents not knowing how to erase answers, to having to take multiple actions in order to answer a question. Furthermore, non-response could possibly occur due to incompatibilities between the Web-based survey and the respondent’s hardware or software (Dillman & Bowker, 2001). Different browsers, different versions of HTML, lack of random access memory, slow Internet
connections, and in some instances, use of the Java programming language, can all cause the survey to be difficult, if not impossible to complete (Dillman & Bowker, 2001).

Measurement error also presents new issues for Web-based surveys. The foremost difficulty here is how to make a survey’s response stimuli identical from one respondent to the next (Dillman & Bowker, 2001). The study at hand used a very basic level of HTML language, which gave some assurance that all individuals received the same response stimuli.

Addressing ways of reducing the four types of survey error (coverage, sample, non-response, and measurement) as they pertain to Web-based surveys, Dillman and Bowker (2001) promulgated the “Principles for the design of web surveys and their relationship to traditional sources of survey error,” which is here included as Appendix C. Though presented by the authors with the caveat that the principles are but “one attempt to develop such procedures,” they nevertheless range broadly through a gamut of issues salient to the design of Web-based surveys – and how each impacts a potential source of error. The introductory page, choice of first question, visual appearance of questions, and use of graphical symbols or words to convey level of completion of the survey are amongst the items considered.

How This Study Addressed Sources of Error

In general, the study sought to reduce measurement, and non-response error by having followed as many of the recommendations presented in Dillman and Bowker’s “Principles” as possible. Coverage error was not an issue, as the study was based on a census of FLCES county agents, and as such each participant had a known
non-zero probability of being included. Sample error was also moot because a census was conducted.

Measurement error was addressed by following Dilman and Bowker’s “Principles,” including a simple, motivating welcoming screen, interesting first question, easy-to-understand navigation buttons, and a clear indication of how much of the survey a respondent has completed. Reduction of non-response error also followed the “Principles,” and included an e-mail invitation from the dean for Extension asking for participation, and e-mail reminders urging participation which were sent at pre-arranged times after the start of the survey. District Extension Directors were asked to encourage participation. Agent’s use of their unique access code also enabled the researcher to directly address issues of non-response. As a means to combat non-response due to inability, or reluctance to use the Web, a paper-based version of the survey was sent via post to all agents who did not complete the Web-based instrument. Due to the tremendous response rate (90.3%), the issue of non-response bias appeared to not be a concern for this study. A limited investigation of the non-respondents (n = 32) did not reveal any obvious differences in gender. As age was an item collected in the survey, the analysis looked at non-respondents’ rank as a means to assess whether there was an age effect. It is assumed that age and rank have a reasonably strong correlation. The majority of non-respondents were of rank I. Most non-responds were located in the Northeast and South Extension districts.

Data Analysis

The SAS® System for Windows, Release 8.2 was used to analyze the data. An alpha level of .05 was set a priori. Frequency distributions and descriptive statistics such as the mean, and standard deviation were calculated for all appropriate
survey items and presented in tabular form (Albright, 2000; Ary et al., 1996; Johnson et al., 1999; Ruppert, 1992). Analysis of variance with an associated Duncan’s test was employed to test for differences in the means of between levels of certain variables such as age. Association between the construct variables was described using Pearson’s Product Moment Multiple Correlation (Albright, 2000). Use of Cronbach’s coefficient alpha tested the consistency of the scale.
CHAPTER 4
RESULTS

This study investigated the current use of information technology, level of information technology skills, and the workplace application of modern information technology among county Extension agents of the Florida Cooperative Extension Service. The study used applied research methodology in that it sought to answer practical questions associated with an immediate problem (Ary et al., 1996).

In light of the manifold technological change of the past 10 years and its impact on Extension, the following questions thus arise: Have county agents kept abreast of this manifold technological change? Are they utilizing the Web to find information to fulfill clientele need? Are they disseminating information to clientele through Web sites or e-mail? Are agents using e-mail to exchange information, and can they attach a file to such messages? And finally, to what degree of sophistication do agents use everyday office software products such as word processors, or spreadsheets?

To answer these questions a survey instrument was adapted from that used in a similar (2000) study of county Extension agents in the state of Texas. The (adapted) instrument included ninety-nine questions that recorded personal and situational factors, and measured patterns of information technology use, specific skills practiced for six different types of software, and types of computer hardware and connectivity. The instrument also assessed future information technology training needs. To these ends specific questions asked agents to gauge their
knowledge of, ability to apply to their job, and their perceived importance of the six types of software. Response to these questions was then analyzed, and an order of training need derived.

This study presents its findings in sequence with the major objectives established in Chapter 1. Those objectives were to

1. Describe county Extension agents’ demographic characteristics and, based on those characteristics, determine their use of information technology, including self-assessed level of overall computer skills.

2. Determine how county Extension agents are using information technology on the job in terms of hardware and software use.

3. Determine county Extension agents’ perceived level of skill with regard to a specific set of information technology tasks.

4. Recommend future information technology training by describing the relationship between agents’ perceived importance of, and self-assessed knowledge about specific information technology skills.

**Objective 1**

Describe County Extension Agents’ Demographic Characteristics and, Based on Those Characteristics, Determine Their Use of Information Technology, Including Self-Assessed Level of Overall Computer Skills

**A General Description of the Respondents**

The number of county Extension agents employed by the Florida Cooperative Extension Service at the inception of this study was 331. Two hundred ninety-nine agents, or 90.33% of this population completed the study’s survey instrument either on-line or by paper. By gender the respondents were 57.86% female (n = 173), and 42.14% male (n = 126). This distribution of males and females mirrored that of the general population of county Extension agents (58.01% female and 49.99% male) at the beginning of the study. The majority of respondents (63.54%) indicated that their age fell between 41 and 60 years (n = 190). Most respondents (69.90%) reported
work experience, including both inside and outside of Extension, of 16 or more years.

Table 1 immediately below presents this information.

Table 1.

<table>
<thead>
<tr>
<th>Number of Respondents by Gender, Age and Years of Work Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Age Group</td>
</tr>
<tr>
<td>20-30</td>
</tr>
<tr>
<td>31-40</td>
</tr>
<tr>
<td>41-50</td>
</tr>
<tr>
<td>51-60</td>
</tr>
<tr>
<td>61-70</td>
</tr>
<tr>
<td>No response</td>
</tr>
<tr>
<td>Years of Work Experience</td>
</tr>
<tr>
<td>Less than 5 years</td>
</tr>
<tr>
<td>5-10 years</td>
</tr>
<tr>
<td>11-15 years</td>
</tr>
<tr>
<td>16+ years</td>
</tr>
<tr>
<td>No response</td>
</tr>
</tbody>
</table>

Comparing Response Groups

Of the 299 respondents, 278 (92.98%) completed the electronic version of the survey instrument on-line, and 21 (7.02%) completed the paper version. For purposes of comparison, respondents in this study were divided into four groups: “Early On-line Respondents” who completed the survey on-line (n = 65), “Late On-line Respondents” who completed the survey on-line (n = 65), “All On-line Respondents” which include all respondents who completed the survey on-line (n = 278), and
“Paper Respondents” who completed the paper version of the survey. To form the early and late on-line groups, the on-line respondents, excluding respondents to the pilot study, were divided into percentage quartiles (Glenn D. Israel – Personal communication, October 2002). The first and last quarters of these respondents were chosen to form the early and late groups, respectively.

An examination for differences between the Early On-line Respondents and Late On-line Respondents was then performed. As is shown in Table 2, the percentages of male (44.62%) and female (55.38%) early on-line respondents are essentially equal to the percentages of gender for all respondents. This changes for the late on-line respondents, with females (64.62%) constituting a greater percentage of this category.

Table 2.

Frequency and Percent by Gender for the Early and Late On-line Response Groups

<table>
<thead>
<tr>
<th>Response Group</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
</tr>
<tr>
<td>Early On-line Respondents</td>
<td>29</td>
<td>44.62</td>
</tr>
<tr>
<td>Late On-line Respondents</td>
<td>23</td>
<td>35.38</td>
</tr>
</tbody>
</table>

The analysis then examined the Early On-line Respondents and Late On-line Respondents for differences in mean response to age, years of work experience, self-rated computer skills, and hours of weekly computer use. This information is provided in Table 3 below. Note that the study employed various scales to
Table 3.

Means and Standard Deviations of Early and Late On-line Respondents by Various Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Early On-line Respondents</th>
<th>Late On-line Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Age Group</td>
<td>3.13</td>
<td>1.13</td>
</tr>
<tr>
<td>Years Work Exp.</td>
<td>3.53</td>
<td>0.88</td>
</tr>
<tr>
<td>Self-rated Com. Skills</td>
<td>3.63</td>
<td>0.67</td>
</tr>
<tr>
<td>Hours of Usage/Week</td>
<td>4.90</td>
<td>1.14</td>
</tr>
</tbody>
</table>

measure levels of these variables (i.e. agents 20-30 years old were assigned the numeric value “1” for having indicated their age fell in the first level of a six level scale). Appendix D gives the scales and values they represent (for all variables using a scale). A t-test for statistically significant differences between the means of these selected variables was then conducted. As Table 4 on the following page indicates, a significant difference in the mean self-rated computer skills score was found, with the early respondents averaging a higher score. No other significant differences were found.

An examination for differences between the All On-line Respondents group and the Paper Respondents groups was then performed. As is shown in Table 5 on the following page, the percentages of male and female for both the All On-line Respondents and Paper Respondents groups are essentially equal to the percentages of gender found for the study’s total, undifferentiated group of respondents (n = 299).
Table 4.
*T-test for Significant Difference between Early and Late On-line Respondents*

<table>
<thead>
<tr>
<th>Variable</th>
<th>t Value</th>
<th>Pr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Group</td>
<td>0.90</td>
<td>0.37</td>
</tr>
<tr>
<td>Years Work Experience</td>
<td>1.16</td>
<td>0.25</td>
</tr>
<tr>
<td>Self-rated Computer Skills</td>
<td>2.26</td>
<td>0.026*</td>
</tr>
<tr>
<td>Hours of Usage per Week</td>
<td>1.27</td>
<td>0.20</td>
</tr>
</tbody>
</table>

*Significant at the $\alpha = 0.05$ level.

Table 5.
*Frequency and Percent by Gender for the Response Groups*

<table>
<thead>
<tr>
<th>Response Group</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
</tr>
<tr>
<td>Electronic Respondents</td>
<td>117</td>
<td>42.09</td>
</tr>
<tr>
<td>Paper Respondents</td>
<td>9</td>
<td>42.86</td>
</tr>
</tbody>
</table>

The All On-line Respondents and Paper Respondents groups were then examined for differences in mean response for age, years of work experience, self-rated computer skills, and hours of weekly computer use. This information is provided in Table 6 on the following page. A t-test for statistically significant differences between the means of these selected variables was then conducted. As Table 7 on the following page indicates, no significant differences were found.
Table 6.

Means and Standard Deviations of Electronic Vs. Paper Response Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Electronic Respondents</th>
<th>Paper Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Age Group</td>
<td>3.05</td>
<td>1.10</td>
</tr>
<tr>
<td>Years Work Exp.</td>
<td>3.47</td>
<td>0.93</td>
</tr>
<tr>
<td>Self-rated Com. Skills</td>
<td>3.51</td>
<td>0.74</td>
</tr>
<tr>
<td>Hours of Usage/Week</td>
<td>4.75</td>
<td>1.25</td>
</tr>
</tbody>
</table>

Table 7.

T-test for Significant Difference between Electronic and Paper Respondents

<table>
<thead>
<tr>
<th>Variable</th>
<th>t Value</th>
<th>Pr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Group</td>
<td>0.98</td>
<td>0.32</td>
</tr>
<tr>
<td>Years Work Experience</td>
<td>1.23</td>
<td>0.21</td>
</tr>
<tr>
<td>Self-rated Computer. Skills</td>
<td>1.86</td>
<td>0.06</td>
</tr>
<tr>
<td>Hours of Usage per Week</td>
<td>0.31</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Use of Information Technology and Self-Assessed Level of Overall Computer Skills

County agents’ use of information technology (IT) is here analyzed vis-à-vis various demographics collected by the study. Aspects of age, gender, work experience, agents’ major programmatic area, and other characteristics are examined to determine their effect on IT use and self-assessed level of computer skill. Note that the total population of respondents (n =299) is being examined.
The analysis begins by differentiating respondents according to gender, age, and work experience. Table 8 shows females between 20-40 years of age constitute 38.15% (n = 66) of the female respondents, whereas males in the same age range constitute only 16.13% (n = 20) of the male respondents. As would be expected to follow from this finding, more female respondents (25.44%) reported work.

Table 8.

*Age and Work Experience of County Extension Agents differentiated by Gender*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
</tr>
<tr>
<td><strong>Age Group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30</td>
<td>3</td>
<td>2.42</td>
</tr>
<tr>
<td>31-40</td>
<td>17</td>
<td>13.71</td>
</tr>
<tr>
<td>41-50</td>
<td>42</td>
<td>33.87</td>
</tr>
<tr>
<td>51-60</td>
<td>50</td>
<td>40.32</td>
</tr>
<tr>
<td>61-70</td>
<td>12</td>
<td>9.68</td>
</tr>
<tr>
<td>No response</td>
<td>2</td>
<td>1.59</td>
</tr>
<tr>
<td><strong>Years of Work Experience</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 5 years</td>
<td>5</td>
<td>3.97</td>
</tr>
<tr>
<td>5-10 years</td>
<td>4</td>
<td>3.17</td>
</tr>
<tr>
<td>11-15 years</td>
<td>13</td>
<td>10.32</td>
</tr>
<tr>
<td>16+ years</td>
<td>103</td>
<td>81.75</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>0.79</td>
</tr>
</tbody>
</table>
experience between 1-15 years than did male respondents (7.14%). The majority of agents in both gender groups reported more than 16 years of work experience. Males with 16+ years of work experience constituted 81.75% of their gender, whereas 61.27% of the female population reported 16+ years of experience. An examination by way of a t-test for differences between the mean age of males and females yielded a statistically significant difference. Female agents are, on average, younger than male agents. This finding leads to statistical examination for differences between mean years of work experience for the genders, which also proved to be statistically significant. Table 9 gives the details of the t-test on both age and years of work.

Table 9.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Male</th>
<th>Female</th>
<th>t Value</th>
<th>Pr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Age Group</td>
<td>3.41</td>
<td>0.92</td>
<td>2.76</td>
<td>1.14</td>
</tr>
<tr>
<td>Years Work Exp.</td>
<td>3.71</td>
<td>0.71</td>
<td>3.26</td>
<td>1.05</td>
</tr>
</tbody>
</table>

*Significant at the $\alpha = 0.05$ level.

An Examination of the Non-respondents

Thirty-two agents (9.66% of the population) did not respond to the study’s survey. Analysis was done to determine if this group had any distinguishing characteristics. As Table 10 on the following page shows, the non-respondents were 59.37% female (n = 19) and 40.62% male (n = 13), which is slightly different than the gender breakdown for the population of respondents. Age was an item supplied by the respondents, so analysis of the non-respondents based on this variable is unavailable. The rank, however, of the non-respondents was available. Given that
rank is usually correlated to an agent’s age, the analysis of non-respondents analyzed accordingly. Table 10 shows that 37.50% (n = 12) of the non-respondents are of Extension Agent I rank, and 21.88% (n = 7) are Extension Agent II rank, etc. Table 10 also shows the Extension districts where the non-respondents are located. Note that 37.50% of the non-respondents are from the “South” Extension district.

Table 10.

*Characteristics of Non-respondents (N = 32)*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>13</td>
<td>40.62</td>
</tr>
<tr>
<td>Female</td>
<td>19</td>
<td>59.38</td>
</tr>
<tr>
<td>Rank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EA I</td>
<td>12</td>
<td>37.50</td>
</tr>
<tr>
<td>EA II</td>
<td>7</td>
<td>21.88</td>
</tr>
<tr>
<td>EA III</td>
<td>7</td>
<td>21.88</td>
</tr>
<tr>
<td>EA IV</td>
<td>6</td>
<td>18.74</td>
</tr>
<tr>
<td>District</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northwest</td>
<td>4</td>
<td>12.50</td>
</tr>
<tr>
<td>Northeast</td>
<td>7</td>
<td>21.88</td>
</tr>
<tr>
<td>Central</td>
<td>6</td>
<td>18.75</td>
</tr>
<tr>
<td>South Central</td>
<td>3</td>
<td>9.37</td>
</tr>
<tr>
<td>South</td>
<td>12</td>
<td>37.50</td>
</tr>
</tbody>
</table>

**Self-rated Computer Skills and Demographics**

Agents were asked to rate their overall computer skills on a scale from “poor” to “excellent.” As shown in Table 11 on the following page, 84.95% (n = 254) of the respondents reported their skills to be either “average” and “above average.” Table
12 reports this information by gender, and shows that 85.37% (n = 107) of the males rated their skills as being either “average” or “above average,” and 84.97% (n = 147) of the females rate their skills as being either “average” or “above average.”

Table 11.
**Self-rated Overall Computer Skill for All Respondents**

<table>
<thead>
<tr>
<th>Skill Rating</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Poor</td>
<td>3</td>
<td>1.00</td>
</tr>
<tr>
<td>Poor</td>
<td>18</td>
<td>6.02</td>
</tr>
<tr>
<td>Average</td>
<td>129</td>
<td>43.14</td>
</tr>
<tr>
<td>Above Average</td>
<td>125</td>
<td>41.81</td>
</tr>
<tr>
<td>Excellent</td>
<td>22</td>
<td>7.36</td>
</tr>
<tr>
<td>No Response</td>
<td>2</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Table 12.
**Self-rated Overall Computer Skills by Gender**

<table>
<thead>
<tr>
<th>Skill Rating</th>
<th>Male</th>
<th>%N</th>
<th>Female</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Poor</td>
<td>1</td>
<td>0.79</td>
<td>2</td>
<td>1.16</td>
</tr>
<tr>
<td>Poor</td>
<td>8</td>
<td>6.35</td>
<td>10</td>
<td>5.78</td>
</tr>
<tr>
<td>Average</td>
<td>55</td>
<td>43.65</td>
<td>74</td>
<td>42.77</td>
</tr>
<tr>
<td>Above Average</td>
<td>52</td>
<td>41.72</td>
<td>73</td>
<td>42.20</td>
</tr>
<tr>
<td>Excellent</td>
<td>10</td>
<td>7.94</td>
<td>12</td>
<td>6.94</td>
</tr>
<tr>
<td>No Response</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1.16</td>
</tr>
</tbody>
</table>
A t-test for significant differences between mean self-rated skill level for males and mean self-rated skill level for females was performed, and the results were not significant. Table 13 below provides the results of this test.

Table 13. 
*T-test for Significant Difference between Male and Female Mean Self-rated Overall Computer Skills*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Male</th>
<th>Female</th>
<th>t Value</th>
<th>Pr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Self-rated Computer Skill</td>
<td>3.49</td>
<td>0.76</td>
<td>3.48</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>0.07</td>
<td>0.93</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis was then conducted on self-rated computer skills by age. Table 14 shows that, across the five age groups, most agents responded that they have “average” to “above average” overall computer skills. Note the study’s three “very poor” responses stem from the 61-70 age group and the 41-50 age group.

Table 14. 
*Self-rated Overall Computer Skills by Age*

<table>
<thead>
<tr>
<th>Skill Rating</th>
<th>Age 20-30</th>
<th>Age 31-40</th>
<th>Age 41-50</th>
<th>Age 51-60</th>
<th>Age 61-70</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>Very Poor</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Poor</td>
<td>1</td>
<td>2.86</td>
<td>1</td>
<td>1.96</td>
<td>5</td>
</tr>
<tr>
<td>Average</td>
<td>11</td>
<td>31.43</td>
<td>18</td>
<td>35.29</td>
<td>44</td>
</tr>
<tr>
<td>Above Av.</td>
<td>20</td>
<td>57.14</td>
<td>24</td>
<td>47.06</td>
<td>41</td>
</tr>
<tr>
<td>Excellent</td>
<td>3</td>
<td>8.57</td>
<td>6</td>
<td>11.76</td>
<td>6</td>
</tr>
<tr>
<td>No Resp.</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3.92</td>
<td>0</td>
</tr>
</tbody>
</table>
An analysis of variance was conducted to determine if differences in mean self-rated computer skills score existed between the five age groups. As Table 15 reports, this hypothesis is valid. A further comparison of the means was performed using Duncan’s multiple range test. The results of this procedure are displayed in Table 16, and show that differences exist between mean self-rated computer skill for the 51-60 age group and the younger age groups, and differences exist between the 61-70 age group and the younger groups, excluding the 51-60 age group. Note that

Table 15.

*Analysis of Variance for Self-rated Overall Computer Skills (N = 295)*

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>F Value</th>
<th>Pr &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>8.046</td>
<td>2.011</td>
<td>3.59</td>
<td>0.0070*</td>
</tr>
<tr>
<td>Error</td>
<td>288</td>
<td>161.182</td>
<td>0.559</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Total</td>
<td>292</td>
<td>169.228</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant at the $\alpha = .05$ level

DEP MEAN = 3.491  ROOT MSE = 0.748  R-Square = 0.047  C.V. = 21.426

Table 16.

*Results of Duncan’s Test for Comparing Means – Independent Variable is Age, Dependent Variable is Self-rated Overall Computer Skills*

<table>
<thead>
<tr>
<th>Levels of the Independent Variable</th>
<th>N</th>
<th>Mean</th>
<th>Duncan Grouping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Group 20-30</td>
<td>35</td>
<td>3.714</td>
<td>A</td>
</tr>
<tr>
<td>Age Group 31-40</td>
<td>49</td>
<td>3.714</td>
<td>A</td>
</tr>
<tr>
<td>Age Group 41-50</td>
<td>97</td>
<td>3.474</td>
<td>A</td>
</tr>
<tr>
<td>Age Group 51-60</td>
<td>93</td>
<td>3.387</td>
<td>A, B</td>
</tr>
<tr>
<td>Age Group 61-70</td>
<td>19</td>
<td>3.105</td>
<td>B</td>
</tr>
</tbody>
</table>
groups with the same “Duncan Grouping” letter designation are not significantly different.

Agents’ major area of programmatic activity (Agriculture, 4-H, Marine, Other, and Family, Youth and Community Services (FYCS) was then considered in the analysis of self-rated computer skills. Table 17 shows that the majority of agents across all program areas self-rated their overall computer skills as “average” to “above average.” Note that 2 of the study’s 3 “very poor” responses stem from the FYCS program area, and that program areas Agriculture and 4-H had 15 “excellent” responses between them.

Table 17.

<table>
<thead>
<tr>
<th>Skill Rating</th>
<th>Agriculture</th>
<th>4-H</th>
<th>Marine</th>
<th>FYCS</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>Very Poor</td>
<td>1</td>
<td>0.74</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>Poor</td>
<td>6</td>
<td>4.44</td>
<td>2</td>
<td>4.00</td>
<td>1</td>
</tr>
<tr>
<td>Average</td>
<td>59</td>
<td>43.70</td>
<td>20</td>
<td>40.00</td>
<td>4</td>
</tr>
<tr>
<td>Above Av.</td>
<td>58</td>
<td>42.96</td>
<td>22</td>
<td>44.00</td>
<td>7</td>
</tr>
<tr>
<td>Excellent</td>
<td>11</td>
<td>8.15</td>
<td>4</td>
<td>8.00</td>
<td>0</td>
</tr>
<tr>
<td>No Resp.</td>
<td>0</td>
<td>0.00</td>
<td>2</td>
<td>4.00</td>
<td>0</td>
</tr>
</tbody>
</table>

An analysis of variance was conducted to determine if differences in mean self-rated overall computer skills score existed between the five programmatic areas. As Table 18 on the following page reports, this hypothesis is not valid. Duncan’s multiple range test for comparison of means was then performed. Table 19 (Pg. 71)
shows that there were no significant differences between mean self-rated overall computer skills for the program areas.

Table 18.

*Analysis of Variance for Self-rated Overall Computer Skills (N = 297) – Independent Variable is Program Area, Dependent Variable is Self-rated Overall Computer Skills*

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>F Value</th>
<th>Pr &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>3.620</td>
<td>0.905</td>
<td>1.57</td>
<td>0.1829</td>
</tr>
<tr>
<td>Error</td>
<td>292</td>
<td>168.587</td>
<td>0.577</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Total</td>
<td>296</td>
<td>172.208</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DEP MEAN = 3.488  ROOT MSE = 0.759  R-Square = 0.021  C.V. = 21.783

Table 19.

*Results of Duncan’s Test for Comparing Means – Independent Variable is Program Area, Dependent Variable is Self-rated Overall Computer Skills*

<table>
<thead>
<tr>
<th>Levels of the Independent Variable</th>
<th>N</th>
<th>Mean</th>
<th>Duncan Grouping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Area Agriculture</td>
<td>16</td>
<td>3.687</td>
<td>A</td>
</tr>
<tr>
<td>Program Area 4-H</td>
<td>48</td>
<td>3.583</td>
<td>A</td>
</tr>
<tr>
<td>Program Area Marine</td>
<td>135</td>
<td>3.533</td>
<td>A</td>
</tr>
<tr>
<td>Program Area Other</td>
<td>12</td>
<td>3.500</td>
<td>A</td>
</tr>
<tr>
<td>Program Area FYCS</td>
<td>86</td>
<td>3.325</td>
<td>A</td>
</tr>
</tbody>
</table>

Computer Usage and Demographics

As is reported in Table 20 on the following page, 113 agents (37.79%) responded that they use their computers, both at home and at work, over 20 hours a week. Another 78 agents (26.09%) report computer use at between 16-20 hours.

Table 21 on the following page shows weekly computer use by gender. A t-test for
significant differences in mean hours of weekly computer use between the genders was performed, and the results were not significant. Table 22 on the following page provides the results of this test.

Table 20.

*Hours of Computer Use per Week for All Respondents*

<table>
<thead>
<tr>
<th>Level of Use</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5 Hours/week</td>
<td>18</td>
<td>6.02</td>
</tr>
<tr>
<td>6-10 Hours/week</td>
<td>44</td>
<td>14.72</td>
</tr>
<tr>
<td>11-15 Hours/week</td>
<td>46</td>
<td>15.38</td>
</tr>
<tr>
<td>16-20 Hours/week</td>
<td>78</td>
<td>26.09</td>
</tr>
<tr>
<td>20+ Hours/week</td>
<td>113</td>
<td>37.79</td>
</tr>
</tbody>
</table>

Table 21.

*Hours of Computer Use per Week by Gender*

<table>
<thead>
<tr>
<th>Level of Use</th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
<td>%N</td>
</tr>
<tr>
<td>1-5 Hours</td>
<td>10</td>
<td>7.94</td>
<td>8</td>
<td>4.62</td>
</tr>
<tr>
<td>6-10 Hours</td>
<td>18</td>
<td>14.29</td>
<td>26</td>
<td>15.03</td>
</tr>
<tr>
<td>11-15 Hrs.</td>
<td>20</td>
<td>15.67</td>
<td>26</td>
<td>15.03</td>
</tr>
<tr>
<td>16-20 Hrs.</td>
<td>32</td>
<td>25.40</td>
<td>46</td>
<td>26.59</td>
</tr>
<tr>
<td>20+ Hours</td>
<td>46</td>
<td>36.51</td>
<td>67</td>
<td>38.73</td>
</tr>
</tbody>
</table>
Table 22.

*T-test for Significant Difference between Male and Female Mean Hours of Weekly Computer Use*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Male</th>
<th>Female</th>
<th>t Value</th>
<th>Pr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Hours of Weekly Use</td>
<td>4.68</td>
<td>1.31</td>
<td>4.79</td>
<td>1.23</td>
</tr>
</tbody>
</table>

Table 23 examines weekly computer use by age, and shows that 42.86% (n = 15) of the 20-30 age group reported spending over 20 hours a week, as did 21 agents (41.18%) in the 31-40 age group, 35 agents (36.08%) in the 41-50 age group, and 37 (39.78%) agents in the 51-60 age group. Only 4 agents (21.05%) in the 61-70 age group reported 20+ hours a week of computer use, and 26.32% (n = 5) of this group reported being on the computer 1-5 hours a week.

Table 23.

*Hours of Computer Use per Week by Age*

<table>
<thead>
<tr>
<th>Level</th>
<th>Age 20-30</th>
<th>Age 31-40</th>
<th>Age 41-50</th>
<th>Age 51-60</th>
<th>Age 61-70</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>1-5 Hours</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1.96</td>
<td>4</td>
</tr>
<tr>
<td>6-10 Hours</td>
<td>6</td>
<td>17.14</td>
<td>9</td>
<td>17.65</td>
<td>13</td>
</tr>
<tr>
<td>11-15 Hrs.</td>
<td>4</td>
<td>11.43</td>
<td>10</td>
<td>19.61</td>
<td>15</td>
</tr>
<tr>
<td>16-20 Hrs.</td>
<td>10</td>
<td>28.57</td>
<td>10</td>
<td>19.61</td>
<td>30</td>
</tr>
<tr>
<td>20+ Hours</td>
<td>15</td>
<td>42.86</td>
<td>21</td>
<td>41.18</td>
<td>35</td>
</tr>
</tbody>
</table>
An analysis of variance was conducted to determine if significant differences in mean hours of weekly computer use existed between the five age groups. As Table 24 reports, this hypothesis is valid. Duncan’s multiple range test for comparison of means was then performed. As reported in Table 25, the mean hours of weekly computer use for the 61-70 age group is less than that of the younger groups.

Table 24.

*Analysis of Variance for Hours of Weekly Computer Use (N = 295) – Independent Variable is Age Group*

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>F Value</th>
<th>Pr &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>16.171</td>
<td>4.042</td>
<td>2.59</td>
<td>0.0368*</td>
</tr>
<tr>
<td>Error</td>
<td>290</td>
<td>452.255</td>
<td>1.559</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Total</td>
<td>294</td>
<td>468.427</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at the α = .05 level

DEP MEAN = 4.755  ROOT MSE = 1.248  R-Square = 0.034  C.V. = 26.257

Table 25.

*Results of Duncan’s Test for Comparing Means – Independent Variable is Age Group, Dependent Variable is Hours of Weekly Computer Use*

<table>
<thead>
<tr>
<th>Levels of the Independent Variable</th>
<th>N</th>
<th>Mean</th>
<th>Duncan Grouping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 20-30</td>
<td>35</td>
<td>4.97</td>
<td>A</td>
</tr>
<tr>
<td>Age 31-40</td>
<td>97</td>
<td>4.81</td>
<td>A</td>
</tr>
<tr>
<td>Age 41-50</td>
<td>51</td>
<td>4.80</td>
<td>A</td>
</tr>
<tr>
<td>Age 51-60</td>
<td>93</td>
<td>4.76</td>
<td>A</td>
</tr>
<tr>
<td>Age 61-70</td>
<td>19</td>
<td>3.89</td>
<td>B</td>
</tr>
</tbody>
</table>
Table 26 shows hours of weekly computer use differentiated by program area. Sixty-one Agriculture agents (45.19%), and 21 (42.00%) 4-H agents report using the computer over 20 hours a week. Percentages of Marine and FYCS agents using the computer over 20 hours a week are less.

An analysis of variance was conducted to determine if significant differences in mean weekly computer use existed between the five programmatic areas. As Table 27 reports, this hypothesis is not valid.

Table 26.

<table>
<thead>
<tr>
<th>Level</th>
<th>Agriculture</th>
<th>4-H</th>
<th>Marine</th>
<th>FYCS</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>1-5 Hours</td>
<td>9</td>
<td>6.67</td>
<td>1</td>
<td>2.00</td>
<td>6</td>
</tr>
<tr>
<td>6-10 Hours</td>
<td>22</td>
<td>16.30</td>
<td>6</td>
<td>12.00</td>
<td>2</td>
</tr>
<tr>
<td>11-15 Hrs.</td>
<td>14</td>
<td>10.37</td>
<td>5</td>
<td>10.00</td>
<td>4</td>
</tr>
<tr>
<td>16-20 Hrs.</td>
<td>29</td>
<td>21.48</td>
<td>17</td>
<td>34.00</td>
<td>2</td>
</tr>
<tr>
<td>20+ Hours</td>
<td>61</td>
<td>45.19</td>
<td>21</td>
<td>42.00</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 27.

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>F Value</th>
<th>Pr &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>4</td>
<td>12.369</td>
<td>3.092</td>
<td>1.95</td>
<td>0.1019</td>
</tr>
<tr>
<td>Error</td>
<td>294</td>
<td>465.817</td>
<td>1.584</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Total</td>
<td>298</td>
<td>478.187</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DEP MEAN = 4.749  ROOT MSE = 1.258  R-Square = 0.025  C.V. = 26.504
Duncan’s multiple range test for comparison of means was then performed. Table 28 shows that no significant differences in mean hours of weekly computer exist between the different program areas.

Table 28.

<table>
<thead>
<tr>
<th>Levels of the Independent Variable</th>
<th>N</th>
<th>Mean</th>
<th>Duncan Grouping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Area Agriculture</td>
<td>50</td>
<td>5.02</td>
<td>A</td>
</tr>
<tr>
<td>Program Area 4-H</td>
<td>16</td>
<td>4.93</td>
<td>A</td>
</tr>
<tr>
<td>Program Area Marine</td>
<td>135</td>
<td>4.82</td>
<td>A</td>
</tr>
<tr>
<td>Program Area Other</td>
<td>86</td>
<td>4.50</td>
<td>A</td>
</tr>
<tr>
<td>Program Area FYCS</td>
<td>12</td>
<td>4.33</td>
<td>A</td>
</tr>
</tbody>
</table>

Source of Computer Knowledge and Demographics

Agents were asked to respond “yes” or “no” to a list of independent questions about their source of computer knowledge. This information is detailed in Table 29 on the following page, and shows that many agents report learning their computer skills at work. In addition to the sources of knowledge listed in the instrument, agents were also given the opportunity to fill in another source of knowledge on their own. Eighteen responses were recorded in this manner, with the following being salient examples: “Computer books,” “IFAS Help Desk,” “military,” “courses at computer shops,” and “software manuals.”
Table 29.

*Number and Percent of Agents Responding “Yes” to Questions about Where Most Computer Knowledge was Learned (Questions asked Independently of Each Other)*

<table>
<thead>
<tr>
<th>Question</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-taught at home</td>
<td>196</td>
<td>65.55</td>
</tr>
<tr>
<td>Learned in college or high school</td>
<td>95</td>
<td>31.77</td>
</tr>
<tr>
<td>Self-taught at work</td>
<td>264</td>
<td>88.29</td>
</tr>
<tr>
<td>Learned at work through in-service training</td>
<td>200</td>
<td>66.89</td>
</tr>
<tr>
<td>Learned from family or friends outside of work</td>
<td>151</td>
<td>50.50</td>
</tr>
<tr>
<td>Learned from co-workers at work</td>
<td>229</td>
<td>76.59</td>
</tr>
</tbody>
</table>

Recalling that the study’s respondents are 42.14% male and 57.86% female,

Table 30 shows a similar gender distribution for most sources of computer

Table 30.

*Number and Percent of Agents, by Gender, Responding “Yes” to Questions about Where Most Computer Knowledge was Learned (Responses are Independent)*

<table>
<thead>
<tr>
<th>Source of Knowledge</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N %N</td>
<td>N %N</td>
</tr>
<tr>
<td>Self-taught at home</td>
<td>85 43.37</td>
<td>111 56.63</td>
</tr>
<tr>
<td>Learned in school</td>
<td>27 28.42</td>
<td>68 71.58</td>
</tr>
<tr>
<td>Self-taught at work</td>
<td>112 42.42</td>
<td>152 57.58</td>
</tr>
<tr>
<td>In-service Training</td>
<td>90 45.00</td>
<td>110 55.00</td>
</tr>
<tr>
<td>Family, etc.</td>
<td>56 37.09</td>
<td>95 62.91</td>
</tr>
<tr>
<td>Co-workers</td>
<td>94 41.05</td>
<td>135 58.95</td>
</tr>
</tbody>
</table>
knowledge. Two exceptions, however, are apparent: Females, in greater percentages than males, indicate that they learned their computer knowledge in school. This might be related to the previous finding that female agents are significantly younger than male agents, and thus may have had more exposure the technology in the school setting. The second exception between the genders in source of computer knowledge is that more females indicate they learned from family or friends outside of work than did males.

An examination of Table 31, which details source of computer knowledge by age, reveals that agents who are 41-60 years of age range report more often that they acquired their knowledge at home than those agents in either the 20-40, or 61-70 age groups. The youngest age group of agents, those 20-30 years of age, indicated that they acquired their knowledge “in high school or college.” more often than any other

Table 31.

<table>
<thead>
<tr>
<th>Source</th>
<th>Age 20-30</th>
<th>Age 31-40</th>
<th>Age 41-50</th>
<th>Age 51-60</th>
<th>Age 61-70</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>Home</td>
<td>23</td>
<td>11.98</td>
<td>34</td>
<td>17.70</td>
<td>66</td>
</tr>
<tr>
<td>School</td>
<td>32</td>
<td>33.68</td>
<td>26</td>
<td>27.37</td>
<td>21</td>
</tr>
<tr>
<td>Work</td>
<td>28</td>
<td>10.77</td>
<td>50</td>
<td>19.23</td>
<td>84</td>
</tr>
<tr>
<td>In-service</td>
<td>13</td>
<td>6.53</td>
<td>31</td>
<td>15.58</td>
<td>69</td>
</tr>
<tr>
<td>Family, etc.</td>
<td>21</td>
<td>14.09</td>
<td>32</td>
<td>21.48</td>
<td>47</td>
</tr>
<tr>
<td>Co-workers</td>
<td>18</td>
<td>7.96</td>
<td>41</td>
<td>18.14</td>
<td>77</td>
</tr>
</tbody>
</table>
age range. On the other hand, agents 41-60 years of age responded most often that their source of computer knowledge was self-taught at work. In-service training is the predominant source of computer knowledge for agents 41-60 years of age. This same age group, with much more frequency than other age groups, also responds that co-workers are a source of their computer knowledge.

Table 32 shows computer knowledge reported by program area. Large percentages of “yes” response were recorded across the program areas for the “self taught at work” source of computer knowledge. With the exception of the Marine program area, agents across the program areas frequently responded that co-workers were a source of computer knowledge.

Table 32.

<table>
<thead>
<tr>
<th>Source</th>
<th>Agriculture</th>
<th>4-H</th>
<th>Marine</th>
<th>FYCS</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>Home</td>
<td>92</td>
<td>68.15</td>
<td>33</td>
<td>66.00</td>
<td>6</td>
</tr>
<tr>
<td>School</td>
<td>34</td>
<td>25.19</td>
<td>22</td>
<td>44.00</td>
<td>6</td>
</tr>
<tr>
<td>Work</td>
<td>122</td>
<td>90.37</td>
<td>42</td>
<td>84.00</td>
<td>8</td>
</tr>
<tr>
<td>In-service</td>
<td>94</td>
<td>69.63</td>
<td>29</td>
<td>58.00</td>
<td>7</td>
</tr>
<tr>
<td>Family, etc.</td>
<td>60</td>
<td>44.44</td>
<td>26</td>
<td>52.00</td>
<td>5</td>
</tr>
<tr>
<td>Co-workers</td>
<td>103</td>
<td>76.30</td>
<td>34</td>
<td>68.00</td>
<td>7</td>
</tr>
</tbody>
</table>

Agents were asked if they had taken any computer courses since the year 2000. As evidenced in Table 33 on the following page, the majority (52.17%, n =
159) responded “no.” Table 34 shows the results of a follow up question that asked the “principal reason” for not taking a computer course since 2000. Seventy agents indicated the reason was too few in-service training (IST) days.

Table 33.

Agents who Have/Have not Taken Computer Courses Since 2000

<table>
<thead>
<tr>
<th>Response</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>141</td>
<td>47.16</td>
</tr>
<tr>
<td>No</td>
<td>159</td>
<td>52.17</td>
</tr>
<tr>
<td>No response</td>
<td>2</td>
<td>0.67</td>
</tr>
</tbody>
</table>

(23.41%) indicated “lack of time” as the reason, and 29 agents (9.70%)

Table 34.

Reason for not Taking a Computer Course Since 2000

<table>
<thead>
<tr>
<th>Response</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of Time</td>
<td>70</td>
<td>23.41</td>
</tr>
<tr>
<td>Lack of Access</td>
<td>14</td>
<td>4.68</td>
</tr>
<tr>
<td>Too Expensive</td>
<td>3</td>
<td>1.00</td>
</tr>
<tr>
<td>No Incentive</td>
<td>9</td>
<td>3.01</td>
</tr>
<tr>
<td>Not Available</td>
<td>11</td>
<td>3.68</td>
</tr>
<tr>
<td>Too few IST Days</td>
<td>29</td>
<td>9.70</td>
</tr>
<tr>
<td>Other</td>
<td>35</td>
<td>11.71</td>
</tr>
<tr>
<td>No response</td>
<td>128</td>
<td>42.18</td>
</tr>
</tbody>
</table>

By gender, 61.90% (n = 78) of the males responded that they had not taken a computer course since 2000, but 53.76% (n = 93) responded that they had taken a
computer course since 2000. This information is provided in Table 35 below. Table 36 shows that 30.16% (n = 38) of the males and 18.50% (n = 32) of the females responded that “lack of time” was the principal reason for not taking a computer

Table 35.
Agents, by Gender, who Have/Have not Taken Computer Courses Since 2000

<table>
<thead>
<tr>
<th>Response</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
</tr>
<tr>
<td>Yes</td>
<td>48</td>
<td>38.10</td>
</tr>
<tr>
<td>No</td>
<td>78</td>
<td>61.90</td>
</tr>
<tr>
<td>No response</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 36.
Reason, by Gender, for not Taking a Computer Course Since 2000

<table>
<thead>
<tr>
<th>Response</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
</tr>
<tr>
<td>Lack of Time</td>
<td>38</td>
<td>30.16</td>
</tr>
<tr>
<td>Lack of Access</td>
<td>5</td>
<td>3.97</td>
</tr>
<tr>
<td>Too Expensive</td>
<td>1</td>
<td>0.79</td>
</tr>
<tr>
<td>No Incentive</td>
<td>5</td>
<td>3.97</td>
</tr>
<tr>
<td>Not Available</td>
<td>5</td>
<td>3.97</td>
</tr>
<tr>
<td>Too few IST Days</td>
<td>11</td>
<td>8.73</td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
<td>13.49</td>
</tr>
<tr>
<td>No response</td>
<td>44</td>
<td>34.92</td>
</tr>
</tbody>
</table>
course. Agents were also given the opportunity to list other reasons for not taking computer courses. Among the 38 responses received this way were: “Not offering what I need,” “no mid level to high end application training offered,” “scheduling conflicts,” “usually too generic and basic,” “signed up for classes but they were cancelled,” and “nothing new I’m interested in.”

Table 37 presents an analysis, by age group, of agents who have not taken a computer course since 2000. Agents 61-70 years of age show the highest incidence (57.89%) of not taking a computer class since the year 2000, whereas agents 31-40 years of age (54.09%) are more likely to have taken a course.

Table 38 on the following page shows that across all age groups, “lack of time” is the most often given response for not taking a computer course. Table 39 (Pg. 83) and Table 40 (Pg. 84) examine the computer course questions by program area, again showing “lack of time” to be the most frequently given reason for not taking a course.

Table 37.

Agents, by Age Group, who Have/Have not Taken Computer Courses Since 2000

<table>
<thead>
<tr>
<th>Response</th>
<th>Age 20-30</th>
<th>Age 31-40</th>
<th>Age 41-50</th>
<th>Age 51-60</th>
<th>Age 61-70</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
<td>42.86</td>
<td>28</td>
<td>54.90</td>
<td>45</td>
</tr>
<tr>
<td>No</td>
<td>20</td>
<td>57.14</td>
<td>22</td>
<td>43.14</td>
<td>52</td>
</tr>
<tr>
<td>No Resp.</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1.96</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 38.

*Reason, by Age Group, for not taking a Computer Course Since 2000*

<table>
<thead>
<tr>
<th>Response</th>
<th>Age 20-30</th>
<th>Age 31-40</th>
<th>Age 41-50</th>
<th>Age 51-60</th>
<th>Age 61-70</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>LO Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>22.86</td>
<td>5</td>
<td>9.80</td>
<td>25</td>
</tr>
<tr>
<td>LO Access</td>
<td>0</td>
<td>0.00</td>
<td>2</td>
<td>3.92</td>
<td>4</td>
</tr>
<tr>
<td>Expense</td>
<td>0</td>
<td>0.00</td>
<td>1</td>
<td>1.96</td>
<td>1</td>
</tr>
<tr>
<td>Incentive</td>
<td>3</td>
<td>8.57</td>
<td>1</td>
<td>1.96</td>
<td>1</td>
</tr>
<tr>
<td>Availability</td>
<td>2</td>
<td>5.71</td>
<td>2</td>
<td>3.92</td>
<td>5</td>
</tr>
<tr>
<td>IST Days</td>
<td>3</td>
<td>8.57</td>
<td>7</td>
<td>13.73</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>8.57</td>
<td>5</td>
<td>9.80</td>
<td>12</td>
</tr>
<tr>
<td>No Resp.</td>
<td>16</td>
<td>45.71</td>
<td>28</td>
<td>54.90</td>
<td>39</td>
</tr>
</tbody>
</table>

Table 39.

*Agents, by Program Area, who Have/Have not Taken a Computer Course Since 2000*

<table>
<thead>
<tr>
<th>Response</th>
<th>Agriculture</th>
<th>4-H</th>
<th>Marine</th>
<th>FYCS</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>Yes</td>
<td>53</td>
<td>39.26</td>
<td>22</td>
<td>44.00</td>
<td>5</td>
</tr>
<tr>
<td>No</td>
<td>82</td>
<td>60.74</td>
<td>27</td>
<td>54.00</td>
<td>7</td>
</tr>
<tr>
<td>No Resp.</td>
<td>0</td>
<td>0.00</td>
<td>1</td>
<td>2.00</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 40.
*Reason, by Program Area, for not taking a Computer Course Since 2000*

<table>
<thead>
<tr>
<th>Response</th>
<th>Agriculture</th>
<th>4-H</th>
<th>Marine</th>
<th>FYCS</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>LO Time</td>
<td>37</td>
<td>27.41</td>
<td>10</td>
<td>20.00</td>
<td>4</td>
</tr>
<tr>
<td>LO Access</td>
<td>5</td>
<td>3.70</td>
<td>3</td>
<td>6.00</td>
<td>1</td>
</tr>
<tr>
<td>Expense</td>
<td>2</td>
<td>1.48</td>
<td>1</td>
<td>2.00</td>
<td>0</td>
</tr>
<tr>
<td>Incentive</td>
<td>4</td>
<td>2.96</td>
<td>2</td>
<td>4.00</td>
<td>0</td>
</tr>
<tr>
<td>Availability</td>
<td>8</td>
<td>5.93</td>
<td>1</td>
<td>2.00</td>
<td>0</td>
</tr>
<tr>
<td>IST Days</td>
<td>11</td>
<td>8.15</td>
<td>6</td>
<td>12.00</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>15</td>
<td>11.11</td>
<td>6</td>
<td>12.00</td>
<td>1</td>
</tr>
<tr>
<td>No Resp.</td>
<td>53</td>
<td>39.26</td>
<td>21</td>
<td>42.00</td>
<td>4</td>
</tr>
</tbody>
</table>

Two hundred ninety-five agents responded to the question “if you have a question about a computer-related issue, where are you most likely to seek an answer.” The majority, 52.17% (n = 156) indicated that they turned to “a colleague or support staff in the office.” The second most frequent response at 24.41% (n = 73) was “from your district’s computer support personnel.” Table 41 on the following page shows this information. In addition to the supplied response, thirty-three agents indicated “other” as answer to this question, and voluntarily offered various responses such as: “County computer support personnel,” “IFAS help,” “Gainesville IT or county IT,” “office support staff or county computer support personnel,” “from district computer personnel,” or “my friend the computer geek.”
Table 41.  
*Where Agents Seek Answer to Computer-related Questions*

<table>
<thead>
<tr>
<th>Response</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>From a colleague or support staff in the office</td>
<td>156</td>
<td>52.17</td>
</tr>
<tr>
<td>From a colleague or support staff in another county</td>
<td>6</td>
<td>2.01</td>
</tr>
<tr>
<td>From your district’s computer support personnel</td>
<td>73</td>
<td>24.41</td>
</tr>
<tr>
<td>You find the answer on your own</td>
<td>27</td>
<td>9.03</td>
</tr>
<tr>
<td>Other</td>
<td>33</td>
<td>11.04</td>
</tr>
<tr>
<td>No response</td>
<td>4</td>
<td>1.34</td>
</tr>
</tbody>
</table>

Demographic Snapshots by Age

**Age group 20-30**

This group of agents accounted for 17.06\% of the respondents (n = 35). The majority of this group, 88.57\%, reported average to above average computer skills. Insofar as computer use is concerned, 42.86\%, of this group spends 20+ hours a week on the computer, and another 40\% spends between 11-20 hours a week on the computer. Of all the sources of computer knowledge that the survey inquired about, the most frequent response by this group was “learned in college or high school.” More than half, 57.14\%, have not taken a computer course since 2000, with 22.48\% indicating that lack of time was the reason. When asked where they sought answers for their computer-related questions, 40.00\% of this age group responded “from a colleague or support staff in the office.”
Age group 31-40

This group of agents accounted for 17.06% of the respondents (n = 51). The majority of this group, 82.35%, reported average to above average computer skills. Insofar as computer use is concerned, 41.18% of this group reported spending 20+ hours a week on the computer, and another 39.22% spends between 11-20 hours a week on the computer. Of all the sources of computer knowledge that the survey inquired about, the most frequent response by this group was “self-taught at work.” Of the respondents in this age group, 43.14% have not taken a computer course since 2000, with 13.73% indicating that too few in-service training days was the reason. The majority of this age group, 50.98%, indicated that they sought answers for computer-related issues from “a colleague or support staff in the office.”

Age group 41-50

This group of agents accounted for 32.44% of the respondents (n = 97), and was the largest of the survey. The majority of this group, 87.63%, reported average to above average computer skills. Insofar as computer use is concerned, 36.08% of this group reports spending 20+ hours a week on the computer, and another 46.39% spends between 11-20 hours a week on the computer. Of all the sources of computer knowledge that the survey inquired about, the most frequent response by this group was “self-taught at work.” Of the respondents in this age group, 53.61% have not taken a computer course since 2000, and 25.77% indicated that lack of time was the reason. This group responded 56.70% of the time that they sought answers to computer-related issues from “a colleague or support staff in the office.”
Age group 51-60

This group of agents accounted for 31.10% of the respondents (n = 93), and was the second largest of the survey. The majority of this group, 82.80%, reported average to above average computer skills. Insofar as computer use is concerned, 39.78% of this group reports spending 20+ hours a week on the computer, and another 38.81% spends between 11-20 hours a week on the computer. Of all the sources of computer knowledge that the survey inquired about, the most frequent response by this group was “self-taught at work.” Of the respondents in this age group, 52.69% have not taken a computer course since 2000, and 25.81% indicated that lack of time was the reason. Responding to the question about where they sought answers to computer-related issues, this group responded 51.61% of the time “from a colleague or support staff in the office.”

Age group 61-70

This group of agents accounted for 6.35% of the respondents (n = 19), and was the most senior of the survey. The majority of this group, 63.61%, reported average computer skills. Insofar as computer use is concerned, 21.05% of this group reported spending 20+ hours a week on the computer, and another 36.84% spends between 11-20 hours a week on the computer. Of all the sources of computer knowledge that the survey inquired about, the most frequent response by this group was “learned at work through in-service training, etc.” Of the respondents in this age group, 57.89% have not taken a computer course since 2000, and 31.58% indicated that lack of time was the reason. The majority of 61-70 year old county agents, 63.16%, seek answers to computer-related issues from colleagues or support staff in the office.
Objective 2

Determine How County Extension Agents are Using Information Technology on the Job in terms of Hardware Use, and the Nature and Frequency of Use of Specific Types of Software

Connectivity, Hardware and Operating System Use, etc.

Ninety-five percent (n = 285) of agents responding to the question as to whether they have a computer on their desk at their office, said “yes.” Ninety-eight percent (n = 293) of the agents responding to the question asking what sort of computer they had on their desk, indicated an IBM P.C. clone with the Windows operating system. Ninety-nine percent (n = 296) of agents responding to whether the computer on their desk was connected to the Internet, indicated “yes.” The majority of agents, 68.90%, responded “yes” to the question about whether they did office work on their home computer. When asked if they used a laptop computer, 75.92% (n = 227) of the responses to the question were “yes,” with males, 77.78%, and females, 74.57%, being almost equally distributed. When asked if they used a Palm Pilot, I-Paq, or some such similar device, 34.78% (n = 104) of the respondents to the question indicated, “yes,” with almost equal responses from males (36.51%) and females (33.53).

Patterns of Use of Electronic Mail

As asked if they use e-mail, 100% (n =299) of the respondents answered “yes.” Agents were then asked to give their average daily use of e-mail. As is shown in Table 42 on the following page, 26.42% (n = 79) of the agents responded “31-45 minutes a day,” and 25.08% (n = 75) responded “46-60 minutes a day.” Asked if they use e-mail to communicate with clientele, a large majority, 91.97% (n = 275), of the agents said “yes.” A follow up to this question asked agents how often they
Table 42.

*Agents’ Average Daily Use of E-mail*

<table>
<thead>
<tr>
<th>Average Daily Use</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15 minutes a day</td>
<td>16</td>
<td>5.35</td>
</tr>
<tr>
<td>16-30 minutes a day</td>
<td>73</td>
<td>24.41</td>
</tr>
<tr>
<td>31-45 minutes a day</td>
<td>79</td>
<td>26.42</td>
</tr>
<tr>
<td>46-60 minutes a day</td>
<td>75</td>
<td>25.08</td>
</tr>
<tr>
<td>Over 60 minutes a day</td>
<td>56</td>
<td>18.73</td>
</tr>
</tbody>
</table>

E-mailed clientele during the month. Seventy-five respondents (25.08%) indicated “more than 20 times a month,” and another 75 (25.08%) responded “1-5 times a month.” This information is provided in Table 43. Agents were also asked to estimate the number of clientele they reached via e-mail during a typical month. As

Table 43.

*How Often Agents E-mail Clientele during the Month*

<table>
<thead>
<tr>
<th>Number of Times per Month</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5 times a month</td>
<td>75</td>
<td>25.08</td>
</tr>
<tr>
<td>6-10 times a month</td>
<td>58</td>
<td>19.40</td>
</tr>
<tr>
<td>11-15 times a month</td>
<td>36</td>
<td>12.04</td>
</tr>
<tr>
<td>16-20 times a month</td>
<td>36</td>
<td>12.04</td>
</tr>
<tr>
<td>More than 20 times a month</td>
<td>75</td>
<td>25.08</td>
</tr>
<tr>
<td>Not applicable</td>
<td>17</td>
<td>5.69</td>
</tr>
<tr>
<td>No response</td>
<td>2</td>
<td>0.67</td>
</tr>
</tbody>
</table>
Table 44 reports, 56.86% (n = 170) of the respondents indicate they contact between 1 and 25 clientele per month via e-mail, and 29 agents (9.70%) reported contacting over 100 clientele per month via e-mail.

Table 44.  
Estimated Number of Clientele Reached via E-mail during a Typical Month

<table>
<thead>
<tr>
<th>Est. Number of Clientele Reached</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-25 clientele per month</td>
<td>170</td>
<td>56.86</td>
</tr>
<tr>
<td>26-50 clientele per month</td>
<td>47</td>
<td>15.72</td>
</tr>
<tr>
<td>51-75 clientele per month</td>
<td>14</td>
<td>4.68</td>
</tr>
<tr>
<td>76-100 clientele per month</td>
<td>19</td>
<td>6.35</td>
</tr>
<tr>
<td>More than 100 clientele per month</td>
<td>29</td>
<td>9.70</td>
</tr>
<tr>
<td>Not applicable</td>
<td>16</td>
<td>5.35</td>
</tr>
<tr>
<td>No response</td>
<td>4</td>
<td>1.34</td>
</tr>
</tbody>
</table>

Patterns of Use of Word Processing Software

Word processing software is used by 96.66% (n = 289) of the responding county agents. Agents were asked to give their average daily use of word processing software. Table 45 on the following page shows that 25.08% (n = 75) of the respondents indicated they use word processing software more than 90 minutes a day. Another 23.41% (n = 70) of the respondents indicate using word processing software between 46-60 minutes a day. When asked which word processing software program they most often used, 46.49% (n = 139) of the respondents to this question indicated Corel Word Perfect, 44.48% (n = 133) indicated MS Word, and 5.35% (n = 16) indicated “other.” Eleven agents (3.68%) did not respond to the question.
Table 45.

**Agents’ Average Daily Use of Word Processing Software**

<table>
<thead>
<tr>
<th>Average Daily Use of Word Processing Software</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15 minutes a day</td>
<td>16</td>
<td>5.35</td>
</tr>
<tr>
<td>16-30 minutes a day</td>
<td>28</td>
<td>9.36</td>
</tr>
<tr>
<td>31-45 minutes a day</td>
<td>40</td>
<td>13.38</td>
</tr>
<tr>
<td>46-60 minutes a day</td>
<td>70</td>
<td>23.41</td>
</tr>
<tr>
<td>61-90 minutes a day</td>
<td>61</td>
<td>20.40</td>
</tr>
<tr>
<td>More than 90 minutes a day</td>
<td>75</td>
<td>25.08</td>
</tr>
<tr>
<td>No response</td>
<td>9</td>
<td>3.01</td>
</tr>
</tbody>
</table>

Patterns of Use of Spreadsheet Software

As asked if they use spreadsheet software, 60.87% (n = 182) said “yes.” Agents were then asked to give, in terms of minutes, their average monthly use of spreadsheet software. Table 46 on the following page shows that 44 agents (14.72%) use spreadsheet software between 0 and 15 minutes a month, and another 38 agents (12.71%) indicate that they use spreadsheet software 16-30 minutes a month. The majority of the respondents, 48.83% (n =146), when asked which spreadsheet software they used most often, indicated Microsoft Excel, whereas 10.03% (n = 30) indicated Corel Quattro Pro, and 1.34% (n = 4) indicated “other.” One hundred and nineteen agents did not respond to the question about most frequently used brand of spreadsheet software.
Table 46.

*Agents’ Average Monthly Use of Spreadsheet Software*

<table>
<thead>
<tr>
<th>Average Monthly Use of Spreadsheet Software</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15 minutes a month</td>
<td>44</td>
<td>14.72</td>
</tr>
<tr>
<td>16-30 minutes a month</td>
<td>38</td>
<td>12.71</td>
</tr>
<tr>
<td>31-45 minutes a month</td>
<td>28</td>
<td>9.36</td>
</tr>
<tr>
<td>46-60 minutes a month</td>
<td>25</td>
<td>8.36</td>
</tr>
<tr>
<td>61-90 minutes a month</td>
<td>17</td>
<td>5.69</td>
</tr>
<tr>
<td>More than 90 minutes a month</td>
<td>30</td>
<td>10.03</td>
</tr>
<tr>
<td>No response</td>
<td>117</td>
<td>39.13</td>
</tr>
</tbody>
</table>

Patterns of Use of Presentation Software

Asked if they use presentation software such as Microsoft PowerPoint or Corel Presentations, 245 (81.94%) agents answered “yes.” Table 47 on the following page shows the number of times per year that agents estimated using presentation software. Seventy-six agents (25.42%) reported using presentation software over 20 times a year, and another 51 (17.06%) respondents indicated average use of presentation software between 6-10 time a year. Asked which presentation software they most often used, the majority of agents, 74.92% (n = 224), responded that they used Microsoft PowerPoint, while 6.02% (n = 18) used Corel Presentations, and 1.34% (n = 4) indicated that they used another product. Fifty-three (17.73%) agents did not respond to the question.
Table 47.

*Agents’ Estimated Average Yearly Use of Presentation Software*

<table>
<thead>
<tr>
<th>Average Yearly Use of Presentation Software</th>
<th>N</th>
<th>%N</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 times a year</td>
<td>59</td>
<td>19.73</td>
</tr>
<tr>
<td>6-10 times a year</td>
<td>51</td>
<td>17.06</td>
</tr>
<tr>
<td>11-15 times a year</td>
<td>33</td>
<td>11.04</td>
</tr>
<tr>
<td>16-20 times a year</td>
<td>30</td>
<td>10.03</td>
</tr>
<tr>
<td>More than 20 times a year</td>
<td>76</td>
<td>25.42</td>
</tr>
<tr>
<td>No response</td>
<td>50</td>
<td>16.72</td>
</tr>
</tbody>
</table>

Patterns of Use of the World Wide Web

Agents were asked if they “could ‘surf’ or browse the Internet.” Two hundred ninety-eight or 98.33% of the respondents answered “yes.” When asked the open-ended question, “in general, what is your opinion of the World Wide Web and its use in Extension work,” 226 agents voluntarily responded in writing. Of these agents, almost all of them, 97.34% (n = 220) used very strong positive statements such as:

“Indispensable;” “Wonderful resource;” “Vital for quick information & ideas;”

“Absolutely essential;” “Invaluable;” “Very important.”

Patterns of Use of the Web Page Editing/Creation Activity

When asked whether they “edit or create Web pages,” 22.74% (n = 68) agents said “yes.” Responding to the related question “who is primarily responsible for maintaining your county’s Extension service Web site,” 21 respondents (7.02%)
indicated “office support staff,” followed closely by “I am” (6.69%, n = 20), and “other” (4.68%, n = 14).

**Objective 3**

**Determine county Extension Agents Perceived Level of Skill with Regard to a Specific set of Information Technology Tasks**

The study endeavored to generate a more objective assessment of agents’ computer skills by asking (agents) to self-report whether they could perform specific tasks with regard to the six types of software that the study considered (e-mail, word processors, spreadsheets, presentation software, Web browsing, and Web development). To these ends a series of yes/no questions about specific skills associated with the six types of software were asked. As is indicated in Table 48 beginning on the following page, questions about e-mail skills and skills associated with surfing the World Wide Web received high percentages of “yes” response, followed by diminishing levels of “yes” response for word processing skills, presentation software skills, spreadsheet skills, and Web page editing/development skills. For purposes of comparison, the above analysis was done for the Paper Respondents (n = 21), All On-line Respondents (n = 278), and for the total population (n = 299).
Table 48.  
*Number and Percent of Respondents indicating “Yes” to Specific Skills Questions*  

<table>
<thead>
<tr>
<th>Specific Software Skill</th>
<th>Paper Respondents</th>
<th>All On-line Respondents</th>
<th>All Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td><strong>E-mail</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you use e-mail?</td>
<td>21</td>
<td>100.00</td>
<td>278</td>
</tr>
<tr>
<td>Can you attach and send files (attachments) through e-mail?</td>
<td>18</td>
<td>85.71</td>
<td>267</td>
</tr>
<tr>
<td>Are you a member of an e-mail listserv?</td>
<td>18</td>
<td>85.71</td>
<td>263</td>
</tr>
<tr>
<td>Can you find addresses in your e-mail program’s address book?</td>
<td>19</td>
<td>90.48</td>
<td>262</td>
</tr>
<tr>
<td>Can you create and use e-mail distribution lists using your e-mail program?</td>
<td>16</td>
<td>76.19</td>
<td>198</td>
</tr>
<tr>
<td>Can you access your e-mail away from the office?</td>
<td>13</td>
<td>61.90</td>
<td>184</td>
</tr>
<tr>
<td>Do you use e-mail folders to organize sent or received e-mail messages?</td>
<td>12</td>
<td>57.14</td>
<td>167</td>
</tr>
<tr>
<td><strong>Word Processing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you use word processing software?</td>
<td>20</td>
<td>95.24</td>
<td>269</td>
</tr>
<tr>
<td>Can you use edit features such as cut and paste?</td>
<td>19</td>
<td>90.48</td>
<td>263</td>
</tr>
<tr>
<td>Can you set page margins?</td>
<td>17</td>
<td>80.95</td>
<td>246</td>
</tr>
<tr>
<td>Can you create tables?</td>
<td>14</td>
<td>66.67</td>
<td>222</td>
</tr>
<tr>
<td>Can you set tabs?</td>
<td>16</td>
<td>76.19</td>
<td>212</td>
</tr>
<tr>
<td>Specific Software Skill</td>
<td>Paper Respondents</td>
<td>All On-line Respondents</td>
<td>All Respondents</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------</td>
<td>-------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
</tbody>
</table>

**Word Processing (continued)**

Can you perform “mail merge” using a dataset of names, etc.? 4 19.05 91 32.73 95 31.77

**Spreadsheet**

Do you use spreadsheet software such as MS Excel or Corel Quattro Pro? 8 38.10 174 62.59 182 60.87

Can you format cells in a spreadsheet to number, or currency, etc.? 3 14.29 150 53.96 153 51.17

Can you sort data in a spreadsheet? 5 23.81 120 43.17 125 41.81

Can you write formulas in a spreadsheet? 1 4.76 120 43.17 121 40.47

Can you create a graph or chart in a spreadsheet (using the Ss. software?) 1 4.76 116 41.73 117 39.13

Can you use nested functions in a spreadsheet? 2 9.52 62 22.30 64 21.40

**Presentation software**

Do you use presentation software? 16 76.19 229 82.37 245 81.94

Can you use different views in the presentation software package? 16 76.19 212 76.26 228 76.25

Can you insert graphics and pictures from a variety of resources? 15 71.43 190 68.35 205 68.56

Can you create a master slide? 14 66.67 186 66.91 200 66.89

Can you create a slide show that runs automatically? 10 47.62 163 58.63 173 57.66
Table 48 - Continued

<table>
<thead>
<tr>
<th>Specific Software Skill</th>
<th>Paper Respondents</th>
<th>All On-line Respondents</th>
<th>All Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Presentation software (continued)</strong></td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>Can you create automatic builds and transitions?</td>
<td>7</td>
<td>33.33</td>
<td>140</td>
</tr>
<tr>
<td><strong>World Wide Web</strong></td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>Can you “surf” or browse the Internet?</td>
<td>21</td>
<td>100.00</td>
<td>273</td>
</tr>
<tr>
<td>Can you use a search engine such as Yahoo or Google to find Web pages?</td>
<td>20</td>
<td>95.24</td>
<td>273</td>
</tr>
<tr>
<td>Can you download files from the Internet?</td>
<td>21</td>
<td>100.00</td>
<td>263</td>
</tr>
<tr>
<td>Can you bookmark frequently used Web pages?</td>
<td>19</td>
<td>90.48</td>
<td>256</td>
</tr>
<tr>
<td><strong>Web Page Editing/Development</strong></td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>Do you create or edit Web pages?</td>
<td>3</td>
<td>14.29</td>
<td>65</td>
</tr>
<tr>
<td><strong>Web Page Editing/Development</strong></td>
<td>N</td>
<td>%N</td>
<td>N</td>
</tr>
<tr>
<td>Can you create hyperlinks?</td>
<td>2</td>
<td>9.52</td>
<td>55</td>
</tr>
<tr>
<td>Can you create a Web page using MS FrontPage or another HTML editor?</td>
<td>2</td>
<td>9.52</td>
<td>54</td>
</tr>
<tr>
<td>Can you incorporate graphics into Web pages?</td>
<td>2</td>
<td>9.52</td>
<td>54</td>
</tr>
<tr>
<td>Can you convert existing files into HTML?</td>
<td>0</td>
<td>0.00</td>
<td>48</td>
</tr>
<tr>
<td>Can you create a Web page using native HTML?</td>
<td>0</td>
<td>0.00</td>
<td>21</td>
</tr>
</tbody>
</table>
Percentage of “yes” response to the specific software skills questions was very similar across the three categories of respondents, with the notable exception of spreadsheet use. For spreadsheet use, percent of “yes” response was much lower for the Paper Respondents group.

**Objective 4**

As a Means to Recommend Future Information Technology Training, Describe the Relationship Between Agents’ Perceived Importance of, and Self-Assessed Knowledge about each of a Specific set of Information Technology Skills

This aspect of the analysis follows from that engaged by Albright in her similar (2000) study of county Extension agents in the state of Texas. In that study Albright showed that agents’ self-assessed knowledge about an information technology skill is closely correlated with their ability to apply the skill on the job. Agents, therefore, reporting a high level of knowledge about a skill are in all likelihood able to apply those skills to their jobs. For the study at hand, this close correlation between knowledge and application held true. Table 49 on the following page provides the results of the correlation.
Table 49.
*Product-Moment Correlation Coefficients for Knowledge and Application by Skill Category*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail Knowledge</td>
<td>.844***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(N = 297)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word Processing Knowledge</td>
<td>.516***</td>
<td>.918***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(N = 288)</td>
<td>(N = 287)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spreadsheet Knowledge</td>
<td>.433***</td>
<td>.468***</td>
<td>.918*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(N = 182)</td>
<td>(N = 178)</td>
<td>(N = 181)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation Software Knowledge</td>
<td>.479***</td>
<td>.551***</td>
<td>.306***</td>
<td>.915***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(N = 245)</td>
<td>(N = 239)</td>
<td>(N = 165)</td>
<td>(N = 244)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WWW Knowledge</td>
<td>.564***</td>
<td>.540***</td>
<td>.441***</td>
<td>.519***</td>
<td>.916***</td>
<td></td>
</tr>
<tr>
<td>(N = 296)</td>
<td>(N = 287)</td>
<td>(N = 181)</td>
<td>(N = 244)</td>
<td>(N = 296)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web Development Knowledge</td>
<td>.350*</td>
<td>.511***</td>
<td>.526***</td>
<td>.506***</td>
<td>.553***</td>
<td>.930***</td>
</tr>
<tr>
<td>(N = 69)</td>
<td>(N = 69)</td>
<td>(N = 59)</td>
<td>(N = 63)</td>
<td>(N = 69)</td>
<td>(N = 69)</td>
<td></td>
</tr>
</tbody>
</table>

*Pr < 0.01
** Pr < 0.001
*** Pr < 0.0001

Albright (2000), following methodology described by Borich, posits that a weighted score combining the agents’ knowledge of a skill with the level of importance that they ascribe to a skill “is a stronger relationship to consider for training” (p. 84) than is the knowledge score alone. This weighting functions as a mathematical equation using the mean values of the “knowledge” and “importance” constructs: (Importance Mean – Knowledge Mean) X Importance Mean = Training
Need (Albright, 2000, p. 87). The effect of the weighting is to accentuate the importance of a skill should the knowledge of that skill be small. Thus, in example, if agents respond in such a manner to indicate that a skill is important, but also respond that they have little knowledge about that skill, the value of the importance of that skill will be increased. Performed for all skills of interest, the weighted knowledge scores are then ranked, with the most pressing training needs garnering the highest value.

Using the weighting method described above, training needs were calculated and ordered for each of the six IT skills areas the study considered. The results are listed in Tables 50 and 51, and show that E-mail skills, with a weighted knowledge score of 4.33 appeared at the top of the list of training needs, followed by presentation software skills (3.32), word processing skills (3.27), World Wide Web

Table 50.

<table>
<thead>
<tr>
<th>Skill Category</th>
<th>Importance Mean</th>
<th>Knowledge Mean</th>
<th>Weighted Knowledge Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>4.42</td>
<td>3.44</td>
<td>4.33</td>
</tr>
<tr>
<td>Word Processing</td>
<td>4.36</td>
<td>3.61</td>
<td>3.27</td>
</tr>
<tr>
<td>Spreadsheet</td>
<td>3.00</td>
<td>2.67</td>
<td>0.99</td>
</tr>
<tr>
<td>Presentation</td>
<td>4.10</td>
<td>3.29</td>
<td>3.32</td>
</tr>
<tr>
<td>WWW</td>
<td>3.95</td>
<td>3.49</td>
<td>1.81</td>
</tr>
<tr>
<td>Web Development</td>
<td>3.45</td>
<td>3.00</td>
<td>1.55</td>
</tr>
</tbody>
</table>
skills (1.81), Web editing/development skills (1.55), and lastly spreadsheet skills (0.99).

Table 51.

*Borich (1990) Training Need Ranking*

<table>
<thead>
<tr>
<th>Skill Category</th>
<th>Weighted Knowledge Score</th>
<th>Rank of Training Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>4.33</td>
<td>1</td>
</tr>
<tr>
<td>Presentation</td>
<td>3.32</td>
<td>2</td>
</tr>
<tr>
<td>Word Processing</td>
<td>3.27</td>
<td>3</td>
</tr>
<tr>
<td>WWW</td>
<td>1.81</td>
<td>4</td>
</tr>
<tr>
<td>Web Development</td>
<td>1.55</td>
<td>5</td>
</tr>
<tr>
<td>Spreadsheet</td>
<td>0.99</td>
<td>6</td>
</tr>
</tbody>
</table>

Respondents were then differentiated by gender and the Borich Model applied in the same manner as above. As Tables 52 and 53 on the following page indicate, a different ranking of training need is evident when gender is considered. For males the top three needs are presentation software, e-mail, and word processing. For females the top three training needs are e-mail, word processing, and presentation software.
### Table 52.
*Mean Impotence and Knowledge Construct Scores and Weighted Knowledge Score by Skills Category and Gender*

<table>
<thead>
<tr>
<th>Skill Category</th>
<th>Male Import. Mean</th>
<th>Male Know. Mean</th>
<th>Male Wted. Know. Score</th>
<th>Female Import. Mean</th>
<th>Female Know. Mean</th>
<th>Female Wted. Know. Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>4.36</td>
<td>3.48</td>
<td>3.84</td>
<td>4.46</td>
<td>3.42</td>
<td>4.64</td>
</tr>
<tr>
<td>Word Processing</td>
<td>4.28</td>
<td>3.51</td>
<td>3.32</td>
<td>4.42</td>
<td>3.67</td>
<td>3.30</td>
</tr>
<tr>
<td>Spreadsheet</td>
<td>2.97</td>
<td>2.79</td>
<td>0.55</td>
<td>3.02</td>
<td>2.58</td>
<td>1.31</td>
</tr>
<tr>
<td>Presentation</td>
<td>4.15</td>
<td>3.22</td>
<td>3.89</td>
<td>4.06</td>
<td>3.35</td>
<td>2.88</td>
</tr>
<tr>
<td>WWW</td>
<td>3.97</td>
<td>3.53</td>
<td>1.74</td>
<td>3.94</td>
<td>3.46</td>
<td>1.86</td>
</tr>
<tr>
<td>Web Development</td>
<td>3.65</td>
<td>3.40</td>
<td>0.91</td>
<td>3.27</td>
<td>2.64</td>
<td>2.06</td>
</tr>
</tbody>
</table>

### Table 53.
*Borich (1990) Training Need Ranking Differentiated by Gender*

<table>
<thead>
<tr>
<th>Skill Category</th>
<th>Male Weighted Know. Score</th>
<th>Male Rank</th>
<th>Female Weighted Know. Score</th>
<th>Female Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>3.84</td>
<td>2</td>
<td>4.64</td>
<td>1</td>
</tr>
<tr>
<td>Word Processing</td>
<td>3.32</td>
<td>3</td>
<td>3.30</td>
<td>2</td>
</tr>
<tr>
<td>Spreadsheet</td>
<td>0.55</td>
<td>6</td>
<td>1.31</td>
<td>6</td>
</tr>
<tr>
<td>Presentation</td>
<td>3.89</td>
<td>1</td>
<td>2.88</td>
<td>3</td>
</tr>
<tr>
<td>WWW</td>
<td>1.74</td>
<td>4</td>
<td>1.86</td>
<td>5</td>
</tr>
<tr>
<td>Web Development</td>
<td>0.91</td>
<td>5</td>
<td>2.06</td>
<td>4</td>
</tr>
</tbody>
</table>
Respondents were then differentiated according to age. Respondents 20-41 years of age formed one group, and those aged 41 and above formed the second group. As Table 54 below and Table 55 on the following page indicate, the ranking of training needs differs for the two groups. For the 20-41 age group the top three needs are e-mail, word processing, and presentation software. Note that this ranking is the same as the female respondents’ training ranking. For the 41 and above age group the top three training needs are e-mail, presentation software, and word processing.

Table 54.

*Mean Impotence and Knowledge Construct Scores and Weighted Knowledge Score by Skills Category and Age Group*

<table>
<thead>
<tr>
<th>Skill Category</th>
<th>Ages 20-41</th>
<th>Age 41 and Above</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Import. Mean</td>
<td>Know. Mean</td>
</tr>
<tr>
<td>E-mail</td>
<td>4.51</td>
<td>3.65</td>
</tr>
<tr>
<td>Word Processing</td>
<td>4.48</td>
<td>3.83</td>
</tr>
<tr>
<td>Spreadsheet</td>
<td>3.12</td>
<td>2.89</td>
</tr>
<tr>
<td>Presentation</td>
<td>4.10</td>
<td>3.53</td>
</tr>
<tr>
<td>WWW</td>
<td>4.05</td>
<td>3.82</td>
</tr>
<tr>
<td>Web Development</td>
<td>3.65</td>
<td>3.26</td>
</tr>
</tbody>
</table>
Table 55.  
*Borich (1990)* Training Need Ranking Differentiated by Age Group

<table>
<thead>
<tr>
<th>Skill Category</th>
<th>Ages 20-41</th>
<th></th>
<th>Age 41 and Above</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weighted Knowledge Score</td>
<td>Rank</td>
<td>Weighted Knowledge Score</td>
<td>Rank</td>
</tr>
<tr>
<td>E-mail</td>
<td>3.88</td>
<td>1</td>
<td>4.52</td>
<td>1</td>
</tr>
<tr>
<td>Word Processing</td>
<td>2.92</td>
<td>2</td>
<td>3.47</td>
<td>3</td>
</tr>
<tr>
<td>Spreadsheet</td>
<td>0.73</td>
<td>6</td>
<td>1.02</td>
<td>6</td>
</tr>
<tr>
<td>Presentation</td>
<td>2.32</td>
<td>3</td>
<td>3.75</td>
<td>2</td>
</tr>
<tr>
<td>WWW</td>
<td>0.94</td>
<td>5</td>
<td>2.10</td>
<td>5</td>
</tr>
<tr>
<td>Web Development</td>
<td>1.40</td>
<td>4</td>
<td>1.44</td>
<td>4</td>
</tr>
</tbody>
</table>

Summary

The 299 respondents were categorized according gender, age, program area, and when and how they submitted their completed survey instrument. Summary statistics were provided for the respondents, showing percentages of males, females, age groups, etc. T-tests revealed no significant difference in mean self-rated computer score between males and females, but an analysis of variance did show differences in this score between certain of the age groups. A t-test showed a significant difference in self-rated computer skills between the Early On-line Respondents and Late On-line Respondents.

Analysis of the three construct variables designed to reveal agents’ future training needs was then conducted for the following groups of respondents: The undifferentiated group of respondents, male respondents, female respondents,
respondents 20-41 years of age, and respondents 41 years of age and above. For the
undifferentiated group of respondents, E-mail topped the list of training needs,
followed by presentation software, word processing, WWW use, Web development,
and spreadsheet skills. For males the top three training needs were shown to be
presentation software, e-mail, and word processing. For females the top three
training needs were e-mail, word processing and presentation software. The 20-41
age group’s top three training needs were e-mail, word processing, and presentation
software. The over 41 age group’s top three training needs were e-mail, presentation
software, and word processing.

As a means to measure consistency between responses for the various items,
Cronbach’s coefficient alpha was computed. This figure was 0.7962.
CHAPTER 5
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study sought to determine how county Extension agents of the Florida Cooperative Extension service are using information technology, and what future information technology training those agents might need. To these ends agents were asked about their use of hardware and software, and also to self-assess their overall level of computer skills. Data was returned from 90.3% of the population of county agents, and subjected to statistical analysis. This chapter offers summary, conclusions, and recommendations based upon the data.

Procedure

The population for this study was county Extension agents in the employ of the University of Florida, Florida Cooperative Extension Service. In July 2002, when the study’s survey commenced, this population was 331. Regular and courtesy Extension agents were included.

The survey instrument, adapted from Albright (2000), was renovated and then subjected to a panel of experts. In its final form this instrument contained 99 individual items that collected information on software skills, patterns of IT use, the three constructs used to assess future software training needs, and personal and situational factors. The instrument was made available to the population via a dedicated university-hosted Web site. Agents were assigned their own individual code that allowed access to the instrument and identified their participation.
Information was collected on numerous independent variables of interest, which included: Type of computer used at the office; if the agent has their own computer on their desk; if their office computer is connected to the Internet; whether the agent uses a laptop PC or a Palm Pilot-type device; what peripheral devices are used at the office; estimated hourly computer use per week; whether the agents does office work on their home computer; where most of their computer knowledge was learned; overall computer skills rating; whether the agent has taken a computer course since the year 2000; what is the principal reason for not taking a computer class; where questions about computer related issues are answered; whether agents use e-mail, word processing, spreadsheets, presentation software, surf the World Wide Web, or are able to create or edit Web pages; and agent’s years of work experience and age.

The survey avoided asking many personal and situational questions, such as gender, rank, Extension district, and county by the use of the unique access code that tied individual response to a comprehensive database.

Notification of the study, its Web address, the agent’s unique access code, and an introductory message from the researchers was transmitted to each individual Extension agent via electronic mail. Those individuals who had invalid e-mail addresses were sent a paper copy of the notification message by way of the United States Postal Service. After three weeks duration, non-respondents were sent a paper version of the instrument, introductory letter, etc., also by way of the United States
Postal Service.\(^1\) Ninety percent (n = 299) of the population of county agents responded.

**Limitations of the Study**

One limitation of the study is that a census of the population of FLCES county Extension agents was conducted. Due to the nature of this type of study, the specific IT infrastructure in place within the FLCES, and specific IT knowledge and skills that might be possessed by FLCES county agents, the findings of the study cannot be generalized to Extension organizations elsewhere, though they are likely to offer insight to those organizations.

Another limitation to the study was that it was not based on an objective demonstration of information technology skills competency, but rather on the felt needs, perceptions, and self-ratings of the respondents. Under these circumstances, and simply under the normal circumstances of a study like this a certain element of bias can be introduced, possibly skewing the results. It can be rationalized, however, that the respondents to this study had little reason to either overtly or inadvertently bias the results.\(^2\) Respondents were guaranteed anonymity, the information solicited was in essence benign, and the overall rationale for the survey was supportive of the respondents’ careers as county Extension agents. Furthermore this study shared similar findings with Albright’s 2000 study of county Extension agents in the state of Texas, a consistency that appears to lend veracity to the response here recorded.

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1 For what it is worth: The principal researcher used regular issue self-adhesive stamps that, in his estimation, gave the cover a look distinct from that of most other (especially metered) mail. The combination of stamps required for the paper survey packet had a striking contrast of colors.

2 One must also consider the possibility that response might be biased by agents answering in a manner that they feel will please administrative entities.
Key Findings and Implications

One key finding of this study is that female respondents are significantly younger than the male respondents, with many more females in the two youngest age groups than there are men. A related key finding is that, by a margin of over 15%, the majority of respondents are female. (Recall that the distribution of gender amongst the respondents is essentially equal to the distribution of gender for the population of agents at the inception of the study). An implication of these findings is that the gender demographics of the Florida Cooperative Extension Service appear to be changing. Perhaps evidencing this change is that respondents to Ruppert’s 1992 study of county Extension agents in Florida were 48.8% female.

Another key finding is that agents in the two youngest age groups (those aged 20-30, and 31-40) indicated most frequently that college or high school is where they obtained their computer knowledge. This was not the case for the older age groups, which more often indicated other sources of computer knowledge. The implication here is that younger agents, having already developed computer skills, may benefit from, and be more attracted to computer training that considers subject matter in a more in-depth manner.

Key findings associated with agents’ use of hardware include: Three-quarters of the respondents reported using a laptop computer; approximately two-thirds of the respondents use a computer from 16 to over 20 hours a week; and over two-thirds of the respondents do office work on their home computer. The implication of this finding is that the Extension organization is now extensively utilizing information technology.
Key findings associated with agents’ use of software include: The vast majority of agents use e-mail to communicate with clientele; over three-quarters of the agents use presentation software; and just over 20% of the agents responded that they could edit or create Web pages. An implication of this finding is that agents have adopted, or are adopting these powerful technological tools and that this may portend a change in the way traditional Extension services are delivered.

There are two key findings associated with computer use and gender. The first is that there was no significant difference in mean self-rated computer skill between males and females. The second is that there was no significant difference in mean hours of weekly computer use between males and females. Implication: In this study males and females are at parity in terms of perceived skill and use of information technology.

Another key finding of the study was that the two oldest age groups (age 51-60 and age 61-70) had self-rated computer skills scores that were significantly lower than those of the younger age groups. This jibes in part with another finding, which was that agents in the oldest age group use their computers significantly less than do the other age groups. Implication: Older individuals in the organization may not have adopted information technology as robustly as have their younger colleagues.

In addition to the previous finding, the study also showed that there were no significant differences in mean self-rated computer skills score when the agents were grouped into program areas. A related key finding is that there were no significant differences in mean weekly computer use between the program area groups.
Implication: Level of information technology use, and the ability to use information technology appears to be similar for each program area.

A key finding with respect to when on-line respondents tendered completed surveys showed that the Early On-line Respondents group had a significantly lower mean self-rated computer skills score than the Late On-line Respondents. Implication: Agents who responded early may likely be more computer literate than those who responded late; they might be able to more readily utilize the technology to conduct their daily business.

Analysis of the three constructs designed to determine training need produced another key finding for the study: E-mail skills, followed by presentation software skills were derived from agents’ response to be the number one and number two training needs. This ranking is based on what the agents perceived to be important. This felt importance is indicative of both an interest, and a desire to learn the subject matter (H. W. Ladewig, personal communication, October 2002). The implication then is for appropriate entities to address information technology training need vis-à-vis the felt needs of their employees.

Discussion

Ten years ago, in 1992, Ruppert conducted a study on computer use by county Extension agents of the Florida Cooperative Extension Service. All county agents, a population of 277 at that time, were asked to participate in the study by way of a paper survey. Response to the survey was a remarkable 94.22% (n = 261) (Ruppert, 1992). Ruppert reported that 92.70% of the respondents had access to a computer, on average, 28.64 hours a week. However, 54.4% of the respondents did not have a computer on their desk. Many agents shared a computer with a colleague or office
staff. Slightly less than one-third of the respondents reported that they used a computer at home.

Six areas of computer expertise were considered in Ruppert’s study: VAX\(^3\) use, Word processing, databases, spreadsheets, CD-ROM, and computer graphics. For each of the six areas of expertise, agents were categorized as “nonusers,” “novices,” “intermediate,” or “old hand” according to their self-reported ability to apply skills to those areas. Using the level of use categories, Ruppert reported an overall mean score for the six areas of computer expertise she considered. This figure was 1.01, where 0 corresponded to “nonuser,” 1 corresponded to “novice,” 2 corresponded to “intermediate,” and 3 corresponded with “old hand.” The average agent, thus, was slightly above the level of a novice user. It should be noted, as a means of comparison to Ruppert’s finding, that the large majority of respondents (+92%) to the current study rated their overall computer skills from “average to excellent.”

There is a stark contrast to be made between the results reported ten years ago by Ruppert, and those reported by the study at hand. For the 2002 survey, 95.32% of the respondents reported having a computer on their desk at the office (45.6% in 1992), and 99.00% of those computers are connected to the Internet. The majority (63.88%) of agents reported in 2002 that they use their computers from 16 to over 20 hours a week (average availability of a computer was 28.64 hours a week in 1992). Over two-thirds of the 2002 respondents indicated that they do office work on their home computer (it was slightly less than one-third in 1992).

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3 The VAX was a “mini computer” manufactured by the Digital Equipment Corporation. Among other things, it provided the IFAS organization with computer networking, and an e-mail facility.
In 2002, 96.66% of the respondents indicated that they use word processing software, up from 79.00% in 1992. Agents who reported using spreadsheet software climbed from 37.70% in 1992 to 60.87% in 2002. Database use, CD-ROM use, and computer graphics, examined by Ruppert in 1992, were not considered by this study. VAX use as performed in 1992, has become obsolete. E-mail, Web browsing, and presentation software are new areas of computer-related tasks that have come to the fore, and are recording very high levels of use by county Extension agents. E-mail now facilitates communications throughout the Extension organization, for both administrative purposes, and in serving clientele need. The vast majority (98.33%) of county agents surf the World Wide Web, and indicate that it is an extremely important resource for work-related information. Web sites are also used to disseminate information to clientele, and for Extension administrative purposes such as registering for in-service training. Presentation software is used by 81.94% of the respondents, which is perhaps an endorsement of the efficacy of this genre of software and its importance in delivering educational information. High use of presentation software may also be construed as an indication that use of other information technology such as digital projectors has been adopted.

That over two-thirds of the agents reported using their computers from 16 to over 20 hours a week, leads this researcher to ask whether information technology is becoming the tail that is wagging the Extension dog. Indeed the figure on computer use included time both at home and at the office, but for the sake of argument let us assume that most of that computer time is expended at the office. For a normal workweek of 40 hours, this would mean agents are on the computer approximately
half their working hours. One wonders if this does not herald some sort of fundamental change in Extension work; that farm visits, face-to-face contact with clientele, demonstrations, and answering telephone calls is being supplanted by e-mail messages, Web sites, and so forth.

The fourteenth question in the survey asked agents to indicate the one main reason that they had not taken a computer course since the year 2000. As previously reported in Chapter 4, the majority of respondents to this question indicated that “lack of time” was the reason they have not taken a computer course. This is the same finding as reported by Albright (2000). There does appear, however, to be some lack of specificity to this response. A question thus arises as to just what exactly “lack of time” means. Any future research investigating why agents are not taking computer courses would be advised to reformulate the response categories to this question in such a manner to home in on more specific reasons for not participating in training.

Commentary regarding the results of the Borich needs assessment conducted by this study is here offered: An examination of the mean “knowledge” construct scores generated by this study shows high levels of knowledge for the skills areas ranking highest for training needs. Thus, in example, we see that though e-mail was ranked the number one training need for the undifferentiated group of respondents, the mean level of knowledge reported for this skill was 3.44 on a 5-point scale. As indicated, this effect was recorded for the other top two training needs.

It undoubtedly would be a hard sell to convince Extension administrators to commit resources to train agents in those areas that they already appear to know the most about. This, then, seems to point to a disadvantage of the Borich model:
Though agents may indeed have a strong felt need for certain training, is this really the training needed to insure that the organization’s IT requirements are effectively being met? Perhaps additional, more objective, measures need to accompany the model.

On the other hand, given the importance of E-mail and presentation software to everyday Extension activities, it seems both logical and reasonable that the needs assessment facet of this study ascertained these two types of software to be, respectively, the number one and number two training needs of the undifferentiated group of county agents. Agents are in essence saying that this communication software that they use on a regular basis is very important to their jobs, and they want to know more about its effective use.

Is it reasonable, then, to say that the Borich methodology really does accurately assess what agents need training in? The answer seems to be affirmative insofar as detecting what agents’ desired training needs. But quite possibly those desires may not correspond to where some not-so-desired training may be useful – like spreadsheet use.

One last note on the Borich methodology: Gauged by examining the patterns of “yes” responses to the specific skills questions that this study asked, the methodology did appear to correctly assess levels of knowledge. Thus, in example, high levels of “yes” response to the various e-mail skills corresponded to a high mean knowledge construct score.

Regarding gender parity and IT use: Ten years ago Ruppert reported that females had less computer access than males, and that fewer females had a computer
on their desk than did males. Ruppert also reported that females were significantly more likely to have received computer skills training from someone else versus having learned them on their own (Ruppert, 1992). Whereas the latter appears to hold to this day (females are much more likely than males to have learned their computer skills in school, from co-workers, or from family members), the issues of computer availability appear to be a thing of the past.

Regarding program area and IT use: Ruppert (1992) reported a significantly lower “computer mean use score”\(^4\) for “home economics or other agents” (Pg. 101). Though the present study has no exact equivalent mean to contrast to that of Ruppert’s study, it did find that there was no significant difference in the mean self-rated computer skills score between the program areas. The tide of information technology seems to have evenly washed through the organization’s major programmatic areas.

**Discussion of the Methodology**

Extension agents were notified three days in advance of the study by an e-mail message from Dr. Christine T. Waddill, Dean for Extension, who encouraged participation. Thereafter the initial e-mail message from the researchers was sent to the population of county agents, and proclaimed the study to be “a unique opportunity for you to express your opinion about computer use on your job, to identify computer hardware and software that you might need, and to provide information that will help determine what future computer training should be offered to county Extension

\(^4\) This mean was derived from the results of the “Computing Concerns Questionnaire (CCQ),” which Ruppert administered as part of her survey of county Extension agents. The CCQ, based on concerns agents feel about computer use, measures level of adoption.
agents.” This initial message also provided a hyperlink to the Web-based instrument, and the recipient’s unique access code.

It seems likely that the dean’s endorsement, and the fact that all of the messages regarding the study were mailed under both the graduate student’s and his committee chair’s name, lent a large margin of authority to the request to participate. A clear association with the University of Florida and a department well known to Extension agents undoubtedly further established the authority of the study. Perhaps also the graduate student’s previous employment in a high-visibility role in Extension lent a certain element of name recognition to the study. Between all the official and quasi-official attention, and perhaps due also to the timeliness of the topic, Extension agents probably perceived the study as important.

Though the official start date of the survey was Monday, July 8th, 2002, the message introducing the study was sent out on Sunday, July 7th, 2002. Response was immediate, with 6 completed surveys arriving that day. Monday the 8th brought 67 more completed surveys, and 28 arrived on Tuesday the 9th. A marked slow-down in response then occurred on Wednesday the 10th (5 surveys received), and Thursday the 11th (14 surveys received). On Thursday evening the researchers e-mailed a reminder message to all members of the population who had not yet returned a completed instrument. Response the next day (Friday the 12th) picked up, with 27 completed surveys received. Over the weekend 3 more completed surveys were tendered, and on Monday, July 15th, an additional 16 surveys were received. Response then dwindled again. Tuesday brought 8, Wednesday 7, and 2 on Thursday. On Thursday evening a second reminder was e-mailed by the researchers
to all members of the population who had yet to have participated. Friday saw response once again climb, with 22 completed surveys being received. This pattern of heightened response after a reminder message repeated itself throughout the duration of the survey. Simply put, sending reminder messages on a regular basis was clearly an important factor in generating response. It should be noted that the principal researcher appealed to each of the District Extension Directors to contact agents within their districts and encourage participation.

The researchers recorded relatively little request for help. Several agents called or e-mailed with problems ranging from not being able to locate their access code, to having a browser that was incompatible with the survey’s Web site. Approximately four agents, who received reminder messages to participate, indicated to the researchers that they had indeed already submitted completed surveys. These agents were asked to complete the on-line survey again, and all successfully tendered completed surveys. There were, however, at least two known cases where agents unsuccessfully tried to submit completed surveys, in one case at least two times. It is not known why this situation existed, nor is it known how many respondents were thus thwarted in their effort to participate.

The data generated by the survey was tendered to the researchers by way of electronic mail. Virtually all of the returned surveys were filled out to completion. An algorithm created by the principal researcher’s Web guru was run to separate the numeric information from the respondents’ comments, and two flat files generated. The flat file of numeric data was readily analyzable with the Statistical Analysis System (SAS).
Agents seemed to have a positive disposition towards the study’s Web-based format. Over two-thirds (68.56%) of the respondents rated Web-based surveys to be of average, above average, or high convenience. Over three-quarters (76.55%) said they would be likely, more than likely, or highly likely to respond to a Web-based survey. Agents’ response when asked to estimate how many Web-based surveys they had participated in ranged from a high of 45 to a low of 0 (mean = 5.60).

It should be noted that e-mail communication for the main survey was conducted very effectively by using MS Word in conjunction with MS Excel to perform a merge-to-e-mail routine. In this manner close to one thousand individualized e-mail messages were broadcast to the population over the duration of the study.

Conclusions

Based on the empirical evidence drawn from this study, the following major conclusions are drawn

1. The Web-based methodology used to administer the survey worked for both researcher and respondent, and worked very well.

2. Agents of the Florida Cooperative Extension Service have embraced information technology, and are using it on the job more than ever before.

3. It is evident that a significant change in the way county Extension agents use information technology has occurred in the past 10 years.

4. Agents have a desire to learn more about the staples of their everyday IT experience: E-mail, presentation software, word processing, and the Web. Future Information Technology training in these areas should go beyond the basics.

Recommendations

The following recommendations stem from this study

1. The majority of agents report that they have not taken a computer course since 2000, and lack of time was given as the principal reason for not doing so. Further
evidence stemming from county agents’ written commentary submitted with the survey, suggests the computer classes that have been offered did not cover desired subject matter, were too basic, or were poorly conducted. It is recommended that these concerns be investigated and addressed. It is also recommended that computer training on the subjects shown by this study as top needs (e-mail, and presentation software) be made a priority.

2. Further research should be done to develop an objective understanding of what information technology skills all agents should be expected to know. What would a suitable suite of IT skills include? Training should then be focused on this set of skills.

3. Research should be conducted on the most effective use of information technology by county agents of the Florida Cooperative Extension Service. Training on these findings should then take place.

4. Research should be conducted to examine exactly how county Extension agents are using software. In example, over 45% of agents in this study responded that their average use of word processing software was from 60 to over 90 minutes a day. What is this time being devoted to?

5. Research similar to the above should be done on county Extension agents’ use of hardware.

6. Research should be done to determine exactly what hardware and software county agents are employing, and whether these products are useful and needed.

7. Research should be done to determine how county Extension agents are using the World Wide Web in conjunction with their educational efforts. Are they looking to other IFAS Web sites (possibly maintained by state Extension specialists) for information? Corporate Web sites? Web sites maintained by other state and national Extension organizations?

8. Research should be done to determine how county Extension agents are using the World Wide Web to disseminate information to clientele. The efficacy of this approach to clientele contact should be assessed, including gaining an understanding of which clientele is being served, and to what degree.

9. Ancillary to the above, research should be conducted to determine how Web site development and maintenance is impacting county Extension agents’ jobs.

10. Future survey research on county Extension agents should strongly consider the Web-based methodology used by this study. High levels of computer literacy, access to the Internet, and other attributes makes county agents a good choice for this efficient, economical means of collecting information.
Welcome to the survey!

...and thank you for taking a few minutes of your valuable time to participate. Please click on the box below to begin the survey.

Begin the survey
You are a pioneer, as this is the first Web-based survey conducted exclusively for all county Extension agents in Florida. Your participation is greatly appreciated, and you have our sincere thanks!

The last survey on Florida county Extension agents' computer use was done 10 years ago. What a long way the technology has come since then, and how different the use of this important resource must now be!

Your participation in this study is completely voluntary, and there is no penalty for not participating. The purpose of the study is to gain an understanding of the level of skill, patterns of use, and workplace application of information technology amongst county Extension agents of the Florida Cooperative Extension Service. You do not have to answer any question you do not wish to answer, and you may withdraw from the study at any time without consequence. The survey takes approximately 15 minutes to complete. We believe there are no direct risks or benefits to you for participating in this study. Your information will be assigned a code number. The list connecting your name to this number will be kept in a locked file in a secure location. When the study is complete and the data have been analyzed, the list will be destroyed. Your name will never appear in any report. There is no compensation for participation in this research. If you have any questions about your rights concerning this study, please contact the UFIRB Office, Box 12250, University of Florida, Gainesville, FL 32611-2250.

If you have any questions about the survey, please contact either Dr. Tracy Irani (352) 392-0502 (e-mail IRANI@ufl.edu), or Austin Gregg (352) 392-1285 (e-mail JAGREGG@ufl.edu).
Survey of Computer Technology Skills
Summer 2002

Please click in the box and enter your survey access code:  
Submit
The survey begins with some questions about the kind of computer hardware you use. NOTE: Please ONLY use the buttons found at the bottom of the survey’s pages to go forward or back. Thanks!

1. What sort of computer do you primarily use at the office?
   - An IBM PC clone with the Windows operating system
   - An Apple computer
   - Other: ________________________

2. Do you have your own computer on your desk at the office?
   - Yes
   - No

3. If you have a computer on your desk at the office, is it connected to the Internet?
   - Yes
   - No
   - I don't have a computer on my desk

4. Do you use a laptop computer for your job?
   - Yes
   - No

5. Do you use a Palm Pilot, I-Paq or similar type device for your job?
   - Yes
   - No
6. Please indicate the peripheral devices you might use at the office:

*Click "yes" or "no" to each*

A. Laser Printer  ☐ Yes ☐ No
B. Color Printer  ☐ Yes ☐ No
C. Other Type of Printer  ☐ Yes ☐ No
D. Scanner  ☐ Yes ☐ No
E. Web Cam  ☐ Yes ☐ No
F. Speakers connected to your computer  ☐ Yes ☐ No
G. CD Burner (device that allows you to create CDs)  ☐ Yes ☐ No

7. If you were to make a "wish list" of hardware or software that you would like to have at the office, what item would you most want?

☐ A computer projector
☐ A laptop computer
☐ A color printer
☐ A new desktop computer
☐ A scanner
☐ New software
☐ Other: Please indicate by typing in the box below...

8. What improvements in hardware and/or software do you believe would most positively impact your ability to serve clientele?

Please indicate by typing in the box below...
Survey of Computer Technology Skills, Summer 2002

Please complete all questions. Please ONLY use the buttons at the bottom of the page to go forward or back in the survey... otherwise data might be lost.

The survey now asks how often you use a computer, how you learned your computer skills, and where you turn for help when you have questions.

9. In a normal week, estimate the number of hours you spend using a computer (both at home and at work):
   - 0 hours
   - 1-5 hours
   - 6-10 hours
   - 11-15 hours
   - 16-20 hours
   - More than 20 hours

10. Do you do office work on your home computer?
   - Yes
   - No
   - Not Applicable

11. Where have you learned most of your computer knowledge?
    Click "yes" or "no" to each
    A. Self taught at home
    - Yes
    - No
    B. Learned in college or high school
    - Yes
    - No
    C. Self taught at work
    - Yes
    - No
    D. Learned at work through in-service training, etc.
    - Yes
    - No
    E. Learned from family or friends outside of work
    - Yes
    - No
    F. Learned from co-workers at work
    - Yes
    - No
    G. Other: 

12. How would you rate your overall computer skills?
   - Very Poor
   - Poor
   - Average
   - Above Average
   - Excellent

13. Have you taken any computer courses since 2000? (These may include courses on word processing, spreadsheets, the Windows operating system, etc.)
   - Yes
   - No
14. If not, what was the principal reason for not taking computer courses?
- Lack of time
- Lack of access
- Too expensive
- No incentive
- Not available
- Too few In-service training days
- Other: Please indicate by typing in the box below...

15. If you have a question about a computer-related issue, where are you most likely to seek an answer?
- From a colleague or support staff in the office
- From a colleague or support staff in another county
- From your district's computer support personnel
- You find the answer on your own
- Other: Please indicate by typing in the box below...
Survey of Computer Technology Skills, Summer 2002

Please complete all questions. Please ONLY use the buttons at the bottom of the page to go forward or back in the survey... otherwise data might be lost.

The survey now inquires if you use e-mail.

16a. Do you use e-mail?
   ☐ Yes
   ☐ No
You have responded that you do use e-mail. The survey would like to ask you the following:

16b. On average, how much time do you devote to e-mail during the day?
   - 0-15 minutes a day
   - 16-30 minutes a day
   - 31-45 minutes a day
   - 46-60 minutes a day
   - More than 60 minutes a day

16c. Do you use e-mail to communicate with clientele?
   - Yes
   - No

16d. How often do you e-mail clientele during the month?
   - 1-5 times a month
   - 6-10 times a month
   - 11-15 times a month
   - 16-20 times a month
   - More than 20 times a month
   - Not applicable

16e. Please estimate the number of clientele you reach via e-mail during a typical month
   - 1-25 clientele
   - 26-50 clientele
   - 51-75 clientele
   - 76-100 clientele
   - More than 100 clientele a month
   - Not applicable

16f. Can you attach and send files (attachments) through e-mail?
   - Yes
   - No

16g. Are you a member of an e-mail listserv that distributes professional information to you?
   - Yes
   - No
16h. Can you find addresses in your e-mail program’s address book?
- Yes
- No

16i. Can you create and use e-mail distribution lists using your e-mail program?
- Yes
- No

16j. Do you use e-mail folders to organize sent or received e-mail messages?
- Yes
- No

16k. Can you access your e-mail away from the office using a laptop, PDA, or some other computer?
- Yes
- No

16l. Please indicate if there are any other e-mail skills that are necessary for successful Extension employees:
Please consider the following:

How important are e-mail skills to your job (such as communicating with colleagues, sharing information with clientele, receiving important administrative messages etc.)?

- 1 - low importance
- 2 - somewhat important
- 3 - average importance
- 4 - above average importance
- 5 - high importance

How would you describe your level of knowledge about e-mail skills?

- 1 - low level of knowledge
- 2 - somewhat knowledgeable
- 3 - average knowledge
- 4 - above average knowledge
- 5 - high level of knowledge

How would you describe your ability to apply e-mail skills to your job?

- 1 - low ability to apply the skills
- 2 - somewhat able to apply the skills
- 3 - average ability to apply the skills
- 4 - above average ability to apply the skills
- 5 - high ability to apply the skills
Survey of Computer Technology Skills, Summer 2002
Please complete all questions. Please ONLY use the buttons at the bottom of the page to go forward or back in the survey... otherwise data might be lost.

The survey now asks if you use word processing software.

17a. Do you use word processing software (such as Microsoft Word or Corel WordPerfect)?
   ☐ Yes
   ☐ No

Your survey is now more than 1/4 complete!
You have responded that you do use word processing software. The survey would like to ask you the following:

17b. On average, how often do you use word processing during the day?
   - 0-15 minutes a day
   - 16-30 minutes a day
   - 31-45 minutes a day
   - 46-60 minutes a day
   - 61-90 minutes a day
   - more than 90 minutes a day

17c. Can you use edit features such as cut and paste?
   - Yes
   - No

17d. Can you set page margins?
   - Yes
   - No

17e. Can you set tabs?
   - Yes
   - No

17f. Can you create tables with your word processing software?
   - Yes
   - No

17g. Can you perform "mail merge" using a dataset of names/addresses and forms (i.e. a letter)?
   - Yes
   - No
17h. Do you use word processing to create brochures, fact sheets, or other educational documents?
- Yes
- No

17i. Which word processing software do you most often use?
- Corel WordPerfect
- Microsoft Word
- Other: __________

17j. Please indicate if there are any other word processing skills that are necessary for successful Extension employees:
Please complete all questions. Please ONLY use the buttons at the bottom of the page to go forward or back in the survey... otherwise data might be lost.

Please consider the following:

How important are word processing skills to your job?

- 1 - low importance
- 2 - somewhat important
- 3 - average importance
- 4 - above average importance
- 5 - high importance

How would you describe your level of knowledge about word processing?

- 1 - low level of knowledge
- 2 - somewhat knowledgeable
- 3 - average knowledge
- 4 - above average knowledge
- 5 - high level of knowledge

How would you describe your ability to apply word processing skills to your job?

- 1 - low ability to apply the skills
- 2 - somewhat able to apply the skills
- 3 - average ability to apply the skills
- 4 - above average ability to apply the skills
- 5 - high ability to apply the skills
The survey now asks if you use spreadsheets.

18a. Do you use spreadsheet software such as Microsoft Excel or Corel Quattro Pro?
   - [ ] Yes
   - [ ] No
You have responded that you do use spreadsheet software. The survey would like to ask you the following:

18b. On average, how often do you use spreadsheet software during the month?
   - 0-15 minutes a month
   - 16-30 minutes a month
   - 31-45 minutes a month
   - 46-60 minutes a month
   - 61-90 minutes a month
   - more than 90 minutes a month

18c. Can you format cells in a spreadsheet to number, or currency, etc.?
   - Yes
   - No

18d. Can sort data in a spreadsheet?
   - Yes
   - No

18e. Can you use nested functions in a spreadsheet?
   - Yes
   - No

18f. Can you create a graph or chart from data in a spreadsheet (using the spreadsheet software)?
   - Yes
   - No

18g. Can you write formulas in a spreadsheet?
   - Yes
   - No
18h. Which spreadsheet software do you most often use?
- Corel Quattro Pro
- Microsoft Excel
- Other: 

18i. Please indicate if there are any other spreadsheet skills that are necessary for successful Extension employees:
Please consider the following:

How important are spreadsheet skills to your job?

- 1 - low importance
- 2 - somewhat important
- 3 - average importance
- 4 - above average importance
- 5 - high importance

How would you describe your level of knowledge about spreadsheet skills?

- 1 - low level of knowledge
- 2 - somewhat knowledgeable
- 3 - average knowledge
- 4 - above average knowledge
- 5 - high level of knowledge

How would you describe your ability to apply spreadsheet skills to your job?

- 1 - low ability to apply the skills
- 2 - somewhat able to apply the skills
- 3 - average ability to apply the skills
- 4 - above average ability to apply the skills
- 5 - high ability to apply the skills
Presentation software such as Microsoft Power Point can be used to add structure to a meeting. A presentation might include charts, graphics, Web links, and so forth.

19a. Do you use presentation software (such as Corel Presentations or Microsoft PowerPoint)?

- Yes
- No

Just a few more minutes! You are now more than 1/2 way done!
You have responded that you do use presentation software. The survey would like to ask you the following:

19b. On average, how often do you use presentation software for your job?
   🗡️ 1-5 times a year
   🗡️ 6-10 times a year
   🗡️ 11-15 times a year
   🗡️ 16-20 times a year
   🗡️ More than 20 times a year

19c. Can you use different views in the presentation software package such as slide sorter, slide, notes page, or slide show?
   🗡️ Yes
   🗡️ No

19d. Can you create a master slide?
   🗡️ Yes
   🗡️ No

19e. Can you insert graphics and pictures from a variety of resources?
   🗡️ Yes
   🗡️ No

19f. Can you create automated builds and transitions?
   🗡️ Yes
   🗡️ No

19g. Can you create a slide show that runs automatically?
   🗡️ Yes
   🗡️ No
19h. Which presentation software do you most often use?
- Corel Presentations
- Microsoft PowerPoint
- Other: [ ]

19i. Please indicate any other presentation skills that are necessary for successful Extension employees:
Please consider the following:

How important are presentation software skills to your job?

☑ 1 - low importance
☑ 2 - somewhat important
☑ 3 - average importance
☑ 4 - above average importance
☑ 5 - high importance

How would you describe your level of knowledge about presentation software?

☑ 1 - low level of knowledge
☑ 2 - somewhat knowledgeable
☑ 3 - average knowledge
☑ 4 - above average knowledge
☑ 5 - high level of knowledge

How would you describe your ability to apply presentation software skills to your job?

☑ 1 - low ability to apply the skills
☑ 2 - somewhat able to apply the skills
☑ 3 - average ability to apply the skills
☑ 4 - above average ability to apply the skills
☑ 5 - high ability to apply the skills
The survey would now like to ask you about the World Wide Web:

20a. Can you "surf" or browse the Internet?
   - Yes
   - No

20b. Can you bookmark frequently used Web pages?
   - Yes
   - No

20c. Can you download files from the Internet?
   - Yes
   - No

20d. Can you use a search engine (such as Yahoo or Google) to find Web pages?
   - Yes
   - No

20e. Which Web browser do you most often use?
   - Netscape Navigator
   - Microsoft Internet Explorer
   - Other: [ ]

20f. Have you ever registered for In-service training using Extension's In-Service Training Web site?
   - Yes
   - No

20g. Have you ever taken an on-line course to receive academic credit?
   - Yes
   - No
20h. In general, what is your opinion of the World Wide Web and its use in Extension work?

20i. Please indicate any other Web browsing skills that are necessary for successful Extension employees:
Please consider the following:

How important are Web browsing skills to your job?

- 1 - low importance
- 2 - somewhat important
- 3 - average importance
- 4 - above average importance
- 5 - high importance

How would you describe your level of knowledge about Web browsing skills?

- 1 - low level of knowledge
- 2 - somewhat knowledgeable
- 3 - average knowledge
- 4 - above average knowledge
- 5 - high level of knowledge

How would you describe your ability to apply Web browsing skills to your job?

- 1 - low ability to apply the skills
- 2 - somewhat able to apply the skills
- 3 - average ability to apply the skills
- 4 - above average ability to apply the skills
- 5 - high ability to apply the skills
Survey of Computer Technology Skills, Summer 2002
Please complete all questions. Please ONLY use the buttons at
the bottom of the page to go forward or back in the survey...
otherwise data might be lost.

The survey would now like to ask whether you edit or create Web
pages.

21a. Do you edit or create Web pages?
○ Yes
○ No

Keep on clicking - the survey is almost done!
Survey of Computer Technology Skills, Summer 2002

Please complete all questions. Please ONLY use the buttons at the bottom of the page to go forward or back in the survey... otherwise data might be lost.

You have responded that you do edit or create Web pages. The survey would like to ask you the following:

21b. Can you edit Web pages?
   ○ Yes
   ○ No

21c. Can you create a Web page using Microsoft FrontPage or another HTML editor?
   ○ Yes
   ○ No

21d. Can you create a Web page using native HTML?
   ○ Yes
   ○ No

21e. Can you create hyperlinks?
   ○ Yes
   ○ No

21f. Can you incorporate graphics into Web pages?
   ○ Yes
   ○ No

21g. Can you convert existing files into HTML?
   ○ Yes
   ○ No

21h. Who is primarily responsible for maintaining your county’s Extension service Web site?
   ○ I am
   ○ Another Extension agent in the office
   ○ Office support staff
   ○ A hired consultant
   ○ Other: [ ]
21i. Please indicate any other Web page creation skills that are necessary for successful Extension employees:
Survey of Computer Technology Skills, Summer 2002

Please complete all questions. Please ONLY use the buttons at the bottom of the page to go forward or back in the survey... otherwise data might be lost.

Please consider the following:

How important are Web page creation skills to your job?
- 1 - low importance
- 2 - somewhat important
- 3 - average importance
- 4 - above average importance
- 5 - high importance

How would you describe your level of knowledge about Web page creation skills?
- 1 - low level of knowledge
- 2 - somewhat knowledgeable
- 3 - average knowledge
- 4 - above average knowledge
- 5 - high level of knowledge

How would you describe your ability to apply Web page creation skills to your job?
- 1 - low ability to apply the skills
- 2 - somewhat able to apply the skills
- 3 - average ability to apply the skills
- 4 - above average ability to apply the skills
- 5 - high ability to apply the skills
Survey of Computer Technology Skills, Summer 2002

Please complete all questions. Please ONLY use the buttons at the bottom of the page to go forward or back in the survey... otherwise data might be lost.

Please tell us what you think of Web-based surveys:

Compared to other types of surveys (paper, telephone, etc.), how do you rate the convenience of Web-based surveys?
- 1 - low convenience
- 2 - somewhat convenience
- 3 - average convenience
- 4 - above average convenience
- 5 - high convenience

How likely are you to respond to a Web-based survey as compared to other types of surveys (paper, telephone, etc.)?
- 1 - Not likely to respond
- 2 - Somewhat likely to respond
- 3 - Likely to respond
- 4 - More than likely to respond
- 5 - Highly likely to respond

How many Web-based surveys do you estimate you have participated in?

Please indicate a number

Do you wish to add any comments about Web-based surveys?
Kindly indicate the following:

23. How many years of professional work experience do you have?

Extension only:
- Less than 5 years
- 5-10 years
- 11-15 years
- 16+ years

Total work experience (including Extension):
- Less than 5 years
- 5-10 years
- 11-15 years
- 16+ years

24. Please indicate the group that includes your age:
- 20-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71+
Survey of Computer Technology Skills, Summer 2002

*Please complete all questions. Please ONLY use the buttons at the bottom of the page to go forward or back in the survey... otherwise data might be lost.*

If you would like to add any points you consider important to the use of computer technology by Extension Agents, please feel free to add them in the space below. Any suggestions for training and other thoughts and comments you might have would be welcomed. Thank you again for your participation!

PLEASE CLICK THE BUTTON ABOVE TO SUBMIT THE SURVEY
APPENDIX B
THE SURVEY OF COMPUTER TECHNOLOGY SKILLS INSTRUMENT
PAPER VERSION
The survey begins with some questions about the kind of computer hardware you use:

1. What sort of computer do you primarily use at the office? (check only one)
   (   ) An IBM P.C. clone with the Windows operating system
   (   ) An Apple Computer
   (   ) Other:

2. Do you have your own computer on your desk at the office?
   (   ) Yes
   (   ) No (please skip to question 4)

3. If you have a computer on your desk at the office, is it connected to the Internet?
   (   ) Yes
   (   ) No
   (   ) I don’t have a computer on my desk

4. Do you use a laptop computer for your job?
   (   ) Yes
   (   ) No

5. Do you use a Plam Pilot, I-Paq or similar type device for your job?
   (   ) Yes
   (   ) No

6. Please indicate the peripheral devices you might use at the office (check all that apply):
   (   ) Laser Printer
   (   ) Color Printer
   (   ) Other type of Printer
   (   ) Scanner
   (   ) Web Cam
   (   ) Speakers connected to your computer
   (   ) CD burner

(Continued above in the right column…)

7. If you were to make a "wish list" of hardware or software that you would like to have at the office, what item would you most want? (check only one)
   (   ) A computer projector
   (   ) A laptop computer
   (   ) A color printer
   (   ) A new desktop computer
   (   ) A scanner
   (   ) New Software
   (   ) Other: ________________________

8. What improvements in hardware and/or software do you believe would most positively impact your ability to serve clientele? _______________________

The survey now asks how often you use a computer, how you learned your computer skills, and where you turn for help when you have questions.

9. In a normal week, estimate the number of hours you spend using a computer (both at home and at work):
   (   ) 0 Hours
   (   ) 1-5 Hours
   (   ) 6-10 Hours
   (   ) 11-15 Hours
   (   ) 16-20 Hours
   (   ) More than 20 Hours

10. Do you do office work on your home computer?
    (   ) Yes
    (   ) No
    (   ) Not Applicable

11. Where have you learned most of your computer knowledge? (check all that apply)
    (   ) Self taught at home
    (   ) Learned in college or high school
    (   ) Self taught at work
    (   ) Learned at work through In-service training, etc.
    (   ) Learned from family or friends outside of work
    (   ) Learned from co-workers at work
    (   ) Other: ________________________
12. How would you rate your overall computer skills? (check only one)
   ( ) Very Poor
   ( ) Poor
   ( ) Average
   ( ) Above Average
   ( ) Excellent

13. Have you taken any computer courses since 2000? (These may include courses on word processing, spreadsheets, the Windows operating system, etc.)
   ( ) Yes
   ( ) No

14. If not, what was the principal reason for not taking computer courses? (check only one)
   ( ) Lack of time
   ( ) Lack of access
   ( ) Too expensive
   ( ) No incentive
   ( ) Not available
   ( ) Too few In-service training days
   ( ) Other: ______________________

15. If you have a question about a computer-related issue, where are you most likely to seek an answer? (check only one)
   ( ) From a colleague or support staff in the office
   ( ) From a colleague or support staff in another County
   ( ) From your district's computer support personnel
   ( ) You find the answer on your own
   ( ) Other: ______________________

16. The survey now inquires if you use e-mail.

16a. Do you use e-mail?
   ( ) Yes
   ( ) No (please skip to question 17 on page 3)

16b. On average, how much time do you devote to e-mail during the day?
   ( ) 0-15 minutes a day
   ( ) 16-30 minutes a day
   ( ) 31-45 minutes a day
   ( ) 46-60 minutes a day
   ( ) More than 60 minutes a day

16c. Do you use e-mail to communicate with clientele?
   ( ) Yes
   ( ) No (please skip to question 16f)

16d. How often do you e-mail clientele during the month?
   ( ) 1-5 times a month
   ( ) 6-10 times a month
   ( ) 11-15 times a month
   ( ) 16-20 times a month
   ( ) More than 20 times a month
   ( ) Not applicable

16e. Please estimate the number of clientele you reach via e-mail during a typical month:
   ( ) 1-25 clientele
   ( ) 26-50 clientele
   ( ) 51-75 clientele
   ( ) 76-100 clientele
   ( ) More than 100 clientele a month
   ( ) Not applicable

16f. Can you attach and send files (attachments) through e-mail?
   ( ) Yes
   ( ) No

16g. Are you a member of an e-mail listserv that distributes professional information to you?
   ( ) Yes
   ( ) No

16h. Can you find addresses in your e-mail program's address book?
   ( ) Yes
   ( ) No

16i. Can you create and use e-mail distribution lists using your e-mail program?
   ( ) Yes
   ( ) No
16j. Do you use e-mail folders to organize sent or received e-mail messages?
( ) Yes
( ) No

16k. Can you access your e-mail away from the office using a laptop, PDA, or some other computer?
( ) Yes
( ) No

16l. Please indicate if there are any other e-mail skills that are necessary for successful Extension employees:

How important are e-mail skills to your job (such as communicating with colleagues, sharing information with clientele, receiving important administrative messages etc.)?
( ) 1 - low importance
( ) 2 - somewhat important
( ) 3 - average importance
( ) 4 - above average importance
( ) 5 - high importance

How would you describe your level of knowledge about e-mail skills?
( ) 1 - low level of knowledge
( ) 2 - somewhat knowledgeable
( ) 3 - average knowledge
( ) 4 - above average knowledge
( ) 5 - high level of knowledge

How would you describe your ability to apply e-mail skills to your job?
( ) 1 - low ability to apply the skills
( ) 2 - somewhat able to apply the skills
( ) 3 - average ability to apply the skills
( ) 4 - above average ability to apply the skills
( ) 5 - high ability to apply the skills

17. The survey now inquires if you use word processing software.

17a. Do you use word processing software?
( ) Yes
( ) No (please skip to question 18 on page 4)

17b. On average, how often do you use word processing during the day?
( ) 0-15 minutes a day
( ) 16-30 minutes a day
( ) 31-45 minutes a day
( ) 46-60 minutes a day
( ) 61-90 minutes a day
( ) more than 90 minutes a day

17c. Can you use edit features such as cut and paste?
( ) Yes
( ) No

17d. Can you set page margins?
( ) Yes
( ) No

17e. Can you set tabs?
( ) Yes
( ) No

17f. Can you create tables with your word processing software?
( ) Yes
( ) No

17g. Can you perform "mail merge" using a dataset of names/addresses and forms (i.e. a letter)?
( ) Yes
( ) No

17h. Do you use word processing to create brochures, fact sheets, or other educational documents?
( ) Yes
( ) No

17i. Which word processing software do you most often use?
( ) Corel WordPerfect
( ) Microsoft Word
( ) Other:

17j. Please indicate if there are any other word processing skills that are necessary for successful Extension employees: _____________________

(Continued above in the right column...)
Survey of Computer Technology Skills, Summer 2002 – page 4

How important are word processing skills to your job?
( ) 1 - low importance
( ) 2 - somewhat important
( ) 3 - average importance
( ) 4 - above average importance
( ) 5 - high importance

How would you describe your level of knowledge about word processing?
( ) 1 - low level of knowledge
( ) 2 - somewhat knowledgeable
( ) 3 - average knowledge
( ) 4 - above average knowledge
( ) 5 - high level of knowledge

How would you describe your ability to apply word processing skills to your job?
( ) 1 - low ability to apply the skills
( ) 2 - somewhat able to apply the skills
( ) 3 - average ability to apply the skills
( ) 4 - above average ability to apply the skills
( ) 5 - high ability to apply the skills

18. The survey now asks if you use spreadsheets.

18a. Do you use spreadsheet software such as Microsoft Excel or Corel Quattro Pro?
( ) Yes
( ) No (please skip to question 19 on page 5)

18b. On average, how often do you use spreadsheet software during the month?
( ) 0-15 minutes a month
( ) 16-30 minutes a month
( ) 31-45 minutes a month
( ) 46-60 minutes a month
( ) 61-90 minutes a month
( ) more than 90 minutes a month

18c. Can you format cells in a spreadsheet to number, or currency, etc.?
( ) Yes
( ) No

18d. Can sort data in a spreadsheet?
( ) Yes
( ) No

18e. Can you use nested functions in a spreadsheet?
( ) Yes
( ) No

18f. Can you create a graph or chart from data in a spreadsheet (using the spreadsheet software)?
( ) Yes
( ) No

18g. Can you write formulas in a spreadsheet?
( ) Yes
( ) No

18h. Which spreadsheet software do you most often use?
( ) Corel Quattro Pro
( ) Microsoft Excel
( ) Other: __________

18i. Please indicate if there are any other spreadsheet skills that are necessary for successful Extension employees:

How important are spreadsheet skills to your job?
( ) 1 - low importance
( ) 2 - somewhat important
( ) 3 - average importance
( ) 4 - above average importance
( ) 5 - high importance

How would you describe your level of knowledge about spreadsheet skills?
( ) 1 - low level of knowledge
( ) 2 - somewhat knowledgeable
( ) 3 - average knowledge
( ) 4 - above average knowledge
( ) 5 - high level of knowledge

How would you describe your ability to apply spreadsheet skills to your job?
( ) 1 - low ability to apply the skills
( ) 2 - somewhat able to apply the skills
( ) 3 - average ability to apply the skills
( ) 4 - above average ability to apply the skills
( ) 5 - high ability to apply the skills

(Continued above in the right column...)
19. **Presentation software like Microsoft PowerPoint can be used to add structure to a meeting. A presentation might include charts, graphics, Web links, and so forth.**

19a. Do you use presentation software such as Microsoft PowerPoint or Corel Presentations?  
( ) Yes  
( ) No (please skip to question 20)

19b. On average, how often do you use presentation software for your job?  
( ) 1-5 times a year  
( ) 6-10 times a year  
( ) 11-15 times a year  
( ) 16-20 times a year  
( ) More than 20 times a year

19c. Can you use different views in the presentation software package such as slide sorter, slide, notes page, or slide show?  
( ) Yes  
( ) No

19d. Can you create a master slide?  
( ) Yes  
( ) No

19e. Can you insert graphics and pictures from a variety of resources?  
( ) Yes  
( ) No

19f. Can you create automated builds and transitions?  
( ) Yes  
( ) No

19g. Can you create a slide show that runs automatically?  
( ) Yes  
( ) No

19h. Which presentation software do you most often use?  
( ) Corel Presentations  
( ) Microsoft PowerPoint  
( ) Other: __________________________

(Continued above in the right column...)

---

How important are presentation software skills to your job?  
( ) 1 - low importance  
( ) 2 - somewhat important  
( ) 3 - average importance  
( ) 4 - above average importance  
( ) 5 - high importance

How would you describe your level of knowledge about presentation software?  
( ) 1 - low level of knowledge  
( ) 2 - somewhat knowledgeable  
( ) 3 - average knowledge  
( ) 4 - above average knowledge  
( ) 5 - high level of knowledge

How would you describe your ability to apply presentation software skills to your job?  
( ) 1 - low ability to apply the skills  
( ) 2 - somewhat able to apply the skills  
( ) 3 - average ability to apply the skills  
( ) 4 - above average ability to apply the skills  
( ) 5 - high ability to apply the skills

20. **The survey would now like to ask you about the World Wide Web.**

20a. Can you "surf" or browse the Internet?  
( ) Yes  
( ) No

20b. Can you bookmark frequently used Web pages?  
( ) Yes  
( ) No

20c. Can you download files from the Internet?  
( ) Yes  
( ) No

20d. Can you use a search engine (such as Yahoo or Google) to find Web pages?  
( ) Yes  
( ) No

20e. Which Web browser do you most often use?  
( ) Netscape Navigator  
( ) Microsoft Internet Explorer  
( ) Other: __________________________
20f. Have you ever registered for In-service training using Extension's In-Service Training Web site?
( ) Yes
( ) No

20g. Have you ever taken an on-line course to receive academic credit?
( ) Yes
( ) No

20h. In general, what is your opinion of the World Wide Web and its use in Extension work? __________________________

20i. Please indicate any other Web browsing skills that are necessary for successful Extension employees:

How important are Web browsing skills to your job?
( ) 1 - low importance
( ) 2 - somewhat important
( ) 3 - average importance
( ) 4 - above average importance
( ) 5 - high importance

How would you describe your level of knowledge about Web browsing skills?
( ) 1 - low level of knowledge
( ) 2 - somewhat knowledgeable
( ) 3 - average knowledge
( ) 4 - above average knowledge
( ) 5 - high level of knowledge

How would you describe your ability to apply Web browsing skills to your job?
( ) 1 - low ability to apply the skills
( ) 2 - somewhat able to apply the skills
( ) 3 - average ability to apply the skills
( ) 4 - above average ability to apply the skills
( ) 5 - high ability to apply the skills

(Continued above in the right column...)

21. The survey would now like to ask you whether you edit or create Web pages.

21a. Can you create or edit Web pages?
( ) Yes
( ) No (please skip to question 22 on page 7)

21b. Can you edit Web pages?
( ) Yes
( ) No

21c. Can you create a Web page using Microsoft FrontPage or another HTML editor?
( ) Yes
( ) No

21d. Can you create a Web page using native HTML?
( ) Yes
( ) No

21e. Can you create hyperlinks?
( ) Yes
( ) No

21f. Can you incorporate graphics into Web pages?
( ) Yes
( ) No

21g. Can you convert existing files into HTML?
( ) Yes
( ) No

21h. Who is primarily responsible for maintaining your county’s Extension service Web site?
( ) I am
( ) Another Extension agent in the office
( ) Office support staff
( ) A hired consultant
( ) Other: __________________

21i. Please indicate any other Web page creation skills that are necessary for successful Extension employees:
How important are Web creation skills to your job?
( ) 1 - low importance
( ) 2 - somewhat important
( ) 3 - average importance
( ) 4 - above average importance
( ) 5 - high importance

How would you describe your level of knowledge about Web creation skills?
( ) 1 - low level of knowledge
( ) 2 - somewhat knowledgeable
( ) 3 - average knowledge
( ) 4 - above average knowledge
( ) 5 - high level of knowledge

How would you describe your ability to apply Web creation skills to your job?
( ) 1 - low ability to apply the skills
( ) 2 - somewhat able to apply the skills
( ) 3 - average ability to apply the skills
( ) 4 - above average ability to apply the skills
( ) 5 - high ability to apply the skills

22. Please tell us what you think of Web-based surveys:

22a. Compared to other types of surveys (paper, telephone, etc.), how do you rate the convenience of Web-based surveys?
( ) 1 - low convenience
( ) 2 - somewhat convenience
( ) 3 - average convenience
( ) 4 - above average convenience
( ) 5 - high convenience

22b. How likely are you to respond to a Web-based survey as compared to other types of surveys (paper, telephone, etc.)?
( ) 1 - Not likely to respond
( ) 2 - Somewhat likely to respond
( ) 3 - Likely to respond
( ) 4 - More than likely to respond
( ) 5 - Highly likely to respond

22c. How many Web-based surveys do you estimate you have participated in?
Please indicate a number:

22d. Do you wish to add any comments about Web-based surveys?

Kindly indicate the following:

23. How many years of professional work experience do you have?

Extension only:
( ) Less than 5 years
( ) 5-10 years
( ) 11-15 years
( ) 16+ years

Total work experience (including Extension):
( ) Less than 5 years
( ) 5-10 years
( ) 11-15 years
( ) 16+ years

24. Please indicate the group that includes your age:
( ) 20-30
( ) 31-40
( ) 41-50
( ) 51-60
( ) 61-70
( ) 71+

If you would like to add any points you consider important to the use of computer technology by Extension Agents, please feel free to add them in the space below. Any suggestions for training and other thoughts and comments you might have would be welcomed. Thank you again for your participation!
APPENDIX C
PRINCIPLES FOR THE DESIGN OF WEB SURVEYS AND THEIR RELATIONSHIP TO TRADITIONAL SOURCES OF SURVEY ERROR
(DILLMAN & BOWKER, 2001)
<table>
<thead>
<tr>
<th></th>
<th>Sampling</th>
<th>Coverage</th>
<th>Measurement</th>
<th>Nonresponse</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduce the Web questionnaire with a welcome screen that is motivational, emphasizes the ease of responding, and instructs respondents on the action needed for proceeding to the next page</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2.</td>
<td>Provide a PIN number for limiting access only to in the sample.</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Choose for the first question an item that is likely to be interesting to most respondents, easily answered, and fully visible on the first screen of the questionnaire.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4.</td>
<td>Present each question in a conventional format similar to that normally used on paper self-administered questionnaires.</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5.</td>
<td>Restrain the use of color so that figure/ground consistency and readability are maintained, navigational flow is unimpeded, and measurement properties of questions are maintained.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>6.</td>
<td>Avoid differences in the visual appearance of questions that result from different screen configurations, operating systems, browsers, partial screen displays and wrap-around text.</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7.</td>
<td>Provide specific instructions on how to take each necessary computer action for responding to the questionnaire and other necessary instructions at the point where they are needed.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>8.</td>
<td>Use drop-down boxes sparingly, consider the mode implications, and identify each with a “click here” instruction.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>9.</td>
<td>Do not require respondents to provide an answer to each question before being allowed to answer any subsequent ones.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>10.</td>
<td>Provide skip directions in a way that encourages marking of answers and being able to click to the next applicable question.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>11.</td>
<td>Construct Web questionnaires so they scroll from question to question unless order effects are a major concern, and/or telephone and web survey results are being combined.</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>12.</td>
<td>When the number of answer choices exceeds the number that can be displayed in a single column on one screen, consider double-banking with an appropriate grouping device to link the together.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>13.</td>
<td>Use graphical symbols or words that convey a sense of where the respondent is in the completion process, but avoid ones that require significant increases in computer memory.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>14.</td>
<td>Exercise restraint in the use of question structures that have known measurement problems on paper questionnaires, e.g., check-all-that-apply and open-ended questions.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
APPENDIX D
SCALES AND THE VALUES THEY REPRESENTED
<table>
<thead>
<tr>
<th>Variable</th>
<th>Scale</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Est. Hours of Weekly Computer use</td>
<td>1</td>
<td>0 Hours</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1-5 Hours</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6-10 Hours</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>11-15 Hours</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>16-20 Hours</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>More than 20 Hours</td>
</tr>
<tr>
<td>Overall Self-rated Computer Skills</td>
<td>1</td>
<td>Very Poor</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Poor</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Above Average</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Excellent</td>
</tr>
<tr>
<td>Time Devoted to E-mail per Day</td>
<td>1</td>
<td>0-15 Minutes a Day</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>16-30 Minutes a Day</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>31-45 Minutes a Day</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>46-60 Minutes a Day</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>More than 60 Minutes a Day</td>
</tr>
<tr>
<td>How Often do you E-mail Clientele/Month</td>
<td>1</td>
<td>1-5 Times a Month</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>6-10 Times a Month</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>11-15 Times a Month</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>16-20 Times a Month</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>More than 20 Times a Month</td>
</tr>
<tr>
<td>Est. Clientele Reached by E-mail per Month</td>
<td>1</td>
<td>1-25 Clientele/Month</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>26-50 Clientele/Month</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>51-75 Clientele/Month</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>76-100 Clientele/Month</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>More than Clientele/Month</td>
</tr>
<tr>
<td>Word Processing Use (Avg. Minutes/Day)</td>
<td>1</td>
<td>0-15 Minutes a Day</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>16-30 Minutes a Day</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>31-45 Minutes a Day</td>
</tr>
<tr>
<td>Variable</td>
<td>Scale</td>
<td>Value</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Word Processing Use - continued</td>
<td>4</td>
<td>46-60 Minutes a Day</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>61-90 Minutes a Day</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>More than 90 Minutes a Day</td>
</tr>
<tr>
<td>Spreadsheet Use (Average Minutes/Month)</td>
<td>1</td>
<td>0-15 Minutes a Month</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>16-30 Minutes a Month</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>31-45 Minutes a Month</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>46-60 Minutes a Month</td>
</tr>
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<td></td>
<td>5</td>
<td>61-90 Minutes a Month</td>
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<td></td>
<td>6</td>
<td>More than 90 Min. a Month</td>
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<tr>
<td>Presentation Softw. Use (Avg. Times/Year)</td>
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<td>1-5 Times a Year</td>
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<tr>
<td></td>
<td>2</td>
<td>6-10 Times a Year</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>11-15 Times a Year</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>16-20 Times a Year</td>
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<td></td>
<td>5</td>
<td>More than 20 Times a Year</td>
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<tr>
<td>Work Experience (Including Extension)</td>
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<td>Less than 5 Years</td>
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<tr>
<td></td>
<td>2</td>
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<td>11-15 Years</td>
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<td>4</td>
<td>16+ Years</td>
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<td>Age Group</td>
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<td>20-30</td>
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<td>31-40</td>
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<tr>
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<td></td>
<td>6</td>
<td>71+</td>
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<td>Construct Variable - Importance</td>
<td>1</td>
<td>Low Importance</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Somewhat Important</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Average Importance</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Above Avg. Importance</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>High Importance</td>
</tr>
<tr>
<td>Construct Variable - Knowledge</td>
<td>1</td>
<td>Low Level of Knowledge</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Somewhat Knowledgeable</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Average Knowledge</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Above Avg. Knowledge</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>High Level of Knowledge</td>
</tr>
<tr>
<td>Variable</td>
<td>Scale</td>
<td>Value</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Construct Variable - Application</td>
<td>1</td>
<td>Low Ability to Apply the Skills</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Somewhat Able to Apply the Skills</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Average Ability to Apply the Skills</td>
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<tr>
<td></td>
<td>4</td>
<td>Above Average Ability to Apply the skills</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>High Ability to Apply the Skills</td>
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APPENDIX E
E-MAIL FROM RESEARCHERS TO PILOT POPULATION INTRODUCING THE STUDY

Dr. Tracy Irani, Assistant Professor
Mr. Austin Gregg, Graduate Student
University of Florida
Department of Agricultural Education and Communication
P.O. Box 110540
Gainesville, Fl 32611-0540

June 24th, 2002

County Extension Agent
University of Florida
IFAS

Dear County Extension Agent,

The last 10 years have brought tremendous change in the way we use, and think about the use of computers. County agents, along with many others in societies throughout the world, have experienced the impact brought by such things as the World Wide Web, Windows, and fast, reliable personal computers.

This is a request for approximately 15 minutes of your time to participate in a Web-based study on county Extension agent’s use of computers. It is a unique opportunity for you to express your opinion about computer use on your job, to identify computer hardware and software that you might need, and to provide information that will help determine what future computer training should be offered to county Extension agents.

As a means to check your name off the survey’s distribution list, and as a means to deter unauthorized use of the survey’s Web site, all participants have been given their own access code. Your response will be kept strictly confidential, and your name will never appear on any report. We will be happy to share the results of the study with you upon its conclusion.

If you have any questions or experience any difficulties with the survey please feel free to contact us by e-mail (IRANI@ufl.edu) or (JAGREGG@ufl.edu). You can reach Tracy Irani by telephone at (352/392-0502), and Austin Gregg at (352/392-1285).
The survey can be found at: http://survey.ifas.ufl.edu

Please use access code 123AB

Thank you in advance for your help
Dr. Tracy Irani, Assistant Professor  
Mr. Austin Gregg, Graduate Student  
University of Florida  
Department of Agricultural Education and Communication  
P.O. Box 110540  
Gainesville, Fl 32611-0540  

June 27th, 2002  

County Extension Agent  
University of Florida  
IFAS  

Dear County Extension Agent,  

A few days ago you should have received an e-mail message from us requesting your participation in Web-based survey on county Extension agent’s use of computers. If you have already completed the survey, we’d like thank you for helping us out.

If you have not yet visited the Web site and filled in the survey, perhaps you would do so sometime today. The survey can be completed quickly and efficiently, and your response is very important to the success of the study.

Feel free to contact either of us if you have any questions about, or difficulties with the survey. Our e-mail addresses are: (IRANI@ufl.edu) or (JAGREGG@ufl.edu). Our telephone numbers are: (352/392-0502 (Tracy Irani)) or (352/392-1285 (Austin Gregg)).

The survey can be found at: http://survey.ifas.ufl.edu

Please use access code 123AB
APPENDIX G
E-MAIL FROM RESEARCHERS TO PILOT POPULATION THANKING THEM FOR THEIR PARTICIPATION, AND INFORMING THEM THAT THEY WERE PART OF A PILOT STUDY

Dr. Tracy Irani, Assistant Professor
Mr. Austin Gregg, Graduate Student
University of Florida
Department of Agricultural Education and Communication
P.O. Box 110540
Gainesville, Fl 32611-0540

July 6th, 2002

County Extension Agent
University of Florida
IFAS

Dear County Extension Agent,

Many of you will have already received an e-mail message from Dean Waddill announcing the study you’ve just participated in. The reason for this apparent incongruity is because you were part of the pilot study.

Your participation allowed us to verify the reliability of the survey and the survey’s Web site. The information that you graciously provided will be included into the master data set, and we won’t be bugging you with any more e-mails!

Thank you again for your help. We are very appreciative!

Sincerely,

Austin Gregg/Tracy Irani

P.S. We hope to put the results up on the Web sometime in October or November.
APPENDIX H
E-MAIL FROM THE DEAN OF EXTENSION INTRODUCING THE STUDY

FRIDAY JULY 05, 2002 3:29 PM

ELECTRONIC MEMORANDUM

TO:          All County Faculty
FROM:        Christine T. Waddill

SUBJECT:     Extension Faculty Computer Usage Survey

On July 8th you will receive a survey asking for your input on computer usage. The study is being led by Austin Gregg and Traci Irani, in the Department of Agricultural Education and Communication. We hope you will take a few minutes to respond as it will provide useful information for developing long-range plans for hardware and training needs in Extension.

Look for an e-mail from Dr. Irani that will direct you to the website hosting the survey.

CTW/jmv
APPENDIX I
E-MAIL FROM THE RESEARCHERS TO THE POPULATION INTRODUCING
THE STUDY AND ASKING FOR PARTICIPATION

Dr. Tracy Irani, Assistant Professor
Mr. Austin Gregg, Graduate Student
University of Florida
Department of Agricultural Education and Communication
P.O. Box 110540
Gainesville, FL 32611-0540

Monday, July 8th, 2002

Dear County Extension Agent,

The last 10 years have brought tremendous change in the way we use, and think about
the use of computers. County agents, along with many other people in societies
throughout the world, have experienced the impact brought by technologies such as
the World Wide Web, Windows, and fast, reliable personal computers.

This is a request for approximately 15 minutes of your time to participate in a Web-
based study on county Extension agents’ use of computers. It is a unique opportunity
for you to express your opinion about computer use on your job, to identify computer
hardware and software that you might need, and to provide information that will help
determine what future computer training should be offered to county Extension
agents.

As a means to check your name off the survey's distribution list and to deter
unauthorized use of the survey's Web site, all participants have been given their own
access code. Your response will be kept strictly confidential, and your name will
never appear on any report. We will be happy to share the results of the study with
you upon its conclusion.

If you have any questions about the study or experience any difficulties with the
survey, please feel free to contact us by e-mail: IRANI@ufl.edu or
JAGREGG@ufl.edu. You can reach Tracy Irani by telephone at 352/392-0502, and
Austin Gregg at 352/392-1285.

The survey can be found at: http://survey.ifas.ufl.edu

Please use this code to access the survey: 123AB
The code consists of 3 numbers and 2 letters.

Thank you in advance helping us with our study,

Tracy Irani/Austin Gregg
Dr. Tracy Irani, Assistant Professor  
Mr. Austin Gregg, Graduate Student  
University of Florida  
Department of Agricultural Education and Communication  
P.O. Box 110540  
Gainesville, FL 32611-0540

Friday, July 12th, 2002

Dear County Extension Agent,

A few days ago you should have received a message from us requesting your participation in a Web-based survey on county Extension agents’ use of computers. If you have already completed the survey, we’d like to take this opportunity to thank you for helping us out.

If you have not yet visited the Web site and filled in the survey, perhaps you’d do so sometime today. The survey can be completed quickly and easily, and your response is very important to the success of the study.

Please use this code to access the survey: 123AB

The code above consists of 3 numbers and 2 letters.

The survey can be found at: http://survey.ifas.ufl.edu

Feel free to contact either of us if you have any questions about, or experience any difficulties with the survey. Our e-mail addresses are: IRANI@ufl.edu or JAGREGG@ufl.edu. You can reach Tracy Irani by telephone at 352/392-0502, and Austin Gregg at 352/392-1285.

We really appreciate your help with our study!

Sincerely,

Tracy Irani/Austin Gregg
APPENDIX K
E-MAIL FROM RESEARCHERS TO THE POPULATION REMINDING THEM
TO PARTICIPATE (SECOND REMINDER MESSAGE)

Dr. Tracy Irani, Assistant Professor
Mr. Austin Gregg, Graduate Student
University of Florida
Department of Agricultural Education and Communication

Friday, July 19th, 2002

Dear County Extension Agent,

We sure do hate to bug you again, but…

We still haven’t heard from you on the Web-based survey of county agents’ use of computers. If you’ve been unable to access the site, or have experienced any other difficulties completing the survey, please contact us by e-mail or telephone. Our e-mail addresses are IRANI@ufl.edu or JAGREGG@ufl.edu. You can reach Tracy Irani by telephone at 352/392-0502, and Austin Gregg at 352/392-1285.

Please use this code to access the survey: 123AB

The code above consists of 3 numbers and 2 letters.

The survey can be found at: http://survey.ifas.ufl.edu

We hope you find a few minutes to join your colleagues who have already responded to our survey. Your response is very important to us!

Thank you for your consideration,

Tracy Irani/Austin Gregg
Dr. Tracy Irani, Assistant Professor  
Mr. Austin Gregg, Graduate Student  
University of Florida  
Department of Agricultural Education and Communication  

Friday, July 26th, 2002  

Dear County Extension Agent,  

We are writing to you concerning our study of county agents’ use of computers. As of today we have yet to have received your completed survey. Many of your colleagues have successfully completed the easy, fast, and efficient on-line survey. The accuracy of the study, however, depends on you and those remaining agents who have yet to respond. Won’t you take a few minutes of your time today and help us out?  

If you have any questions or experience any difficulties with the survey please feel free to contact us by e-mail (IRANI@ufl.edu or JAGREGG@ufl.edu). You can reach Tracy Irani by telephone at 352/392-0502, and Austin Gregg at 352/392-1285.  

Please use access code: 123AB  

The survey can be found at: http://survey.ifas.ufl.edu  

Thank you for your help!  

Sincerely,  

Tracy Irani/Austin Gregg
Monday, July 29, 2002 1:05 PM

Good afternoon everyone,

I've attached a note from Austin Gregg regarding a survey he is conducting on computer usage by agents. I hope all of you take a few minutes and complete the survey for him. Response has slowed down considerably and about one-third of all agents have replied. Thanks.

Rodney L. Clouser

(The attached “note” from the principal researcher referenced in the DED’s e-mail above is here included:)

Thursday, July 11, 2002 8:53 AM

Good morning Dr. Clouser,

As I suspect you are aware, we began a Web-based survey on county agents' use of computers last Monday. Anyway, as is characteristic with Web-based surveys, we had a big response right off the bat, but it has now slowed to a trickle. (Thus far we have received 124 responses out of a potential 315.)

I'm writing today to ask if you would be so kind as to encourage participation in the study. It's easy to complete, and takes about 15 minutes. All agents have been contacted with information on how to find and gain access to the survey.

CEDs have replied in droves (a finding I suspect), and most all respondents (CEDs and agents alike) have been adding very interesting comments. The study should produce good information.

Thanks for any assistance you might be able to give,

Austin G.
Dear County Extension Agent,

By now you most likely have heard about our Web-based survey. Because we haven’t heard from you, we thought you might prefer the paper version, which is enclosed. The Web version is still available to you, and the address and access code is on this page.

Thanks for your patience, and your help!

Dr. Tracy Irani, Assistant Professor
Mr. Austin Gregg, Graduate Student
University of Florida
Department of Agricultural Education and Communication
P.O. Box 110540
Gainesville, Fl 32611-0540

August 1st, 2002

County Extension Agent
University of Florida
IFAS

Dear County Extension Agent,

The last 10 years have brought tremendous change in the way we use, and think about the use of computers. County agents, along with many others in societies throughout the world, have experienced the impact brought by such things as the World Wide Web, Windows, and fast, reliable personal computers.
This is a request for approximately 15 minutes of your time to participate in a study on county Extension agent’s use of computers. It is a unique opportunity for you to express your opinion about computer use on your job, to identify computer hardware and software that you might need, and to provide information that will help determine what future computer training should be offered to county Extension agents.

Although we have enclosed a paper copy of the survey, you can also quickly and easily complete it on-line. Simply go to http://survey.ifas.ufl.edu - and use access code 123AB. The code consists of 3 numbers and 2 characters.

Your participation in this study is completely voluntary, and there is no penalty for not participating. The purpose of the study is to gain an understanding of the level of skill, patterns of use, and workplace application of information technology amongst county Extension agents of the Florida Cooperative Extension Service. You do not have to answer any question you do not wish to answer, and you may withdraw from the study at any time without consequence. The survey takes approximately 15 minutes to complete. We believe there are no direct risks or benefits to you for participating in this study. Your information will be assigned a code number. The list connecting your name to this number will be kept in a locked file in a secure location. When the study is complete and the data have been analyzed, the list will be destroyed. Your name will never appear in any report. There is no compensation for participation in this research. If you have any questions about your rights concerning this study, please contact the UFIRB Office, Box 12250, University of Florida, Gainesville, FL 32611-2250.

If you have any questions or experience any difficulties with the survey please feel free to contact us by e-mail (IRANI@ufl.edu or JAGREGG@ufl.edu). You can reach Tracy Irani by telephone at 352/392-0502, and Austin Gregg at 352/392-1285.

Thank you in advance for your help! We will be happy to share the results of the study with you when it is complete.

Tracy Irani/Austin Gregg

Agreement:

I have read the procedure described above. I voluntarily agree to participate in the procedure and I have received a copy of this description.

Participant__________________________________________
Date:________________

Principal Investigator_________________________________
Date:________________
APPENDIX O
LETTER FROM RESEARCHERS TO AGENTS WHO HAD NOT RESPONDED TO THE ON-LINE SURVEY REMINDING THEM TO PARTICIPATE

Dr. Tracy Irani, Assistant Professor
Mr. Austin Gregg, Graduate Student
University of Florida
Department of Agricultural Education and Communication
P.O. Box 110540
Gainesville, Fl 32611-0540

August 14th, 2002

Dear County Agent,

Just a brief message to ask if you would be so kind as to participate in our survey… We’ve had a great response from Extension agents across the state, but your response is still very, very important to us! Won’t you take a few minutes today to complete either the paper or on-line survey?

Feel free to contact either of us if you have any questions about the survey. Our e-mail addresses are: IRANI@ufl.edu or JAGREGG@ufl.edu. Our telephone numbers are: 352/392-0502 (Tracy Irani) or 352/392-1285 (Austin Gregg).

Although we sent you a paper copy, you can also very easily complete the survey online. Simply go to http://survey.ifas.ufl.edu - and use the following access code: 123AB (The code is 3 numbers and 2 letters.)

Thank you for your participation! We look forward to sharing the results with everybody sometime in the near future!

Tracy Irani and Austin Gregg
REFERENCES


School to require one online course. (2000, October 22). *The Gainesville Sun*, p. 6A.


BIOGRAPHICAL SKETCH

Jon Austin Gregg was born in October of 1956, in Gainesville, Florida. He grew up in Gainesville, a small town in rural north central Florida that is home to the University of Florida. He graduated from Buchholz High School in 1974. His college career began at Santa Fe Community College in Gainesville, where he received an AA degree in 1978. Transferring to the University of Florida thereafter, he received a B.S. degree in statistics in 1984.

After graduating from college Austin ran a small landscape maintenance business. He also engaged in post-baccalaureate studies, taking more courses in the area of statistics. In 1987 he began working for the University of Florida, and over the next five years held several OPS positions in computer-related fields. He was hired as a full-time University of Florida employee in 1992, and began working for the Institute of Food and Agricultural Sciences’ Program Evaluation and Organizational Development unit. At Program Evaluation he was responsible for many aspects of collecting and analyzing planning and reporting information generated by the Florida Cooperative Extension Service. Currently he is a computer programmer analyst working for the Information Systems Department of the University Florida’s Division of Finance and Administration.

Austin’s father was an internationally known research scientist, his mother an instructor of music. Austin is a member of both the Gamma Sigma Delta and Alpha Tau Alpha academic honor societies.