

Barriers to Internet-Based Learning Systems  
in a Select Virginia Agricultural Population

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Abstract

The purpose of this study was to identify the barriers Virginia agricultural producers encounter when using the Internet and their preferences when seeking information delivered via the Internet. The results are expected to provide Extension educators needed information about producer Internet use patterns and their preferences related to Internet-based learning systems.

The survey population (N = 370) consisted of Virginia agricultural producers currently known to be using the Internet as identified by the county Agricultural Extension agents. Data were collected online via an interactive, encrypted Web site and analyzed with SAS/STAT software.

The 186 usable producer responses indicated that they were predominately white (98.36%), males (82.87%) averaging 51 years of age with some college education. Their primary occupation was farm or ranch work (41.71%) with a gross value of agricultural sales of \$100,000 - \$249,999. Nearly 60% conducted Internet agricultural marketing activities; three quarters purchased agricultural supplies, 43.17% conduct non-agricultural Internet business, and 50% use dialup services to access the Internet. In total, 95.68% of the responding producers access the Internet at least once a week and 31.60% reported previous participation in Internet-based learning.

Producers below 30 years of age considered their lack of experience/training to be less of a barrier than older producers. Time constraints associated with job responsibilities, isolation from other program participants, and their ability to learn at a distance were seen as greater barriers by males than females. Producers listing their primary occupation as other than farming saw time constraints associated with their job as a greater barrier than those retired but still farming. Producers with a high school education generally rated barriers associated with Internet-based learning as greater obstacles than those with advanced degrees. Following an exposure to an Internet-based learning experience, no differences were observed related to the producers' age, gender, primary occupation, and the operation's gross value of agricultural sales and the selected factors.

Producers making agricultural Internet purchases, perceived their motivation to participate in Internet-base learning as less of a barrier than those that did not. Generally, as the producers' Internet use frequency increased, their perception of the barriers was reduced and those with previous Internet-based learning experience saw their ability to learn at a distance as less of a barrier than did those with no experience.

A comparison of pre- and post-exposure data, revealed time constrains associated with job responsibilities, access to instructors/specialists, feedback/instructor contact, and the motivation to participate as the greatest barriers to Internet-base learning. Differences in pre- and post-exposure assessments confirm that producers' perception of the barriers were worse than actuality.

Extension's Internet-based learning experiences should be accessible from a familiar Internet location. The learners' abilities and connectivity should be considered

when developing systems to minimize barriers associated with these factors. Internet-based activities should be relevant to the learner. Experiences should be available in multiple formats including video, audio, print and combinations of the aforementioned. Learners should be afforded the opportunity to interact with the presenter/instructor via the most acceptable and timely means.

## DEDICATION

I hereby dedicate this dissertation to my loving wife, Kay Chappell and our three wonderful children; Glenn Franklin Chappell, III, Elizabeth Lee Chappell, and Sallie Louise Chappell for providing their support and love during times when I was all but lovable. I further dedicate this dissertation to my parents, Carol and Glenn Chappell, for providing guidance, love, and backing throughout my life. Over twenty years ago, Betty Ann and Larry Tucker welcomed a young punk into their lives and shared the most precious gift they could with it, their daughter. My life has been blessed beyond my wildest dreams. It is through the combination of these people and their love that we were able to accomplish this significant achievement. I am truly grateful to you all. God Bless each of you. Gie.

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## Chapter 1

### Introduction

#### *Introduction*

Cooperative Extension has a long, rich history of providing non-formal educational programs. Its purpose as described by the 1914 Smith-Lever Act was to conduct educational programs aimed at helping people meet their essential needs and concerns (Grantham, 1958). To expand upon this role, Sanderson (1988) outlined the current national mission of Cooperative Extension as:

1. The ultimate goal of Cooperative Extension is the development of people, enabling them in self-determination, resource management, and the management of change in the primary dimensions of their lives.
2. The means of this work is education, which empowers people through their acquisition of new knowledge, attitudes, skills and aspirations.
3. Extension's methods are non-formal (i.e., noncredit), off-campus, and oriented toward people's problems and needs.
4. Extension's home in the land-grant system provides a base for reliable, credible information and for the institution's access to people's needs.
5. Extension's program priorities arise from the mutually agreed upon determinations by the three partners in the work: the USDA, the land-grant institutions, and county governments. (p.7)

It is this philosophy that allows Cooperative Extension to constantly change and adapt to the needs of its clients.

The recent advances in technology have made it possible to offer quality non-formal educational opportunities at a distance via the Internet or by other electronic means. The term e-learning was developed to describe this method of delivery and includes Web-based learning, computer-based learning, virtual classroom and digital collaboration (Kaplan-Leiserson, 2000). This medium makes it possible to meet the educational needs of the learner while addressing many of the constraints associated with our fast-paced modern society.

Research by Willis (1993) found that adult learners have a wide variety of reasons for pursuing learning at a distance: constraints of time, distance, and finances; the opportunity to take courses or hear outside speakers who would otherwise be unavailable; and the ability to come in contact with other students from different social, cultural, economic, and experiential backgrounds. The technology exists to provide the experience to our agricultural producers, but little is known about the limitations or barriers from the perspective of the agricultural learner or barriers in their environment. As mentioned in Sanderson's description, one of the key components of Extension is the "management of change in the primary dimensions of their lives." As with learners in the distance experience, agricultural producers need access to non-formal distance learning opportunities for many of the same reasons mentioned by Willis (Zirkle, 2003). By understanding the barriers, Extension can fulfill its role to assist with managing change.

Agricultural producers need to have better access to current information in a timely manner because the face of rural America has changed dramatically in the past few decades, as have the responsibilities and needs of the agricultural producer. Agricultural production has increasingly become concentrated into fewer and fewer large

farm businesses. In 1935 there were nearly seven million farms in the United States in contrast to only 2.1 million in 2002. Farms generating less than \$100,000 in farm sales made up 85% of all farms in 2002, but produced only 11% of total sales. Production and sales associated with the largest 3% of U.S. farms (less than 71,000 farms) generated 62% of total sales (U.S. Department of Agriculture, 2002).

According to the Special Report for Virginia Cooperative Extension titled “An Introduction to Virginia Issues: Information and Analysis” (VPI & SU, 2005), global and national trends have affected Virginia farming more rapidly and perhaps more dramatically than anywhere else in the nation. Cash farm income on the traditional cropping farms is increasingly threatened by low commodity prices, rising costs, and uncertain yields. Virginia producers have been forced to reduce their reliance on the more traditional crops such as peanuts and tobacco because of competition from other states and nations and the erosion of traditional marketing support programs. Livestock production has also suffered from more competition, higher production costs, and issues related to environmental compliance. The Virginia public generally supports agriculture as a favorable land use, but residents in urbanizing rural areas often complain about the noise, odor, and other side-effects of agricultural business operations. Producers are in dire need of information to address these issues.

The 2002 Census reported 47,606 Virginia farms with total sales valued at \$2.36 billion, representing just 0.8% of gross state product. Using backward- and forward-linkages to other economic sectors, Lamie (1998) estimated that 11.2% of gross state product and 10% of state employment are related to activities of the agricultural sector. Some might argue that Lamie’s estimate is high. However, when one realizes that

Virginia's agriculture not only includes traditional field crops, vegetables, livestock, and seafood, but also includes aquaculture, landscape and nursery products, ornamentals, and premium farm wines, his estimate seems conservative. There are also agricultural links to the tourism and forestry industries.

During the Virginia Situational Analysis of 2003-2004, agricultural producers expressed a desire for improved access to current educational resources and information to manage their agricultural business operations. For example, producers are mandated by pesticide laws to attend recertification meetings in order to retain restricted use pesticide (RUP) licenses. These licenses make it possible for producers to have access to pest control options available in pursuit of an economically stable operation. Unfortunately in many cases, these meetings conflict with production practices, recreational activities, and personal commitments thus providing for a less than optimal learning situation. Often producers and agriculture professionals are required to travel great distances to attend meetings that address specific topics or certification requirements. These programs require attendance, but often fail to provide the most conducive learning environment. As a result of the multiple roles of agricultural producers and family members (U.S. Department of Agriculture, 2002), there is a need to research and develop Internet-based resources that augment or replace the traditional face-to-face educational meetings. Economically, the traditional meeting format may be placing an undo financial strain on many of our producers and agricultural professionals.

A considerable amount of research has been conducted relating to the quality of the distance educational experience and how that educational experience is closely related to the learner's feelings about acquiring the specific knowledge. This research

supports the contention that adult students are intrinsically motivated and usually do not need to be forced to participate in the educational experience, if the information is relevant and they are prepared and willing to learn. Cohen (2002) established when learners go to the trouble of finding a course or opportunity; they have a vested interest in learning the material. From this research it could be concluded that students that want to succeed and are prepared to learn, stand a higher probability of achieving success.

Distance education has truly evolved over time to meet the changing needs of the distance learner. To understand this process and the importance of this study, it is important to look at the long history of what was first called distance education. Dating back to 1728, an advertisement in a Boston paper offered learning by mail (IHEP, 1999). Over the decades, distance education grew as a method of teaching. In the late 1980s distance learning was defined by Clark and Verduin (1989) using the following criteria:

1. The separation of teacher and learner during at least a majority of each instructional process,
2. The use of educational media to unite teacher and learner and carry course content, and
3. The provision of a two-way communication between the teacher, tutor, or educational agency and learner.

Holberg (1995) described distance education in his book “Theory and Practices of Distance Education”: *“It is characterized by non-contiguous communication and can be carried out anywhere and at any time, which makes it attractive to adults with professional and social commitments.”* It is the “any time anywhere” aspect of distance learning that makes this medium appealing to the agricultural community.

### Statement of the Problem

Agricultural producers need faster access to current information, skills and tools to manage, operate and maximize profits in a sustainable agricultural system. Extension educators lack sufficient information about the Internet use patterns of agricultural producers, their preferences related to Internet-based learning systems, and the barriers they encounter when using the Internet. Such information is the baseline for Virginia Cooperative Extension to develop relevant Internet-based learning opportunities for agricultural producers that address their needs and provide timely access to critical information, education, training, and research-based findings. This study identified the barriers that agricultural producers encountered in Virginia when using the Internet and their preferences when seeking information, tools, and skills delivered via the Internet. Resources need to be allocated to assist educators in meeting these needs and making the educational experience relevant to the business of agriculture in Virginia and the nation.

### Significance of the Study

Cooperative Extension faculty and educators must understand the barriers faced by agricultural producers when assessing and utilizing Internet-based learning systems. Through this awareness program relevance will be ensured; needs addressed and systems will be designed that minimize or even overcome the barriers to this method of educating the populace of producers. Identifying and addressing the barriers to electronic learning systems in the population will provide the catalyst for other individuals to adopt this media as a way to obtain resources and materials to more efficiently manage their

farming operation. The findings of this study are expected to enhance the development of *eXtension: About* (2005) technologies, expand the audience of participants, and improve the efficiency of extension outreach from Land-grant Universities. It will allow the extension system to more efficiently serve in ways that provide accurate and just-in-time information for making critical decisions.

### Research Questions

Listed below are the research questions that guided this study.

1. What are the important demographics of agricultural producers who utilize or could utilize the Internet to access agricultural information in Virginia?
2. To what extent are selected demographic factors of agricultural producers related to their Internet access of agricultural information in Virginia?
3. What are the use patterns of the producers using the Internet?
4. What is the level of importance of computer and the Internet to the producers' agricultural operation?
5. To what extent do producers perceive selected factors as barriers to Internet-based learning systems?
6. To what extent do selected factors encourage or discourage producer participation in Internet-based learning systems?

### Definition of Terms

*Diffusion* is the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 1995).



*e-Learning* is a delivery method which includes Internet-based learning, computer-based learning, virtual classrooms and digital collaboration (Kaplan-Leiserson, 2000).

*Formal education* is an educational experience resulting in the awarding of credit towards a diploma or certificate (Sanderson, 1988).

*Non-formal education* (i.e., noncredit) is an educational experience usually off-campus, and oriented towards people's problems and needs (Sanderson, 1988).

*An innovation* is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. The characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption. The characteristics which determine an innovation's rate of adoption are: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability (Rogers, 1995). These characteristics are described below.

1. *Relative advantage* is the degree to which an innovation is perceived as better than the idea it supersedes. The degree of relative advantage may be measured in economic terms, but social prestige, convenience, and satisfaction are also important factors. It does not matter so much if an innovation has a great deal of objective advantage. What does matter is whether an individual perceives the innovation as advantageous. The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption will be (Rogers, 1995).
2. *Compatibility* is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. An idea that is incompatible with the values and norms of a social

system will not be adopted as rapidly as an innovation that is compatible. The adoption of an incompatible innovation often requires the prior adoption of a new value system, which is a relatively slow process (Rogers, 1995).

3. *Complexity* is the degree to which an innovation is perceived as difficult to understand and use. Some innovations are readily understood by most members of a social system; others are more complicated and will be adopted more slowly. New ideas that are simpler to understand are adopted more rapidly than innovations that require the adopter to develop new skills and understandings.
4. *Trialability* is the degree to which an innovation may be tested on a limited basis. New ideas that can be tried on the installment plan will generally be adopted more quickly than innovations that are not divisible. An innovation that is trialable represents less uncertainty to the individual who is considering it for adoption (Rogers, 1995).
5. *Observability* is the degree to which the results of an innovation are visible to others. The easier it is for individuals to see the results of an innovation, the more likely they are to adopt it. Such visibility stimulates peer discussion of a new idea, as friends and neighbors of an adopter often request innovation-evaluation information about it (Rogers, 1995).

*Innovativeness* is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system. There are five adopter categories or classifications of the members of a social system on the basis on their innovativeness: (1) innovators, (2) early adopters, (3) early majority, (4) late

majority, and (5) laggards (Rogers, 1995). The specific descriptions of the five adopter categories are described below.

1. *Innovators* are the first 2.5% of the individuals in a system to adopt an innovation.

Venturesomeness is almost an obsession with innovators. This interest in new ideas leads them out of a local circle of peer networks and into more cosmopolite social relationships. Communication patterns and friendships among a clique of innovators are common, even though the geographical distance between the innovators may be considerable. Being an innovator has several prerequisites. Control of substantial financial resources is helpful to absorb the possible loss from an unprofitable innovation. The ability to understand and apply complex technical knowledge is also needed. The innovator must be able to cope with a high degree of uncertainty about an innovation at the time of adoption. While an innovator may not be respected by the other members of a social system, the innovator plays an important role in the diffusion process: That of launching the new idea in the system by importing the innovation from outside of the system's boundaries. Thus, the innovator plays a gate keeping role in the flow of new ideas into a system (Rogers, 1995).

2. *Early adopters* are the next 13.5% of the individuals in a system to adopt an innovation. Early adopters are a more integrated part of the local system than are innovators. Whereas innovators are cosmopolites, early adopters are localities. This adopter category, more than any other, has the greatest degree of opinion leadership in most systems. Potential adopters look to early adopters for advice and information about the innovation. This adopter category is generally sought

- by “change agents” as a local missionary for speeding the diffusion process. Because early adopters are not too far ahead of the average individual in innovativeness, they serve as a role-model for many other members of a social system. The early adopter is respected by his or her peers and is the embodiment of successful, discrete use of new ideas. The early adopter knows that to continue to earn this esteem of colleagues and to maintain a central position in the communication networks of the system; he or she must make judicious innovation-decisions. The early adopter decreases uncertainty about a new idea by adopting it, and then conveying a subjective evaluation of the innovation to near-peers through interpersonal networks (Rogers, 1995).
3. *Early majority* is the next 34% of the individuals in a system to adopt an innovation. The early majority adopt new ideas just before the average member of a system. The early majority interacts frequently with their peers, but seldom holds positions of opinion leadership in a system. The early majority's unique position between the very early and the relatively late to adopt makes them an important link in the diffusion process. They provide interconnectedness in the system's interpersonal networks. The early majority are one of the two most numerous adopter categories, making up one-third of the members of a system. The early majority may deliberate for some time before completely adopting a new idea. "Be not the first by which the new is tried, nor the last to lay the old aside," fits the thinking of the early majority. They follow with deliberate willingness in adopting innovations, but seldom lead (Rogers, 1995).

4. *Late majority* is the next 34% of the individuals in a system to adopt an innovation. The late majority adopt new ideas just after the average member of a system. Like the early majority, the late majority make up one-third of the members of a system. Adoption may be the result of increasing network pressures from peers. Innovations are approached with a skeptical and cautious air, and the late majority do not adopt until most others in their system have done so. The weight of system norms must definitely favor an innovation before the late majority is convinced. The pressure of peers is necessary to motivate adoption. Their relatively scarce resources mean that most of the uncertainty about a new idea must be removed before the late majority feel that it is safe to adopt (Rogers, 1995).
5. *Laggards* are the last 16% of the individuals in a system to adopt an innovation. They possess almost no opinion leadership. Laggards are the most localite in their outlook of all adopter categories; many are near isolates in the social networks of their system. The point of reference for the laggard is the past. Decisions are often made in terms of what has been done previously. Laggards tend to be suspicious of innovations and change agents. Resistance to innovations on the part of laggards may be entirely rational from the laggard's viewpoint, as their resources are limited and they must be certain that a new idea will not fail before they can adopt (Rogers, 1995).

## Limitation and Delimitations

### *Limitations*

This study was limited in that the population of the participants was not a probability sample. Therefore, the population was not representative of the total agricultural population of Virginia, and the findings cannot be generalized beyond the subjects in this study.

Technology is constantly changing and affording new options for the delivery of educational material via the Internet on a daily basis. Therefore, accurately determining, at any given time, the barriers to an educational media that is constantly changing is difficult and is recognized as a limitation in this study.

### *Delimitations:*

The participants in this study were delimited to agricultural producers engaged in production of agricultural commodities, have Internet access, and email addresses. The study population was identified by Virginia Cooperative Extension, Agriculture and Natural Resource Agents (ANR) and was chosen because of their active participation in and familiarity with Virginia Cooperative Extension programs. This population is accessible via email, has established a working relationship with the local Agricultural Extension Agents, and will be more likely to participate in the study if requested to do so.

## Theoretical Framework

Distance learning is attractive because it affords time, situational, and place bound learners the opportunity to participate in courses and programs that would otherwise be

unavailable. Although this system eliminates barriers, it also presents barriers that are unique to the medium (Zirkle, 2003). Zirkle's work establishes the fact that as with the other educational mediums, distance learning does not fit every learner's style or meet every learner's needs but will serve as a mechanism to meet some learner's needs.

Patricia Cross (1981, p.98) described the reasons why adult learners participate or do not participate in learning activities. She organized the learning barriers into three categories: situational, institutional and dispositional. Situational barriers are those obstructions related to the individual's position in life at any given time. These include issues related to transportation, age, time constraints, and family responsibilities. Institutional barriers are created by the educational institutions and discourage learners from accessing opportunities because of the institution's programs, policies, and procedures. These barriers include problems with admissions, registration, scheduling of courses, financial aid, and support services. Finally, Rezabek (1999) described dispositional barriers as those related to the attitudes and perceptions about oneself as a learner. These stem from the individual's personal background, attitude, motivation, learning style, and self-confidence.

The application of findings by Cross (1981, p.98) about access and participation in distance learning has been the focus of numerous studies (Berge, 1998; Berge & Muilenburg, 2003; Berge, Muilenburg, & Haneghan, 2002; Cho & Berge, 2002; Muilenburg & Berge, 2001; Zirkle, 2001, 2002). Not only was the primary focus of these studies on institutional and student barriers but also on the faculty barriers associated with distance learning offerings. Faculty time, training, access, resources, expertise, and support were all identified as problems to offering formal courses at a distance. With

distance learning, faculty are required to change teaching styles. Some faculty members see distance offerings as a threat to advancement. Others have difficulty respecting the academics of distance offerings, not to mention issues related to staffing. If one professor can serve thousands of students, then job security could possibly become a factor (Galusha, 1998).

Despite extensive research on the subject, specific information on the utilization of distance learning in Career and Technical Education is relatively limited (Zirkle, 2003). Furthermore, research related to distance learning in the non-formal setting is almost nonexistent. This research will investigate the situational, institutional and dispositional barriers to Internet-based learning in the agricultural population that currently uses the Internet in Virginia.

Once the barriers to non-formal Internet-based learning are understood, the adoption and utilization of this medium should progress through the steps in Roger's (1995) Diffusion of Innovations Model. This is assuming the barriers are overcome and this medium meets the criteria of an advantageous innovation. The characteristics of an innovation, as perceived by the members of a social system, determine whether it is advantageous and the rate of adoption. As with previous innovations, the rate of adoption for Internet-based learning will be determined by the extent to which it speaks to the five adoption characteristics: (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability.

Diffusion of innovation as a mass communication theory has been used to examine how an innovation is adopted in a particular social system. Since the ground-breaking study by Ryan and Gross (1943) on the adoption of hybrid seed corn in Iowa, the



diffusion of innovation model has been used to look at the diffusion of new products, ideas, and practices around the world. Specifically since the 1960s, the diffusion model has been applied in such disciplines as education, public health, communication, marketing, geography, general sociology, and economics. The model, with its practical implication on the adoption of technological innovations, was used as a theoretical framework to understand how students adopted a web-based course management system and integrated that system into their learning environment (Liao, 2005). Liao found that Rogers' model successfully explained the adoption of the system because it was perceived as advantageous. In this case, the innovation was perceived as advantageous because it led to increased interaction between the students and instructors about course materials, which contributed to student learning.

The study of the adoption of hybrid seed corn by Iowa farmers revealed how social change could be examined via the analysis of the adoption of innovation. The Iowa study researched the overall pattern of adoption by focusing on background factors that contribute to the adoption of the new seeds, the role of the mass media and interpersonal communication in the adoption process, and the time lag between awareness and adoption (Ryan & Gross, 1943). It was discovered that while the mass media contributed to the awareness of the innovation, interpersonal communication among farmers was the determining factor for the adoption of the new seeds. As in the study by Ryan and Gross (1943), interpersonal communication should be one of the prominent determining factors for adoption of Internet-based learning.

## Chapter 2:

### Conceptual Framework and Literature Review

As with hybrid seed corn adoption, Internet usage in the agricultural community has risen. Based on data collected by the National Agricultural Statistics Service (NASS) (U.S. Department of Agriculture, 2005) published in *Farm Computer Usage and Ownership*, 51% of farms in the U.S. have Internet access. This represents a 3% increase compared to data collected in 2003. Surely, as technology continues to evolve and access becomes more available, the number of farms utilizing the Internet will continue to increase. Over the same two year period, the percent of farms with access to computers remained constant at 58%; however, farms that either owned or leased a computer increased from 54% to 55%. There was also a one percentage point increase from 30% to 31% in computer usage for farm business purposes for the same period. As the numbers indicate, the business of farming is similar to any other business; producers are beginning to increase their reliance on computers and technology.

When the data are broken down into categories based on farm sales and government payments, clear trends develop. See Table 1. Seventy-nine percent of the farms with combined sales and government payments in excess of \$250,000 have access to computers. Seventy-seven percent owned or leased a computer and 72% have access to the Internet. Sixty-six percent of the respondents in this category use the computer for their farm business.

Table 1

*Farm Computer Usage: by Economic Class<sup>z</sup> and Type of Farm (n = 32,500)*

Economic Class and Type	Farms (%)			
	With Computer Access	That Own or Lease Computer	With Internet Access	Using Computers for Farm Business
\$250,000 & Over	79	77	72	66
\$100,000 – 249,999	69	67	59	51
\$10,000 – 99,999	54	51	46	33
Crop Farms	60	57	52	33
Livestock Farms	57	54	50	29

<sup>z</sup> Economic class refers to sales and government payments received during the previous year.

As farm income declines, there is also a general decline in each of the previously described categories. Of the farms with sales and government payments between \$100,000 and \$249,999, 69% had access to computers, 67% owned or leased computers, 51% are using computers for their farm business and 59% have Internet access. For farms with sales and government payments between \$10,000 and \$99,999, the numbers continue to decline by approximately 15 percentage points across the categories. Fifty-four percent reported having access to a computer, 51% owned or leased a computer, 33% use a computer for their farm business and 46% have access to the Internet. When the data are analyzed by comparing livestock operations and crop operations, cropping

farms' percentages were slightly higher in computer access, computer use in the farm business, and access to the Internet.

In 2005, data were collected on how operators accessed the Internet. The primary method of Internet access by reporting U.S. farms was Dialup (69%) followed by DSL (13%), Cable (6%), Satellite (4%), Wireless (3%) and Unknown/Other (5%). The data established the fact that a majority of U. S. farms have access to the Internet. As a result of that accessibility, producers have the potential to participate in Internet-based learning. The data also shows that a majority of the farms have the slowest form of Internet access. This could be a limiting factor when attempting to access files or presentations that require large quantities of data to be transmitted rapidly.

#### *Traditional verses Internet-based Courses*

Since the fledgling stages of distance learning, there has been controversy related to the equity of the offerings as it pertains to student learning. Specifically, when comparing traditional courses and online courses, a number of factors have been measured in an attempt to clarify the situation. When measuring student achievement and learning, a majority of the research fails to identify differences between the two formats on learning outcomes across varied subject matter (Gagne & Shepherd, 2001; Green & Gentlemann, 2001; Johnson, Aragon, Shaik, & Palma-Rivas, 2000; Ryan, 2000; Schulman & Sims, 1999; Wade, 1999). The data demonstrate that the performance of students who participated in distance learning courses was like that of those who participated in the traditional on-campus courses as measured by the grade distribution of the students. In fact, research conducted by Butzin (2000), Hubbard (2000), and

Morrissey (1998) demonstrated that online students actually performed better than their on-campus counterparts. Research by Cohen (2002) attributed the higher level performance in the on-line student population to better preparation, motivation, and the self-selection of courses. As mentioned earlier, when students are intrinsically motivated and intentionally select offerings directly related to an achievable goal, performance will be greater than in those that lack these characteristics.

### *Student Attitude and Satisfaction*

In a comparison of a graduate course taught both on campus and via distance learning; Johnson, Aragon, Shaik, & Palma-Rivas (2000) failed to demonstrate differences in the project ratings and grade distribution of the students. However, they were able to establish a slightly higher level of satisfaction with the course in the population of students participating in the traditional setting. As with some of the previous citations, this research documented that distance learning can be as effective as learning in the traditional classroom setting, but there is the potential there will be differing levels of satisfaction between the two groups.

Research on student attitudes toward online learning supports the contention that students of all ages who are provided easy access to computer-mediated distance learning classes generally have a positive experience with this type of educational format (Abbott & Faris, 2000; Baron & McKay, 2001; Gagne & Shepherd, 2001; Mitra & Steffensmeier, 2000). Conversely, Phipps and Merisotis (1999) documented that if the student does not have access to the appropriate equipment, the support structure is not adequate, or the computer and software is prohibitive based on cost, then this should not

be recommended as an alternative delivery method. The research by Phipps and Merisotis (1999) support the U.S. Department of Agriculture (2005) findings related to the higher use rates and utilization of computers by the producers in the higher farm income brackets.

As one would expect, equipment, software, accessibility and supportive services play an important role in determining the level of student and/or user satisfaction. However, satisfaction is also related to the instructional approaches used in the course. Abbott & Faris (2000) showed the level of participant satisfaction increased with the incorporation of meaningful assignments, supportive faculty, and the use of quality discussion groups. Research by Porter (1994) found teacher mediation increased the completion rate for distance education courses and students needed support and direction to enable them to make the transition from traditional classroom to self-directed learning environment. The incorporation of tools to help students monitor their progress and obtain timely feedback on activities was particularly important. Practical experience as a teaching assistant has demonstrated the importance of these factors as they relate to course satisfaction.

Course satisfaction was related to the student's computer proficiency level (Baron & Mckay, 2001). In much the same way literate students would be more satisfied with a textbook, those with advanced computer skills progressed and were more satisfied with distance learning courses. Baron & Mckay (2001) found that students with little distance learning experience needed to spend a greater amount of time on the course than students that were more knowledgeable. However, through exposure and use of the technology, the students became more proficient by the end of the course (Cohen, 2000). More often

than not, the students adapt more quickly than their teachers to new technology (Sherry, 1996). Cohen (2002) attributes the increase in technological proficiency (sending attachments, e-mail, etc.) to the “learning by doing phenomenon.” Through the incorporation of these practices into the learning experience and the establishment of a beneficial relationship practice and the acquisition of a goal, the students became more proficient. As a result of task inclusion, students increased their proficiency and level of satisfaction with the course.

### *Successful Course Characteristics*

The aesthetics in computer-based learning relate to how the information is presented and organized. A well presented and organized assembly serves as a motivational factor to encourage the learner to study the material. Kearsely (2000) stressed the importance of usability and aesthetics in computer-based learning but also emphasized that these factors alone do not ensure a successful learning experience. Not only do these factors not ensure success, they must be mixed in the proper measures. There needs to be a balance between usability and aesthetics so that it is both visually pleasing and user friendly. For online instruction to be successful, it must be successfully implemented (Cohen, 2002). It must incorporate factors such as instructional design, user interface, visual appeal, technical support, and user training to ensure success. The learner must be able to easily follow the instruction and have the user support and training to manage the material. In short, computer based learning is not a stand alone proposition.

Keegan (1983) has noted that it is the separation of the student and teacher imposed by distance education that removes a vital link of communication between the two parties. If not reestablished by some other means, the learning process could become compromised depending on the individuals learning style and instructional style utilized by the teacher. Creed (1996) listed two beneficial characteristics of electronic communication associated with distance learning; it is not restricted to time and place and it is primarily visual and textual rather than aural. Therefore, these characteristics of electronic communication make it possible to restore the “vital link” using visual and textual forms of communication that are not restricted by the factors of time and place. Thus, this medium must be matched to a specific type of learner and does not fit the characteristics of every learner.

Phipps and Merisotis (1999) concluded that the mode of instruction is less important than the quality and design of the instruction. Poor instruction can not be compensated for with “bells and whistles.” They suggest that learner tasks, the characteristics and motivation of the learner, and the instructor are important and not the technology. It does not matter where the information comes from or how it gets to the learner as long as it provides a well-designed learning experience that matches the needs of the learner. Cohen (2002) reiterated the point that although distance learning courses involve various new factors, they are fundamentally the same as other courses and must include effective instruction. Students will enjoy or dislike a course based on the instructor and the presentation of the content. Cohen posed the following questions for consideration: “What is effective instruction and what is the most effective way to teach students who possess different learning styles and different competencies? How can



instructors become more effective? How can we develop effective on-line courses that take full advantage of the on-line environment?" These are all questions that need to be addressed. Through the determination of the barriers to Internet-based electronic learning, we will be able to speak toward many of the questions posed by Cohen.

### *Technology Acceptance and Student Needs*

Holloway and Ohler (1991) found that a widely accepted technology is most often defined by a single characteristic: it makes a task rewarding for the user, where the "user" includes the student first and the faculty second. If the use of a new system does not make the performance of a task rewarding, there is little motivation to accept the technology. Conversely, if it simplifies or poses a "relative advantage" (Rogers, 1995) towards the accomplishment of a goal, the probability of acceptance and utilization is high.

Currently, data and video options such as Internet-based courses and two-way video are the leading technologies for distance delivery (Waits & Lewis, 2003). With virtually universal access to the Internet it is likely that this technology will continue to be the preferred choice for distance offerings. Although technology is an integral part of distance education, any successful program must focus on the instructional needs of the students rather than the technology itself. As indicated by Creed (1996), the incorporation of various delivery methods will enhance the learning process and stand a greater probability of matching the learner's needs and styles. In the absence of the ability to specifically match the offerings to the individual learner, the incorporation of multiple delivery methods will make it possible to meet the needs of multiple learners in

an efficient manner. Fortunately, numerous methods of distance learning are available to accomplish this goal (Kaplan-Leiserson, 2000) and make it possible for learners to have multiple exposures for the information to become engrained (Anderson, 1990, 1995; Calfee, 1981). As teachers, we want the participants to succeed. If the student is successful, the teacher is successful and we have established the relationship for effective learning. Distance learning options give the instructor more opportunities to teach individuals who otherwise could not participate.

Teaching and learning are two separate functions that require participation by both the learner and teacher. In developing a learning experience, teachers must consider the learners' ages, cultural and socioeconomic backgrounds, interests and experiences, educational levels, and familiarity with distance education methods and delivery systems (Schamber, 1988). Another important variable is the preference of the student for a particular mode of learning, i.e., cooperative, competitive, or individualized (Johnson & Johnson, 1974). Many current distance education projects incorporate cooperative learning, collaborative projects, and interactivity within groups of students as well as between sites. If teachers recognize the existence of these alternate learning styles, and if they attempt to make a match between these modes and the content to be learned, then they can develop a local instructional theory. As with most distance learning situations, a localized theory has a greater prospect of success than a general instructional theory intended to function satisfactorily in a variety of settings and practitioners (Owens & Straton, 1980, p. 160). Virginia Cooperative Extension has a long history of developing grass roots programs to meet the needs of the local learner. The utilization of distance learning opportunities should not be different.

### *Distance Learning and Acceptance*

According to Keegan (1983) fundamentally speaking, distance education is characterized by the separation of the learner and the teacher. A number of terms (distance education, distance teaching, distance learning, open learning, distributive learning, asynchronous learning, tellearning, and flexible learning) describe this learning process (Picciano, 2001). Distance learning has been accepted as a valid means for delivering courses on college campuses across the country. Based on a 2002 survey (Market Data Retrieval, 2002) of 1,621 two- and four-year colleges and universities, 84% reported distance learning programs with 47% of those leading to accredited degrees.

For effective learning to occur there must be a sender, a message and a receiver. If one of the three elements is faulty the process is compromised. For example, if agricultural producers perceive a need to be in the field instead of the learning environment, then effective learning is not occurring because the learner is unable or not willing to participate in the experience. When present in these cases, the learner may be present in body but not in mind. Our colleges and universities have set the stage for Extension to offer distance opportunities in the informal setting.

To facilitate a more cooperative environment, imagine if there were options for the producer to engage in the learning experience while in the field or later in the day or evening after field work had been accomplished. The experience might be more educationally rewarding. As indicated by Schamber (1988) this system would address the characteristics and needs of learners and provide a more conducive environment. The

distance learning environment offers agricultural producers the opportunity to participate from remote locations without the expenditure of resources and time in transit.

Extension educators should review Bennett's hierarchy (Bennett, 1979) to determine if their current methods are meeting the needs of clientele. Programs must be adapted to the changing situations of learners and focus on the "activities" portion of Bennett's hierarchy which incorporates educational methods and program content. Distance education has been adopted by 84% of our two- and four-year colleges and universities. Extension educators should embrace this opportunity and utilize it to its fullest extent in the non-formal setting.

The characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption. The characteristics which determine an innovation's rate of adoption are (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability (Rogers, 1995). Initially, participants might be hesitant to try new ways of learning, but once we understand the barriers and encouragement and exposure are provided, they will realize that they can learn on their own schedule and on their own terms. Not all participants will find the new methods beneficial because not all participants are identical.

In general, people like to appear progressive and those in agriculture are no different. Giving them new and alternative ways to learn will allow them to explore how they can continue to be better at what they have always been, agricultural professionals. By determining and eventually overcoming any barriers to Internet-based learning, Extension educators will give producers the ability to be self-mediated learners and possibly overcome barriers that exist within current systems. Many times people avoid

new innovations because they do not want to appear uninformed or assume the risks associated with adoption. Through education we can overcome the barriers to these alternative delivery methods and provide members of the agricultural system the opportunity to transition to the next level of adoption.

## Chapter 3

### Research Design and Methodology

#### *Introduction*

The study seeks to determine the current barriers in delivery of information, necessary skills of the learner, and resources for implementing Internet-based learning systems in the agricultural population of Virginia. This is expected to provide extension educators needed information about Internet use patterns of agricultural producers and their preferences related to Internet-based learning systems. It is hoped that the outcome and impact of the study will be new opportunities for streamlining educational processes and information delivery to a greater populace than currently served by traditional methods of Virginia Cooperative Extension.

#### *Overview of Procedures*

The study population was identified by the county Agricultural and Natural Resources (ANR) extension agents. Once identified, they were contacted by mail to introduce the study and alert them to the pending email which provided them with Internet links to the pre-survey, the breeze presentations and the post survey. The pre-survey served to gauge the producers' assessment of selected factors as barriers to Internet-based learning. Following the opportunity to participate in an Internet-based learning experience, the post-exposure survey measured the change in their assessment of the same factors as barriers. Five days and 14 days following the initial email, a post card and reminder email (with the same links), respectively were sent to encourage participation. Starting three weeks following the initial email, non-respondents were

contacted via telephone to further encourage completion of the survey or offer them the opportunity to complete the pre-exposure survey via telephone. Data collection was terminated 30 day following the initial email notification.

### *Population*

The population of this study consisted of Virginia agricultural producers currently known to be using the Internet as described by the county agricultural extension agents. The study population was identified by the individual county Agricultural and Natural Resources (ANR) extension agents listed in the Virginia Cooperative Extension electronic mailing list (Appendix A). Agents were asked via email (Appendix B) to identify farmers that produce listed agricultural commodities, regularly participate in extension programs, and use the Internet. The ANR agents were requested to provide the names, email addresses, street addresses, and phone numbers of producers meeting these criteria. These individuals were accessible via email, had the ability to access an online survey and had established a working relationship with the local agents. Fifty-one agents responded to the request representing sixty-eight of Virginia's ninety-five counties. The population for this study (N = 370) comprised the entire list of known producers as identified by the participating agents.

### *Instrumentation*

The World Wide Web has gained acceptance as a valuable research tool for conducting surveys because of the reduced costs associated with the medium, the capacity for rapid access by a large, dispersed population and the ability to conduct

research in a timely manner (Deutskens, Ruyter, WetZels, & Oosterveld, 2004; Dillman, 2000; Ilieva, Baron, & Healey, 2002; Ladner, Wingenbach, & Raven, 2002; Leung, 1998; Mertler, 2003; O'Neill, 2004; Solomon, 2001). The survey was conducted online via an interactive, encrypted Web site, <https://www.survey.vt.edu/>. The participants in the study were provided access to the survey and issued a survey code in the initial email. The code was only utilized to discriminate between respondents and non-respondents (Gregg & Irani, 2004; O'Neill, 2004) and to provide a means of determining if there were any measurable changes in the population once the treatment was administered. Non-respondents were followed up with an additional email and subsequent phone calls (Dillman, 2000; Illieva, Baron, & Healey, 2002). My email address, phone number, and cell phone number were made available on all correspondence in the event there were questions or problems. Participants were also encouraged to contact their local ANR agent if they had questions.

Pre-exposure survey: The pre-exposure survey (Appendix C) was used to collect demographic data and establish a baseline of what extent producers perceive selected factors as barriers to Internet-based learning systems. Sections one through three, of the pre-exposure survey, were based on the National Agricultural Statistics Service (NASS) 2005 June Agricultural Survey. Section four was patterned after the "Student/Learner Factors/Barriers" portion of Zirkle's (2003) study on access factors and barriers to offering distance education courses and programs. Zirkle's (2003) work is further based on distance education barrier studies by Garland (1993), Galusha (1998), Hillesheim (1998), Yap (1996), and Zirkle (2002).



The first section, questions one through five of the pre-exposure survey, was comprised of demographic questions regarding age, race, gender, primary occupation, and education level of the respondent. In the second section, questions six through eight sought to gather economic and production data related to the producers' operation. In section three, questions nine through 12 utilized a five point Likert scale (1 = not important, 2 = minor importance, 3 = moderate importance, 4 = major importance, and 5 = extremely important) to establish the respondent's perspective of the importance of the following factors to the agricultural business: 1) rapid access to information, 2) the Internet, 3) computers, and 4) Internet-based distance learning. Additional questions (13–21) in section three were used to determine the respondents' current Internet use patterns, accessibility, Internet use frequency, their participation in an Internet-based learning activity, who in the farming operation most frequently uses the Internet, who are the users of the Internet in the farming operation and what percentage of the agricultural business records are kept on the computer. Section four, questions twenty-two through thirty-two, was used to determine to what extent producers perceive selected factors as barriers to Internet-based learning systems.

Post-exposure survey: The first section, question number one, of the post-exposure survey (Appendix D) determined which presentation the participant viewed or attempted to view, the portion viewed and the respondents actual/perceived reasons for viewing "a portion" or "none" of the presentation. Section two, questions two through five, utilized a five point Likert scale (1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, and 5 = strongly disagree) to gauge the respondent's degree of preference for Internet-based learning opportunities, their participation in future Internet-based learning

opportunities, the effectiveness of this delivery method for the dissemination of educational and production information, and their preference for Internet-based learning verses conventional Extension production programs. Section three, questions six through 16 was the same as section four in the pre-exposure survey. This section was used to determine to what extent the producers' mind-set changed about the selected factors as barriers following an exposure to an Internet-based learning activity.

The final section, questions 17 through 20, of the post-survey utilized a series of qualitative questions that allowed the respondents to elaborate in the following areas: a) what factors would encourage you to participate in future Internet-based learning activities, b) what do you consider to be the greatest benefits to Internet-based learning activities, c) what do you consider to be the greatest barriers to learning activities, and d) do you have any additional comments or suggestions?

The surveys and presentations were field-tested by producers from Prince George and Isle of Wight counties (N = 26). The same procedures as utilized for the test population were followed for the field testing. Seventeen of the 26 producers responded which resulted in a response rate of 65%. Pilot testing was necessary to obtain feedback concerning the clarity of the surveys and procedures and to add content validity to the instruments.

#### *Reliability of the instrument*

Four methods are most commonly used to estimate the reliability of an instrument: test-retest, equivalent forms, internal consistency, and scorer agreement (Ary, Jacobs, & Razavieh, 1972). The first three of the mentioned methods use correlation

procedures to determine the reliability of the instrument and the last is based on the consistency of rating a performance or product among different judges who are testing the performance of the product. For the instrument used in this study, reliability was determined using an internal-consistency method. Cronbach's Alpha was utilized to determine inter-item reliability since the instruments used contained multiple choices within a five-point Likert scale. Using the field test data, Cronbach's Alpha was calculated at .91.

#### *Validity of the instrument*

According to DSS Research (2004), a measure is valid when the differences in observed scores reflect the true differences in the characteristics one is attempting to measure and nothing else. Sections one through three of the pre-exposure survey were based on the National Agricultural Statistics Service (NASS) 2005 June Agricultural Survey. Section four was patterned after the "Student/Learner Factors/Barriers" portion of Zirkle's (2003) work. The focus of the study was on access factors and barriers to offering distance education courses and programs. Zirkle's (2003) work was patterned after distance education barrier studies by Garland (1993), Galusha (1998), Hillesheim (1998), Yap (1996), and Zirkle (2002).

The research instruments were examined for face validity by a panel of experts. Three faculty members at Virginia Polytechnic Institute and State University with teaching expertise and research interests in distance education comprised the panel that reviewed the survey questionnaires. Minor changes were suggested regarding the wording and were incorporated into the survey instruments.

### *Data collection*

The research data collection process is very important (Dillman, 2000). A letter (Appendix E) was drafted to introduce the study, its research questions, and anticipated outcomes. It also outlined how the participants were selected, and for them to contact their local ANR Extension agent if they have any questions regarding the authenticity of or questions related to the survey. The letter also informed them that they would be receiving an email (Appendix F) with the links to the pre-exposure survey, the presentations, and the post-exposure survey and that they would be receiving a copy of the results at the conclusion of the project. The letter described the steps to complete the surveys, an estimated time for completion and emphasized that only pooled data will be utilized to maintain confidentiality.

Participants were given a choice of four topics/presentations (forages, soybeans, corn and small grains, and vegetables) of similar size (18,361.9 Kb, 21,511.3 Kb, 22,409.9 Kb, and 26,115.5 Kb) and duration (10.32 minutes, 11.19 minutes, 12.33 minutes, and 10.44 minutes respectively) to view. The presentations spanned a variety of subjects representing all of the major production areas of the state of Virginia. The presentations were posted on the breeze server <http://www.breeze.ag.vt.edu/> and were adapted from AEE 5984 – *Survey of Agricultural Practices and Issues* lectures taught the Spring semester of 2006 at Virginia Tech. The course was offered in a distance format and consisted of subject matter from various agricultural disciplines including animal science, aquaculture, environmental sciences, entomology, economics, food science, crop science, cotton production, peanut production, horticulture, and plant pathology. Since

the four edited presentations were of similar size and duration and the participants were given a choice of presentation topics, factors related to preference and accessibility were minimized. Participants were also offered the opportunity to view the entire unedited presentations upon completion of the research project. Through email correspondence, they indicated their desire to do so and were provided links to unedited presentations. No data were collected on these requests.

On 28 September 2006, an email (Appendix F) was sent to all the participants reviewing the study questions and anticipated outcomes and a step by step procedure for completing the process. To persuade the participants to check their email, a postcard (Appendix G) was sent on 3 October 2006 to encourage their participation and provide them with the option of contacting their local agricultural agent or myself if they had questions related to the survey. Two weeks after the initial email, a follow-up email (Appendix H) was sent to non-respondents encouraging them to complete the survey. Starting three weeks following the initial email, non-respondents were contacted via telephone to further encourage completion of the survey or offer them the opportunity to complete the pre-exposure survey via telephone. Survey and follow-up procedures were in accordance with those outlined by Dillman (2000).

To control non-response error, late respondents were compared to early respondents to determine if significant differences existed in the data and if no differences exist then the results can be merged (Miller & Smith, 1983). The dependent variables for the early and late respondents were compared using ANOVA. No significant differences were observed ( $p = 0.05$ ); therefore, the data were combined.

The researcher completed Training in Human Subjects Protection on the following topics: Historical Basis for Regulating Human Subjects Research, The Belmont Report, and Federal and Virginia Tech Regulatory Entities, Policies and Procedures on May 22, 2006. A Certificate of Completion (Appendix J) was awarded on the same date. Permission was granted from the Virginia Tech Research Compliance Office to conduct this study (Appendix I).

### *Procedures*

Data were analyzed in three ways:

1. Demographic data were summarized according to age, race, gender, primary occupation, education, and gross operation income.
2. Responses to the Likert style questions were input into the statistical package SAS and analyzed through basic descriptive measures and relationships between the variables.
3. Responses to the open ended questions were summarized qualitatively and examined for themes, specific data and other information.

Question 1: What are the important demographics of agricultural producers who utilize or could utilize the Internet to access agricultural information in Virginia?

Procedures: Selected demographics for the agricultural producers were age, race, gender, primary occupation, level of education, and total gross value of agricultural sales. Data for this question were presented using summary statistics such as means, ranges and percentages.

Question 2: To what extent the selected demographic factors of agricultural producers related to their Internet access of agricultural information in Virginia?

Procedures: Comparative statistics (ANOVA) were used to determine if there were significant interactions between independent variables and the mean of the self-rated dependent variables both pre and post-exposure to an Internet-based learning experience.

Question 3: What are the Internet use patterns of Virginia agricultural producers?

Procedures: Means and percentages were used to characterize their self-reported Internet use patterns.

Question 4: What is the level of importance of computer and the Internet to the producers' agricultural operation?

Procedure: Borg and Gall (1983) stated that Likert scales are the most common type of scale used to measure the opinion of respondents. A five-point scale was utilized using this scale 1 = not important, 2 = minor importance, 3 = moderate importance, 4 = major importance, and 5 = extremely important. The data were described using summary statistics such as means and rankings.

Question 5: To what extent do producers perceive selected factors as barriers to Internet-based learning systems?

Procedure: A five-point Likert scale was also used to measure the respondent's perception of the selected factors as barriers to Internet-based learning systems. The scale used was 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, and 5 = extreme barrier. Means were computed to determine the respondent's

perception of the factors as barriers before exposure to an Internet-based learning experience.

Question 6: To what extent do selected factors encourage or discourage producer participation in Internet-based learning systems?

Procedures: A five-point Likert scale for measurement of the respondent's perception of the same selected factors as barriers to Internet-based learning systems was utilized in this question as in question 5. Means were computed and compared to the pre-exposure data (Question 5) to determine if there was a measurable change in their responses following the exposure to the Internet-based learning experience.

Qualitative Response: A series of qualitative questions were utilized to explain factors that may have been beyond the reach of the survey questions and to add support to the quantitative data. The following questions/requests were posed to the participants:

1. What would encourage you to participate in future Internet-based learning activities?
2. What do you consider to be the greatest benefits to Internet-based learning activities?
3. What do you consider to be the greatest barriers to Internet-based learning activities?
4. If you have other comments and suggestions please enter them in the space provided.

The qualitative responses were summarized and categorized into like themes. In many cases the respondents incorporated multiple themes into each response; therefore the total number of theme responses exceeds the total number of responses.



### *Summary*

The population of this study was identified by the individual county Agricultural and Natural Resources (ANR) Extension agents and consisted of the agricultural population of Virginia currently known to be using the Internet. A series of open and closed-ended questions were utilized to gather demographic data, determine the relationship between the demographic factors and the producers' access to Internet-based agricultural information, their use patterns, and importance of the computer and Internet to the agricultural operation. Finally, a series of Likert scale questions were used to determine the perceived and actual barriers to Internet-based learning as perceived by the producers. Responses were organized using summary and comparative statistics. The findings of this study are expected to enhance the development of *e-Xtension* (2005) technologies, expand the agricultural audience of participants, and improve the efficiency of extension outreach from Land-grant Universities.

## Chapter 4

### Results

#### *Study Design*

This chapter presents a detailed review and analysis of the data collected during this study. The purpose was to identify the barriers that agricultural producers encounter when using the Internet to access agricultural information.

Response rate: Out of a total of 370 producers identified by the agents, 186 usable responses were collected for the pre-exposure survey generating a response rate of 50%. For the post-exposure survey, 160 usable responses were collected resulting in a response rate of 43%. The producers in the study population represented 68 of Virginia's 95 counties.

#### *Statistical analysis*

Question 1: What are the important demographics of the agricultural producers who utilize or could utilize the Internet to access agricultural information in Virginia? Table 2 and Figures 1 and 2 present the demographics of the responding agricultural producers who utilize or could utilize the Internet to access agricultural information in Virginia. The mean age of the respondents was 51.54 (SD = 10.61) years of age ranging from 25 to 82 years. The respondents were almost exclusively white (98.36%) and predominately male (82.87%) versus female (17.13%). The primary occupation of those responding was farm/ranch work (41.71%), as expected, but was closely followed by other at 36.57%. For example, respondents in the other category listed their occupation as account managers, business owners, educators, brokers, farm supply sales, and

veterinarians among others. Retired/still farming or ranching was a distance third at 18.86% with only a small percentage of the respondents listing their primary occupation as hired managers (2.86%). The predominant levels of education (Figure 1) were college degree, masters degree, and some college at 36.96%, 16.85%, and 16.85%, respectively. The next most reported education category was high school encompassing 12.50% of the responses.

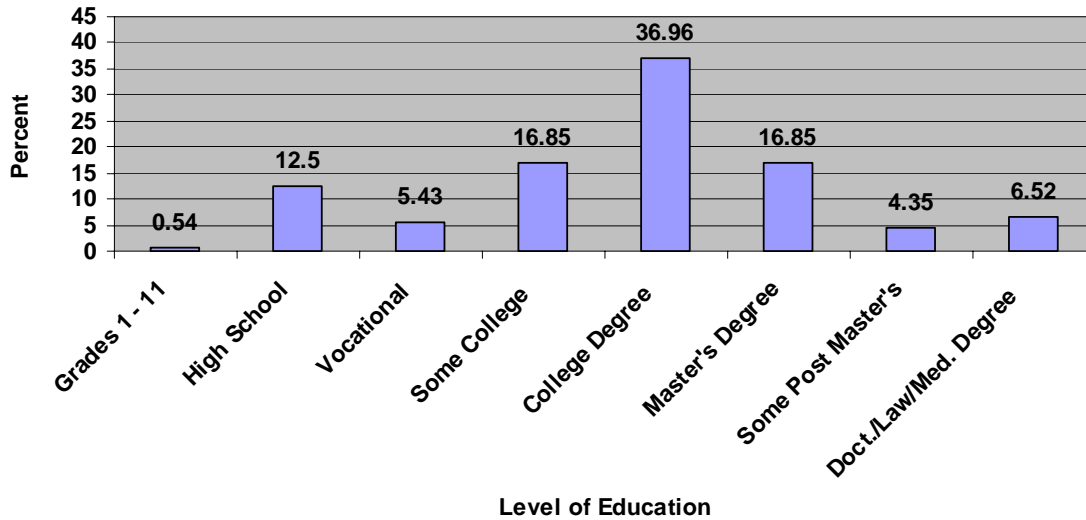
The most commonly reported levels in gross value of agricultural sales (Figure 2) was \$100,000 - \$249,999 (14.84%), followed by \$25,000 - \$49,999 (12.09%) and \$10,000 - \$24,999 (11.54%). Thirteen operations reported sales and government payments in the \$500,000 - \$999,999 (7.14%) and \$1,000,000 and over categories (7.14%). A slightly higher number, 14 reported sales in the \$2,500 – \$4,999 (7.69%) and \$5,000 - \$9,999 (7.69%) categories.

Table 2

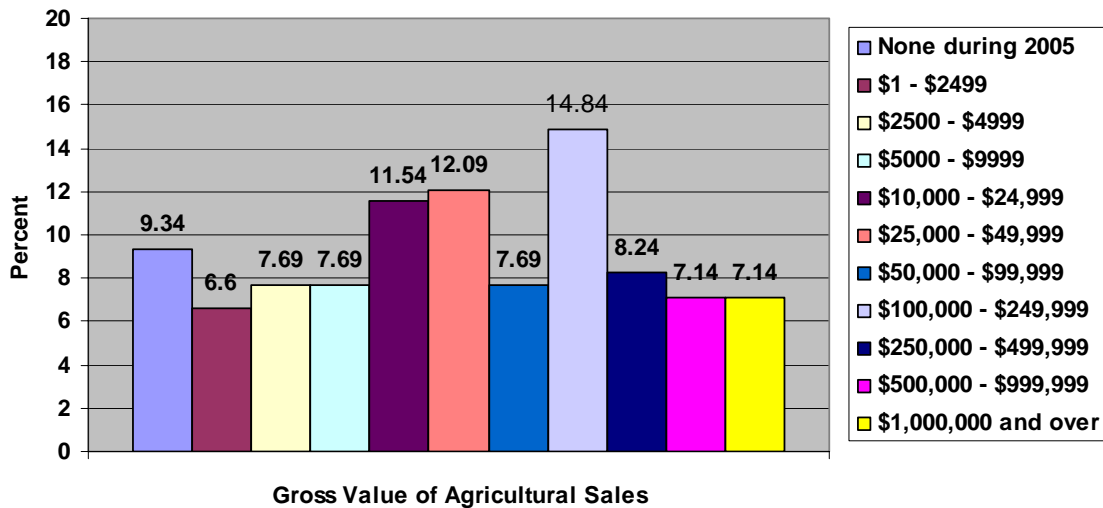
*Demographics of Agricultural Producers That Utilize the Internet to Access Agricultural Information in Virginia*

Demographics	N	%
Race (N = 183)		
White	180	98.36
Black/African American	2	1.09
American Indian/Alaska Native	1	.55
Gender (N = 181)		
Male	150	82.87
Female	31	17.13
Primary Occupation (N = 175)		
Farm/Ranch Work	73	41.71
Other	64	36.57
Retired/Still Farming or Ranching	33	18.86
Hired Manager	5	2.86

**Figure 1. Level of Education of Agricultural Producers that Utilize the Internet to Access Agricultural Information in Virginia (N = 184)**



**Figure 2. Gross Value of Agricultural Sales of Agricultural Producers Who Utilize the Internet to Access Agricultural Information in Virginia (N = 182)**



Question 2: To what extent are selected demographic factors of agricultural producers related to their Internet access of agricultural information in Virginia? The independent variables presented in the tables for this question are coded as follows:

- Expertise = Level of computer expertise
- Technology = Availability of technology
- Cost = Cost of technology
- Experience = Lack of experience/training
- Support = Support services
- Access = Access to instructors/specialists
- Time = Time constraints associated with job responsibilities
- Isolation = Isolation from other program participants
- Distance = Ability to learn at a distance
- Feedback = Feedback and instructor contact
- Motivation = Motivation to participate

Table 3 and Figure 3 identify the relationship between the producers' age and the study's independent variables. No significant differences were observed in any of the variables except for the producers' lack of experience/training. The respondents in the age category <30 rated the lack of experience/training as less of a barrier to their participation in an Internet-based learning activity than any of the other age groups.

**Figure 3. The Relationship of Agricultural Producers' Age to their Internet Access of Agricultural Information (N = 186)**

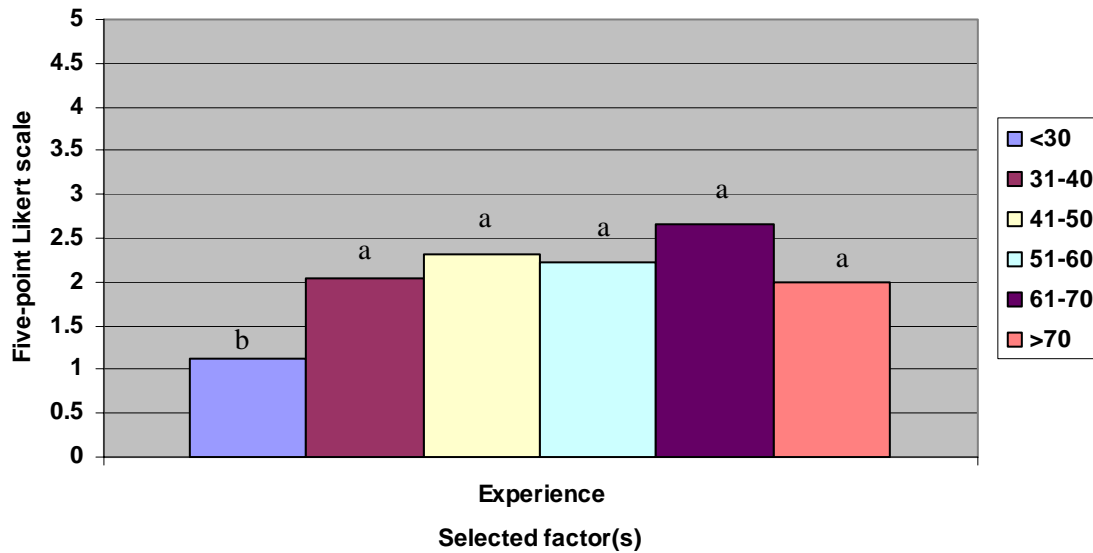
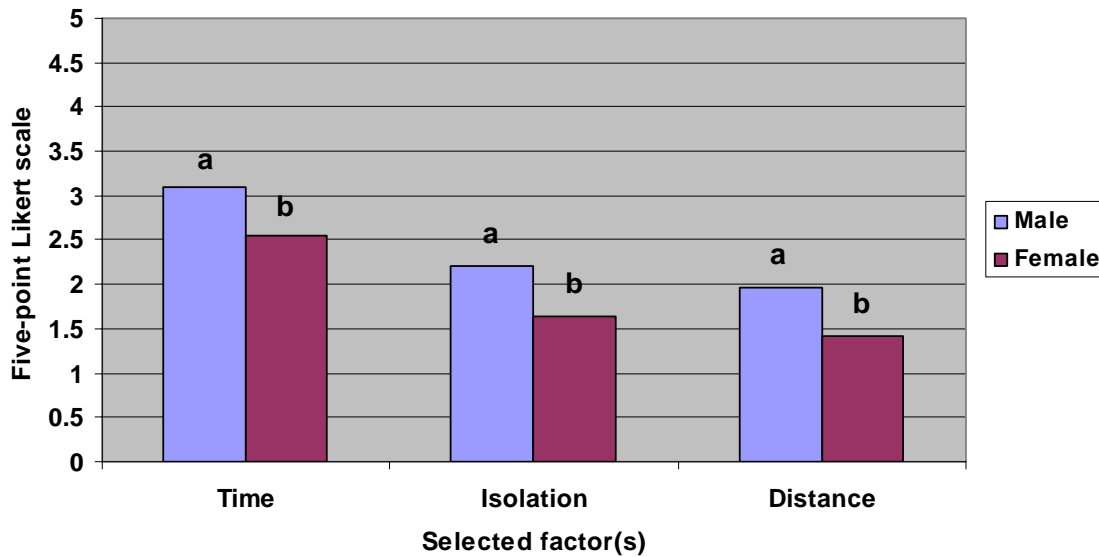


Table 4 and Figure 4 summarize the relationship of agricultural producers' gender to their Internet access of agricultural information. Differences were observed as it related to time constraints associated with job responsibilities, isolation from other participants, and the ability to learn at a distance. In all three cases, females rated the respective factors as less of a barrier (2.55, 1.64, and 1.42) than the males (3.10, 2.21, and 1.96). Both the male and female responses for time were perceived as moderate barriers, while the other variables were perceived as minor barriers except for the female's response for the ability to learn at a distance. That variable was viewed as not a barrier.

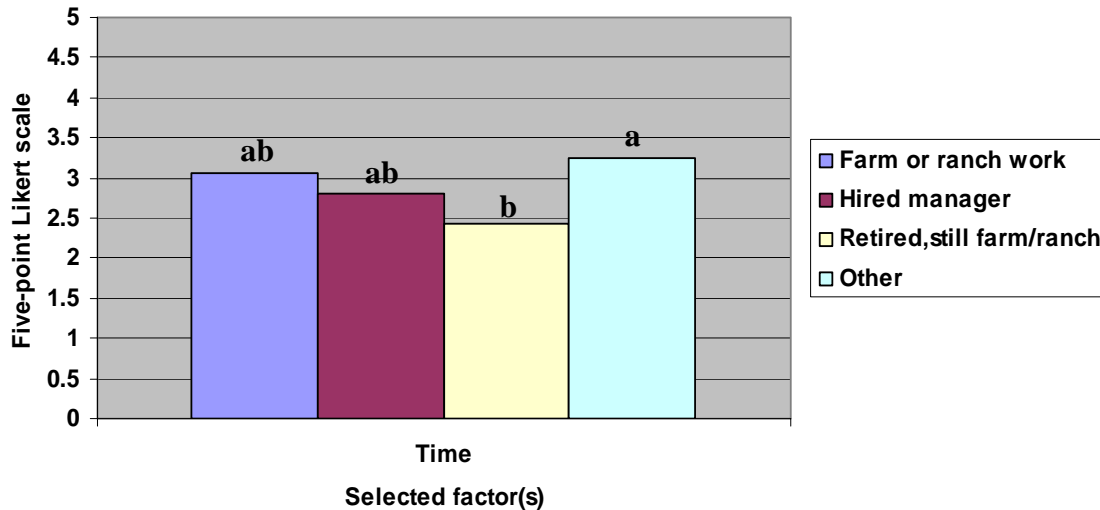
**Figure 4. The Relationship of Agricultural Producers' Gender to their Internet Access of Agricultural Information (N = 186)**



In Table 5, The Relationship of Agricultural Producers' Primary Occupation to their Internet Access of Agricultural Information, and Figure 5 only time constraints associated with job responsibilities differed related to the occupation of the respondent. Those in the other category rated time constraints as 3.25 which was significantly higher than the retired and still farming or ranching unit at 2.42. No differences were noted between those actively farming/ranching and hired manager categories and the previously mention primary occupation categories.



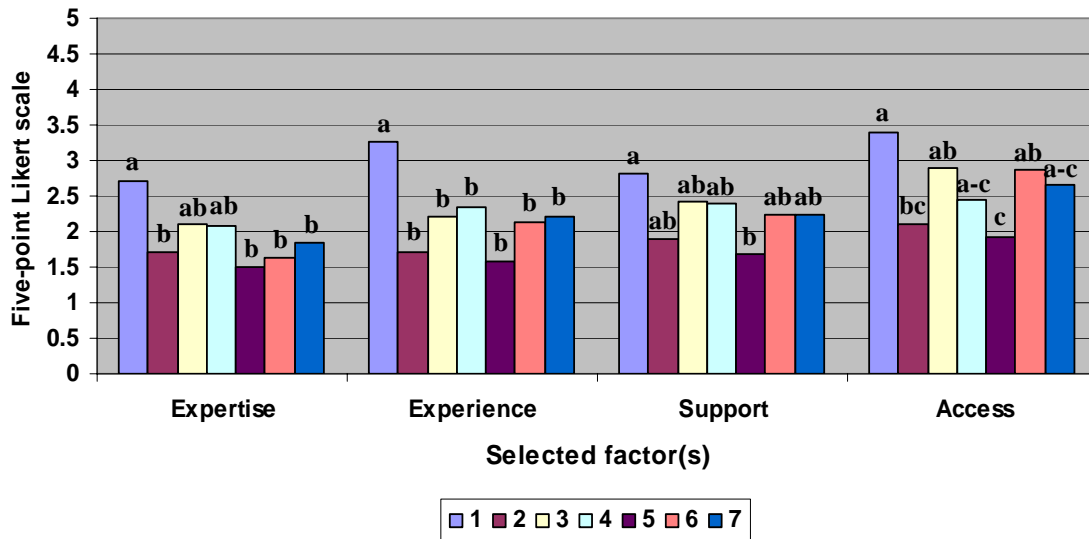
**Figure 5. The Relationship of Agricultural Producers' Primary Occupation to their Internet Access of Agricultural Information (N = 186)**



Significant differences were observed in the producers' responses as they related to their level of education (Table 6, Figures 6 and 7). The level of computer expertise, lack of experience/training, support services, access to instructors/specialists, time constraints associated with job responsibilities, isolation from other program participants, and the ability to learn at a distance all varied with the producers' level of education. Producers with a high school education rated their level of computer expertise as more of a barrier (2.70) than those with vocational training beyond high school (1.70), a masters degree (1.50), some post masters graduate school (1.62), and those with a doctorate, medical or law degree (1.83). Their lack of experience was also an aspect that those with a high school education rated higher (3.26). Their responses were higher than all of the remaining groups. Respondents with a high school education saw support services (2.81) as a greater barrier than those with a masters degree (1.69). Access to instructors/specialists was perceived by those with a high school education as a greater

barrier (3.39) than producers with vocational training beyond high school (2.10) or a masters degree (1.91).

**Figure 6. The Relationship of the Producers' Level of Education to their Internet Access of Agricultural Information (N = 184)**



Time was seen as a greater barrier by those with a high school education (3.39) and those with some college (3.20) when compared to producers with vocational training beyond high school and those with some post masters graduate school. Isolation from other program participants was seen as less of a barrier by the individuals with vocational training beyond high school (1.60), a masters degree (1.58) or those individuals with some post masters graduate school than those with a high school education (2.74). Finally, the ability to learn at a distance was perceived to be a greater barrier by those with a high school education (2.65) than by all other groups except for those with some college (2.06).

**Figure 7. The Relationship of Agricultural Producers' Level of Education to their Access of Agricultural Information (N = 186)**

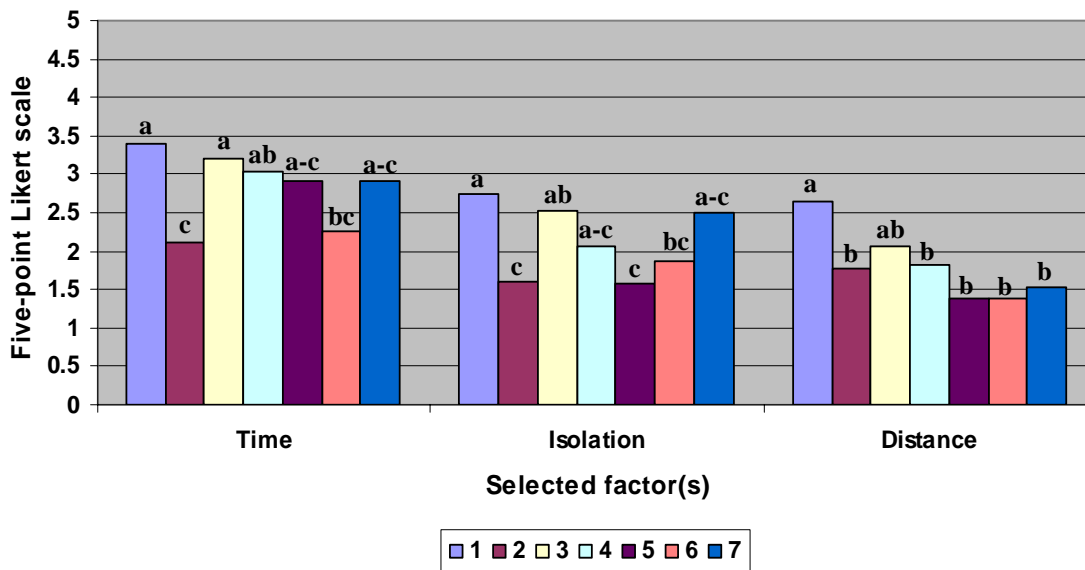


Table 7 and Figure 8 display the relationships between producers' assessment of the perceived barriers associated with Internet-based learning and the gross value of agricultural sales and government payments. All factors were not significant except for the multilevel differences observed in the responses related to time constraints associated with job responsibilities and isolation from other program participants. Producers in operations with gross sales in the \$500,000 - \$999,999 range perceived time constraints associated with job responsibilities (3.54) as a greater barrier than those in the following gross sales ranges: \$2,500 – 4,999 (2.36), \$5,000 - \$9,999 (2.57), and those with no sales during 2005 (2.53). Producers in the \$500,000 - \$999,999 category also perceived isolation from other program participants as a greater barrier than those in all of the other

income categories except for those in the \$100,000 - \$249,999 and \$250,000 - \$499,999.

**Figure 8. The Relationship of Agricultural Producers' Gross Agricultural Sales to their Internet Access of Agricultural Information (N = 186)**

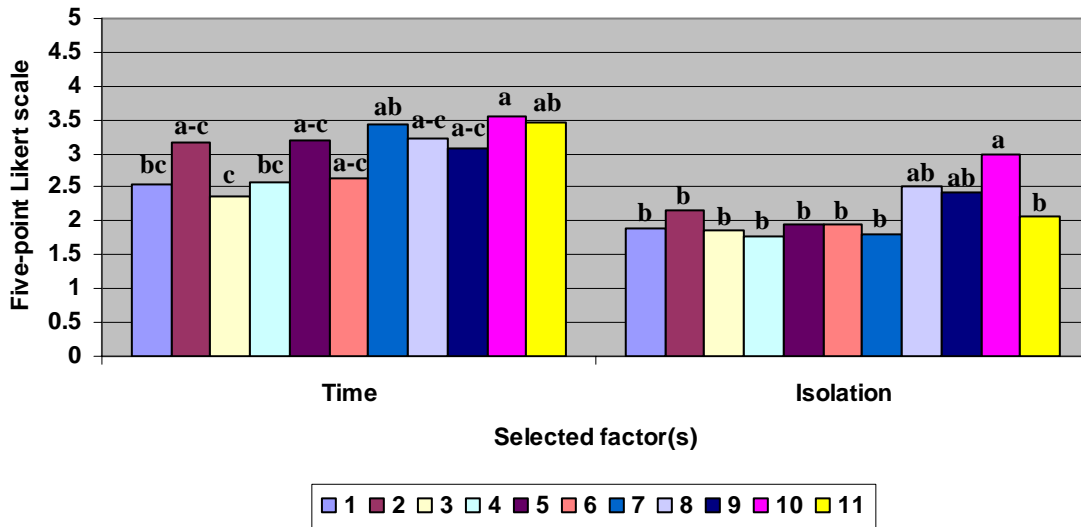


Table 8 and Figure 9 illustrate how the perceived barrier responses related to the producers use of the Internet to make agricultural purchases. Producers who use the Internet to make agricultural purchases rated the motivation to participate in Internet-based learning as less of an obstacle (2.29) than those who did not make agricultural purchases via the Internet (2.76). Producers using the Internet to make agricultural purchases perceived motivation to participate as a minor barrier verses a moderate barrier for those not making Internet agricultural purchases. No other differences were noted in any of the other variables related to agricultural Internet purchases. As presented in Table 9, no differences were observed in the measured variables as they pertained to the producers' use of the Internet to conduct non-agricultural business.

**Figure 9. The Relationship between a Producers' Agricultural Internet Purchases and their Internet Access of Agricultural Information (N = 186)**

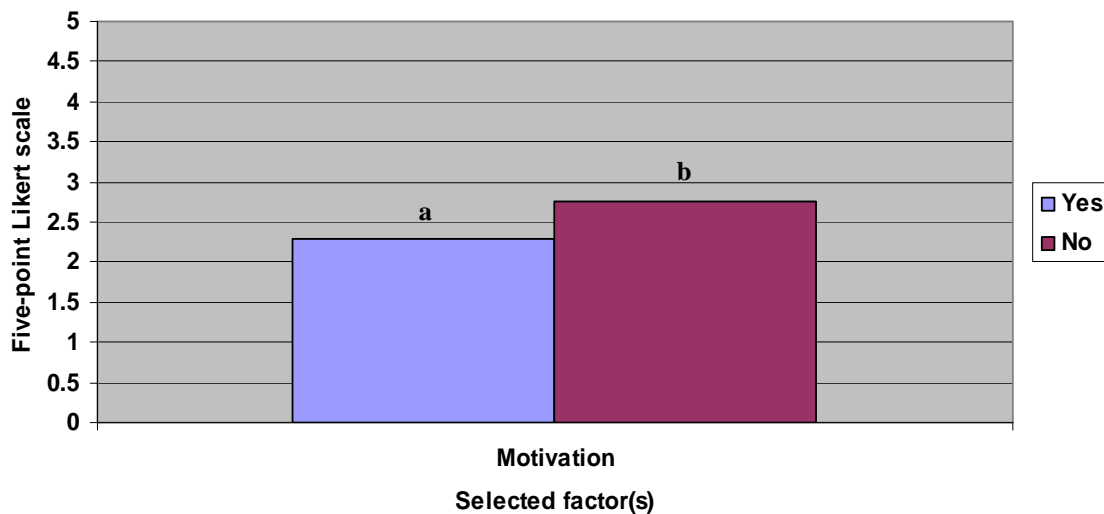
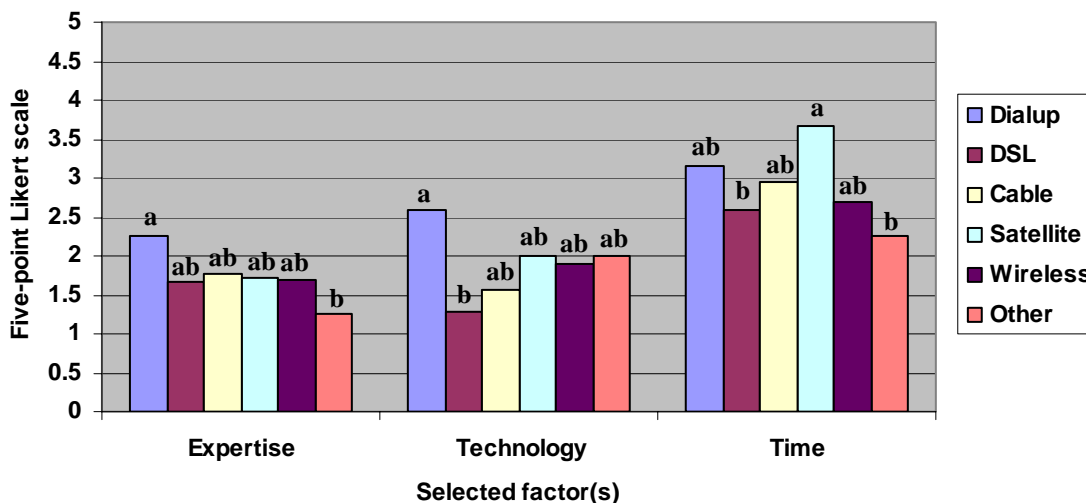


Table 10 and Figure 10 depict the perceived barriers as they relate the producers' method of Internet access. Producers with dialup ranked their level of computer expertise as a greater barrier (2.26) than those that reported their Internet access as other (1.25). Respondents with dialup also perceived the availability of technology (2.58) as a greater barrier than those with DSL (1.29). Finally, individuals with satellite access rated time constraints associated with job responsibilities as a larger barrier (3.67) than those with other listed as the method of Internet access (2.25).

**Figure 10. The Relationship of Agricultural Producers' Method of Internet Access to Their Internet Access of Agricultural Information (N = 186)**



The producers' frequency of Internet access generated several significant interactions when compared to their perceived barriers. Table 11 and Figure 11 depict these responses. Producers that access the Internet once a month or less reported their level of computer expertise (3.50), lack of experience (4.00), time constraints associated with job responsibilities (4.50) and isolation from other program participants (3.12) as moderate to major barriers. Their responses were significantly different from the other two frequencies of access categories for these variables. Those with daily use frequencies and those that access the Internet once a week did not differ significantly from each other in the aforementioned categories. Those accessing the Internet daily or once a week perceived their expertise (1.90, 2.03), lack of experience (2.11, 2.36), time constraints associated with job responsibilities (2.92, 2.97) and their isolation from other

program participants (2.08, 2.11) respectively as minor to moderate barriers.

**Figure 11. The Relationship of Agricultural Producers' Frequency of Internet Use to their Internet Access of Agricultural Information (N = 186)**

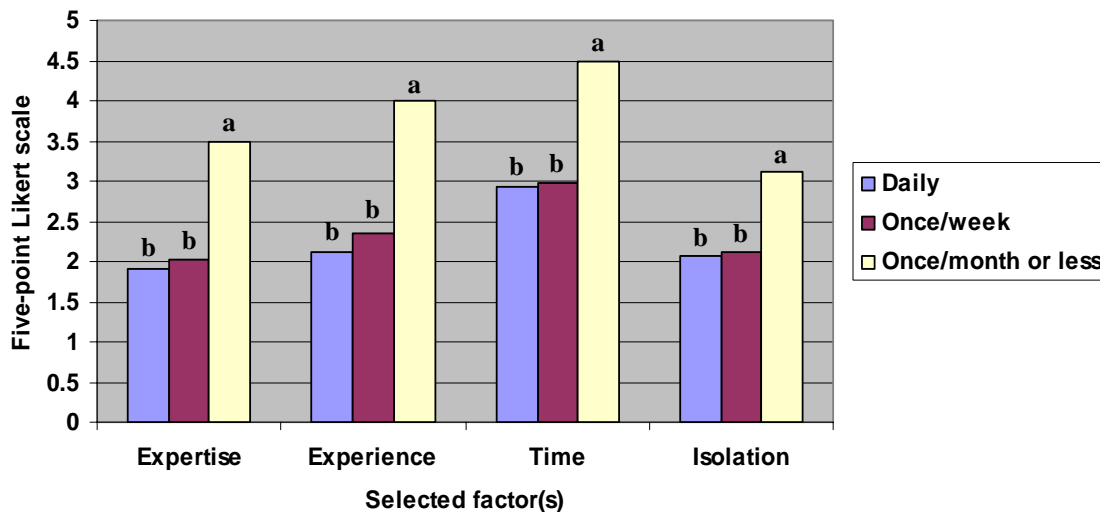


Table 12 and Figure 12 show the relationship of agricultural producers' previous participation in Internet-based learning to their perceived barriers. The only variable to be significantly impacted by the producers' previous participation in Internet-based learning was their perceived ability to learn at a distance. Those with previous experience rated the ability to learn at a distance as less of a barrier (1.62) than those with no previous experience (1.94).

**Figure 12. The Relationship of Agricultural Producers' Previous Participation in Internet-based Learning to their Internet Access of Agricultural Information (N = 186)**

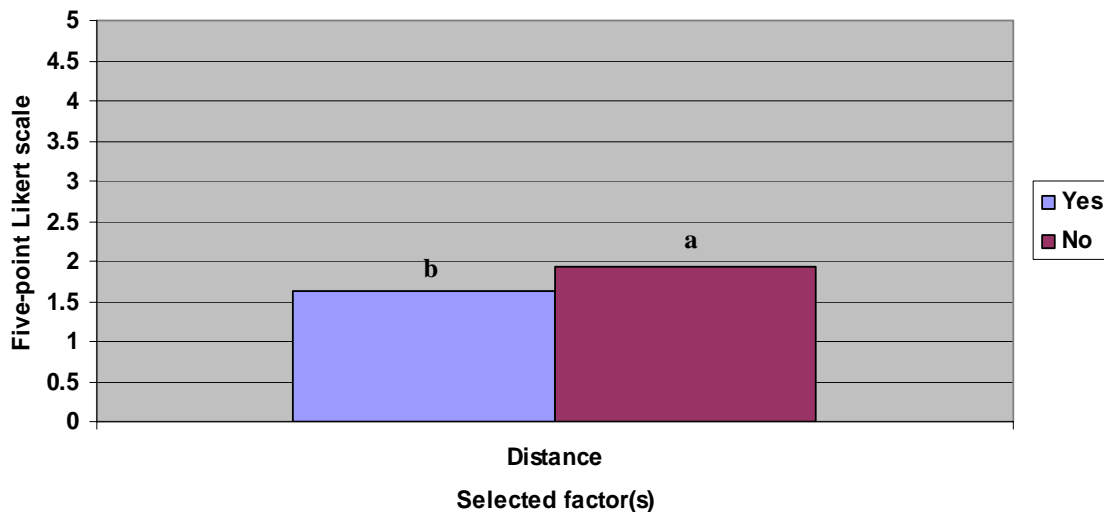


Table 13 and Figure 13 explain the relationship between the most frequent users of the Internet in the farming operation and the perceived barriers to the access of agricultural information via the Internet. Producers that listed their children as the most frequent users of the Internet in the farming operation were more likely to perceive isolation from other program participants as a barrier than the other groups. All other variables in Table 13 were not significant.



**Figure 13. The Relationship of the Most Frequent Users of the Internet in the Agricultural Operation to their Internet Access of Agricultural Information (N = 186)**

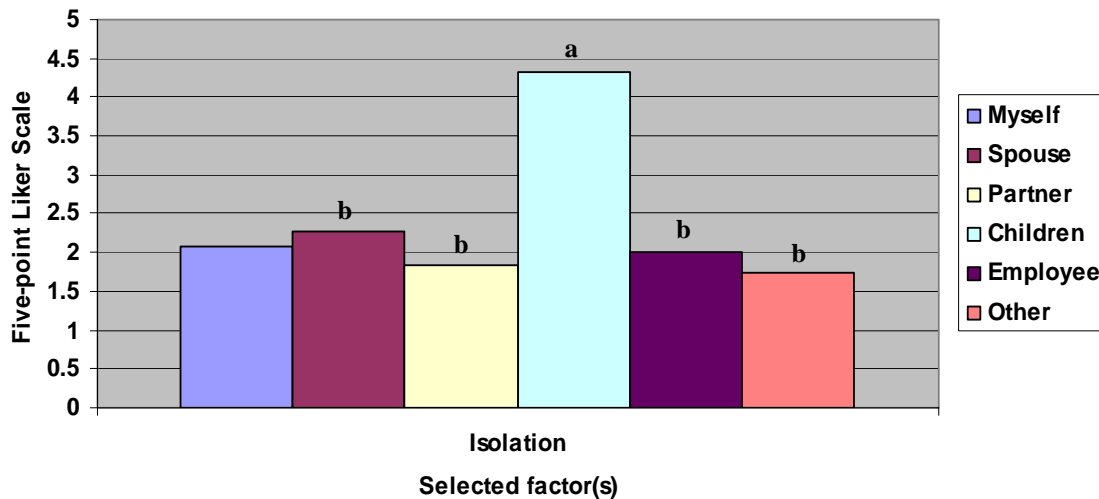


Table 14 illustrates the relationship between the percentage of agricultural business records kept on the computer and barriers to the access of agricultural information via the Internet. One would have expected differences related to technology and computers such as their level of computer expertise, the availability of technology, and the lack of experience/training to be present but, no noteworthy differences existed in the data.

Tables 15-21 and Figures 14 – 16 present the results in the measured variables as they relate to selected demographics following an exposure to an Internet-based learning experience. In Tables 15 – 17 and 19, no significant differences existed in the variables as they relate to producer age, gender, primary occupation, and gross value of agricultural sales. Table 18 and Figure 14 depict the relationship between the barriers as measured after the exposure to an Internet-based learning system and the producers' level of education. In this case, producers with a high school education (2.80) rated their level of

computer expertise as more of a significant barrier than those with any other level of education. Producers with a high school degree also rated their lack of experience (2.93) as more of a barrier than all other levels of education. In that same category, those with vocational education beyond high school (2.12) saw experience as more of a factor than those with a masters degree (1.13). Support services were perceived as a greater barrier by those with a high school education than either those with a masters degree (1.26) or post masters graduate school (1.60). Producers with some college perceived support services as a greater problem than those with a masters degree (1.26).

**Figure 14. The Relationship of Agricultural Producers' Level of Education to their Internet Access of Agricultural Information Post-exposure (N = 154)**

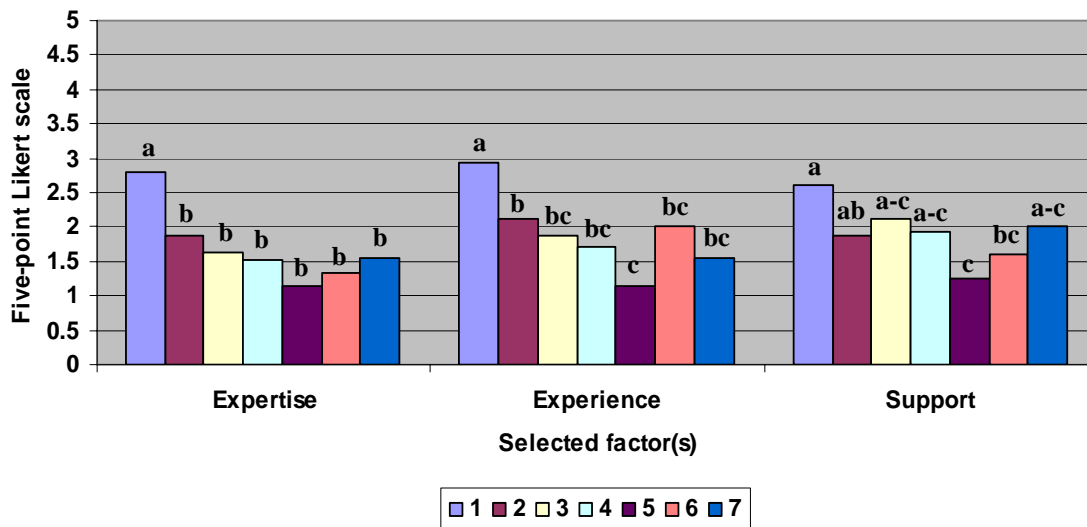


Table 20 and Figure 15 explain differences in the dependent variables as they relate to the presentation viewed. Significant differences existed for their level of computer expertise and their lack of experience factors. Producers that viewed the soybeans presentation rated their lack of experience (2.50) as more of a barrier than those that viewed either the forages (1.67) or vegetables (1.45) presentation. Level of computer

expertise was also rated as a greater barrier (2.42) by those that viewed the soybeans presentation compared to those viewing forages (1.49) or vegetables (1.32).

**Figure 15. The Relationship of Agricultural Producers' Presentation Selection to their Internet Access of Agricultural Information Post-exposure (N = 154)**

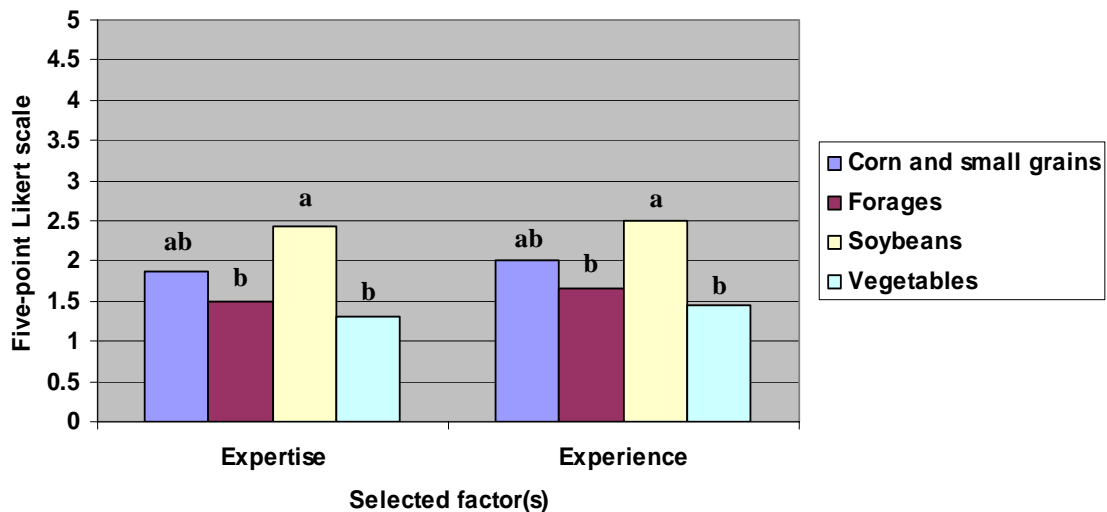
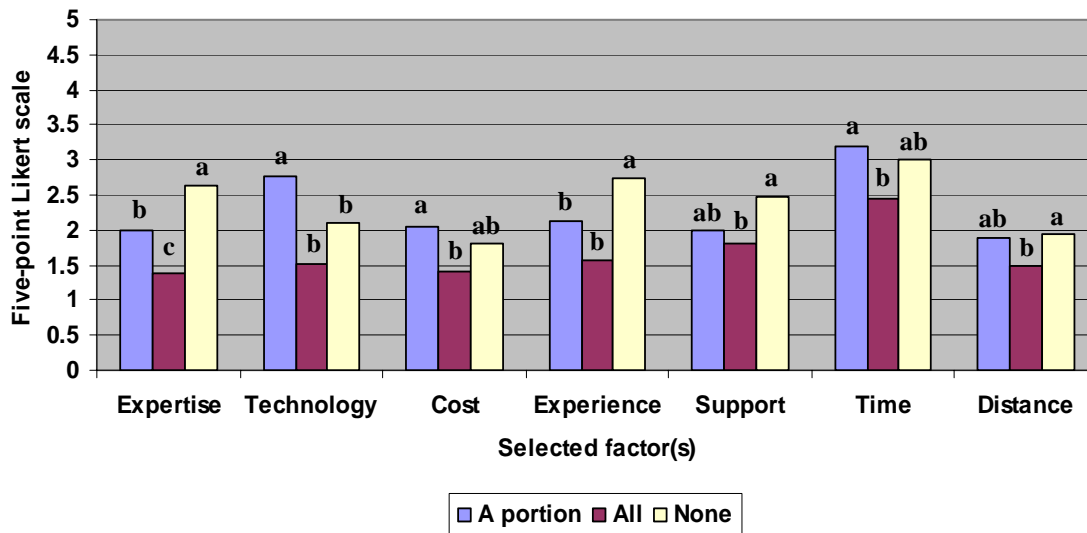


Table 21 and Figure 16 depict the producers' responses in relation to the portion of the presentation viewed. Producers that viewed all of the presentation rated barriers associated with their level of computer expertise as 1.37 which differed significantly from those that viewed a portion (2.00), which differed from those that viewed none (2.64). The availability of technology was rated as a greater barrier by those that viewed a portion (2.76) than either of the groups that viewed all (1.52) or none (2.09) of the presentation. Producers that viewed all of the presentation (1.42) saw the cost of technology as less of a barrier than those that viewed a portion (2.06). Neither of these groups differed from those that viewed none of the presentation (1.82).

As it relates to barriers associated with the producers' lack of experience, those that viewed none of the presentation saw it as a greater barrier (2.73) than either of the

groups that viewed all (1.56) or none (2.12). Support services were also perceived as a greater barrier by those that viewed none (2.48) of the presentation than those that viewed it all (1.80). Neither of these aforementioned groups differed from those that viewed a portion (2.00). Barriers associated with the ability to learn at a distance followed the same trends as the barriers related to support services. For those able to view none (1.95), it was a greater barrier than those able to view all (1.50), but neither group varied from those able to view a portion (1.88).

**Figure 16. The Relationship of the Portion of the Presentation Viewed by the Agricultural Producer to their Internet Access of Agricultural Information Post-exposure (N = 154)**



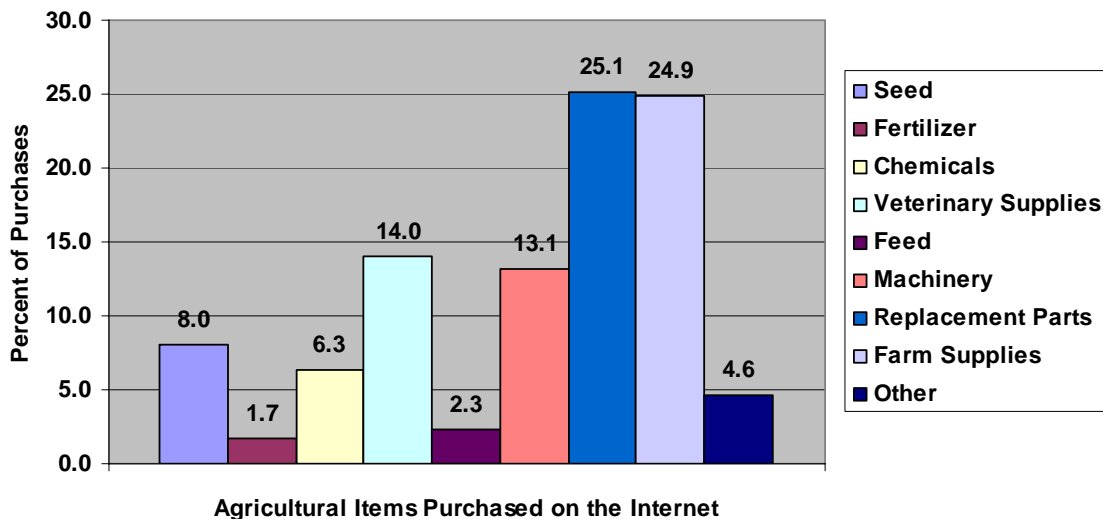
Time constraints associated with job responsibilities were rated as a greater barrier by those that viewed a portion of the presentation (3.18) than those that viewed all of it (2.46). The portion of the population that was able to view none of the presentation rated it as 3.00 which is numerically less than those able to view a portion and greater than those able to view all, but did not significantly differ from either of these groups.

Question 3: What are the use patterns of the producers using the Internet?

Table 22 presents the Internet use patterns of the Virginia producers that responded to the survey. A majority of them (74.7%) use the Internet to make agricultural purchases.

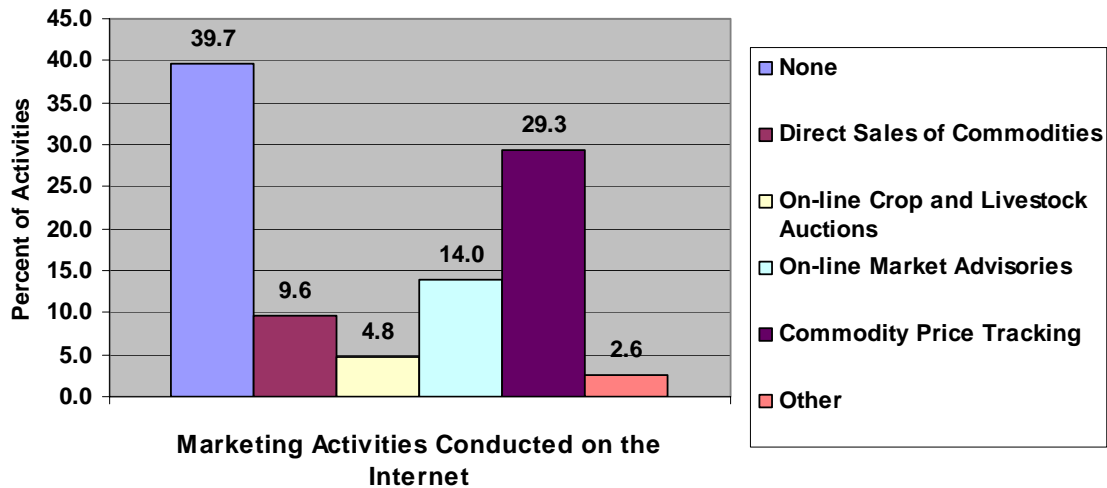
Figure 17 illustrates half of the purchases were accounted for by two categories: the acquisition replacement parts at 25.1% and the purchase of farm supplies at 24.9%. The next three most reported items purchased via the Internet were veterinary supplies (14.0%), machinery (13.1%) and seed (8.0%).

**Figure 17. Internet Purchases of Agricultural Producers Who Utilize the Internet to Access Agricultural Information in Virginia (N = 350)**



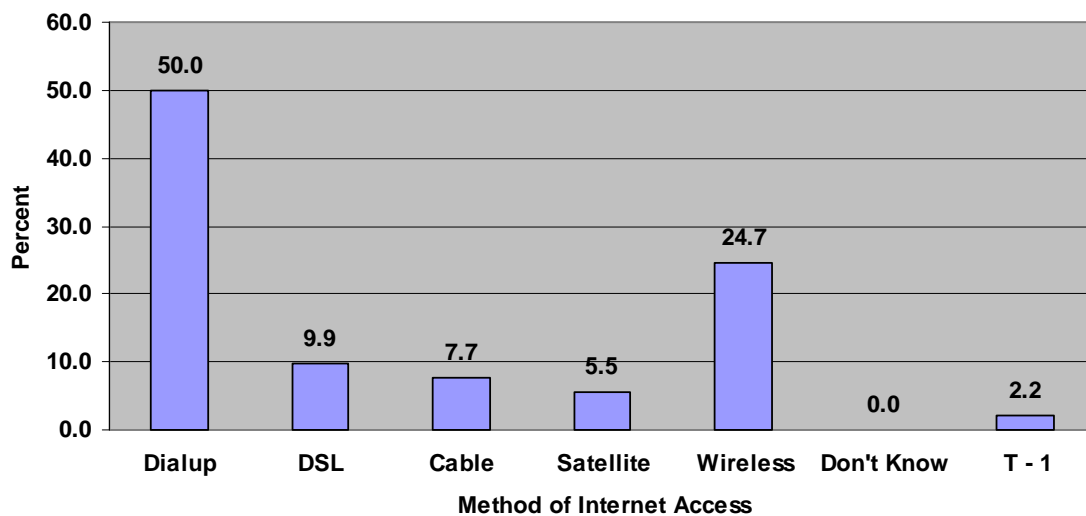
Agricultural marketing activities were conducted by approximately 60% of the respondents. Figure 18 depicts that the most common marketing activities related to commodity price tracking (29.3%), on-line market advisories at 14.0% and direct sales of commodities at 9.6%. In contrast to the 74.7% of producers that use the Internet to purchase agricultural supplies, only 43.2% use it to conduct non-agricultural business.

**Figure 18. Internet Marketing Activities of Agricultural Producers Who Utilize the Internet to Access Agricultural Information in Virginia (N = 229)**



The primary method of Internet (Figure 19) access was dialup (50.0%) followed distantly by wireless (24.7%), DSL (9.9%), and cable (7.7%). Satellite (5.5%) and T-1 lines (2.2%) for Internet access were smaller percentages.

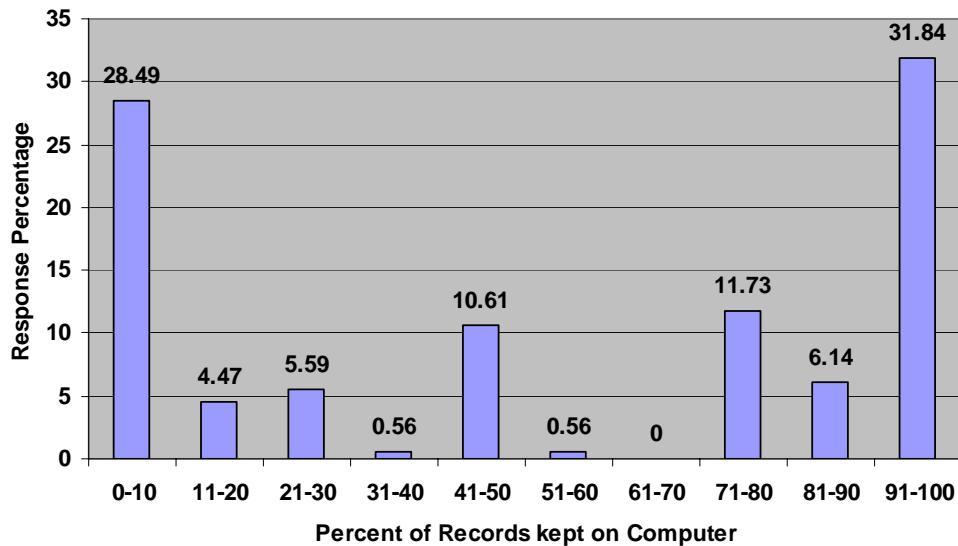
**Figure 19. Method of Internet Access of Agricultural Producers Who Utilize the Internet to Access Agricultural Information in Virginia (N = 182)**



A majority of producers (76.2%) use the Internet daily. The next most reported frequency of use was at least once a week at 19.5%. In total the responding producers (95.7%) reported Internet access at least once a week. The remaining frequencies combined represent less than 5% of the reporting population. Surprisingly, almost a third of the responding producers (31.6%) reported past participation in Internet-based learning activity. The most frequent users of the Internet in the farming operation were the respondents (myself) at 77.8%, followed by their spouses (16.1%), their partners in the operation (3.3%) and children (1.7%). When asked “who are the users of the Internet in the farming operation,” the most frequent responses were myself then spouse, children and partner at 48.4%, 27.0%, 12.2% and 5.3% respectively.

The producers were asked what percentage of their agricultural business records are kept on the computer. The responses ranged from 0.0% to 100.0%. The data were organized into 10% response groupings and presented in the last section of Table 22 and Figure 20. The two extreme categories, 0-10% and 91-100%, represented over 60% of the data collected in the study. The 91 to 100 grouping embodied 31.84% of the responses and the 0 to 10 represented 28.5%. The 71 to 80 category had 11.7% of the entries and the 41 to 50 group consisted of 10.6%.

**Figure 20. Records Kept on Computer of Agricultural Producers Who Utilize the Internet to Access Agricultural Information in Virginia (N = 179)**



The produces have a tendency to buy into the “all or none” mentality related to the percent of business records kept on the computer. If the scale was divided at the 50% mark and the percentage of the responses summed in each category there was nearly an equal total percentage in each range (i.e. 50.3% in the lower range and 49.7% in the upper range).



Table 22

*Use Patterns of Agricultural Producers Who Utilize the Internet to Access Agricultural Information in Virginia*

Use Pattern	N	%
Used the Internet to Make Agricultural Purchases (N = 182)		
Yes	136	74.7
No	46	25.3
Agricultural Items Purchased on the Internet (N = 350)		
Replacement parts	88	25.1
Farm supplies	87	24.9
Veterinary Supplies	49	14.0
Machinery	46	13.1
Seed	28	8.0
Chemicals	22	6.3
Other <sup>w</sup>	16	4.6
Feed	8	2.3
Fertilizer	6	1.7

Table 22 (continued)

*Use Patterns of Agricultural Producers Who Utilize the Internet to Access Agricultural Information in Virginia*

Use Pattern	N	%
Agricultural Marketing Activities Conducted on the Internet (N = 229)		
None	91	39.7
Commodity price tracking	67	29.3
On-line market advisories	32	14.0
Direct sales of commodities	22	9.6
On-line crop and livestock auctions	11	4.8
Other <sup>x</sup>	6	2.6
Used the Internet to Conduct Non-Agricultural Business (N = 183)		
No	104	56.8
Yes	79	43.2

Table 22 (continued)

*Use Patterns of Agricultural Producers Who Utilize the Internet to Access Agricultural Information in Virginia*

Use Pattern	N	%
Method of Internet Access ( N = 182)		
Dialup	91	50.0
Wireless	45	24.7
DSL	18	9.9
Cable	14	7.7
Satellite	10	5.5
Other <sup>y</sup>	4	2.2
Don't Know	0	0
Frequency of Internet Use (N = 185)		
Daily	141	76.2
At least once a week	36	19.5
Once a month or less	8	4.3

Table 22 (continued)

*Use Patterns of Agricultural Producers Who Utilize the Internet to Access Agricultural Information in Virginia*

Use Pattern	N	%
Past participation in Internet-based learning (N = 183)		
No	127	69.4
Yes	56	30.6
Individual in the operation most frequently using the Internet (N = 180)		
Myself	140	77.8
Spouse	29	16.1
Partner in operation	6	3.3
Children	3	1.7
Employee	2	1.1
Other	0	0.0

Table 22 (continued)

*Use Patterns of Agricultural Producers Who Utilize the Internet to Access Agricultural Information in Virginia*

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Use Pattern	N	%
Users of the Internet in the Farming Operations (N = 337)		
Myself	163	48.4
Spouse	91	27.0
Children	41	12.2
Partner in farming operation	18	5.3
Employee(s)	15	4.4
Other <sup>z</sup>	5	1.5
Owner (if other than yourself)	4	1.2

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Table 22 (continued)

*Use Patterns of Agricultural Producers Who Utilize the Internet to Access Agricultural Information in Virginia*

Use Pattern	N	%
Percentage of farm records kept on computer (N=179)		
0-10	51	28.5
11-20	8	4.5
21-30	10	5.6
31-40	1	0.6
41-50	19	10.6
51-60	1	0.6
61-70	0	0
71-80	21	11.7
81-90	11	6.1
91-100	57	31.8

<sup>w</sup>Other = books, grain marketing, horse tack and equipment, information on supplies, insurance, options, plants, plant plugs, livestock, and research. <sup>x</sup>Other = farm website for informational purposes, product information, quality assured beef program, and view sale items. <sup>y</sup>Other = T-1 line. <sup>z</sup>Other = parents, students, mother, renter and brother.

Question 4: What is the level of importance of computer and the Internet to the producers' agricultural operation? The respondents were asked to gauge the importance of the computer and the Internet to the agricultural operation using a five-point Likert scale. The scale used to accomplish this objective was: 1 = not important, 2 = minor importance, 3 = moderate importance, 4 = major importance, and 5 = extremely important.

The means of the responses were then ranked to determine what the producers considered to be of greatest importance for the variables evaluated. The data are presented in Table 23. The computer was ranked as most important with a mean score of 3.86. Rapid access to information ranked second, followed by the Internet with respective scores of 3.74 and 3.45. They ranked Internet-based learning as the least important variable with a mean score of 3.23. All of the reported means fell between three and four indicating they were perceived to be of moderate to major importance to their agricultural business.

Table 23

*The Level of Importance of a Computer and the Internet to the Producers' Agricultural Operation (N = 186)*

Questions	Mean	SD	Rank <sup>z</sup>
How important is the computer to your agricultural business?	3.86	1.17	1
How important is rapid access to information to your agricultural business?	3.74	1.03	2
How important is the Internet to your agricultural business?	3.45	1.15	3
How important is Internet-based learning to your agricultural business?	3.23	1.13	4

<sup>z</sup>Rank = Rank of mean score, 1 being the highest.

Note. Likert scale: 1 = not important, 2 = minor importance, 3 = moderate importance, 4 = major importance, 5 = extremely important.

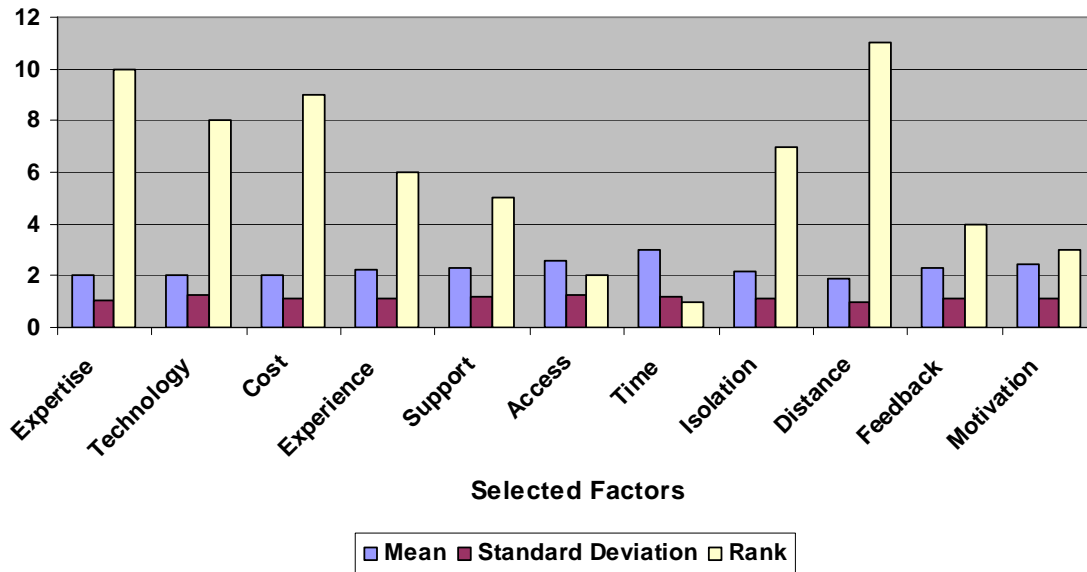


Question 5: To what extent do producers perceive selected factors as barriers to Internet-based learning systems? Table 24 and Figure 21 present the means and rankings of the variables as evaluated by the producers. The independent variables presented in the table for this question are coded as follows:

- Expertise = Level of computer expertise
- Technology = Availability of technology
- Cost = Cost of technology
- Experience = Lack of experience/training
- Support = Support services
- Access = Access to instructors/specialists
- Time = Time constraints associated with job responsibilities
- Isolation = Isolation from other participants
- Distance = Ability to learn at a distance
- Feedback = Feedback and instructor contact
- Motivation = Motivation to participate

Overall, the responses fell between moderate barrier (3.00) and minor barrier (2.00), except for the ability to learn at a distance. It was ranked as the most unimportant barrier (1.85). In contrast, the respondents ranked time constraints associated with job responsibilities as the greatest barrier (3.00). Access to instructors/specialists (2.57), motivation to participate (2.42), and feedback and instructor contact (2.27) were the next most important barriers.

**Figure 21. The Extent to Which Producers Perceive Selected Factors as Barriers to Internet-based Learning Systems (N = 186)**



On the other end of the scale, the level of computer expertise (2.00) and the cost of technology (2.00) were perceived as the second and third ranking of least important barriers. If the highest and lowest ranking barriers were eliminated, the remaining means in Table 24 would differ only by .57 units of measure. learning

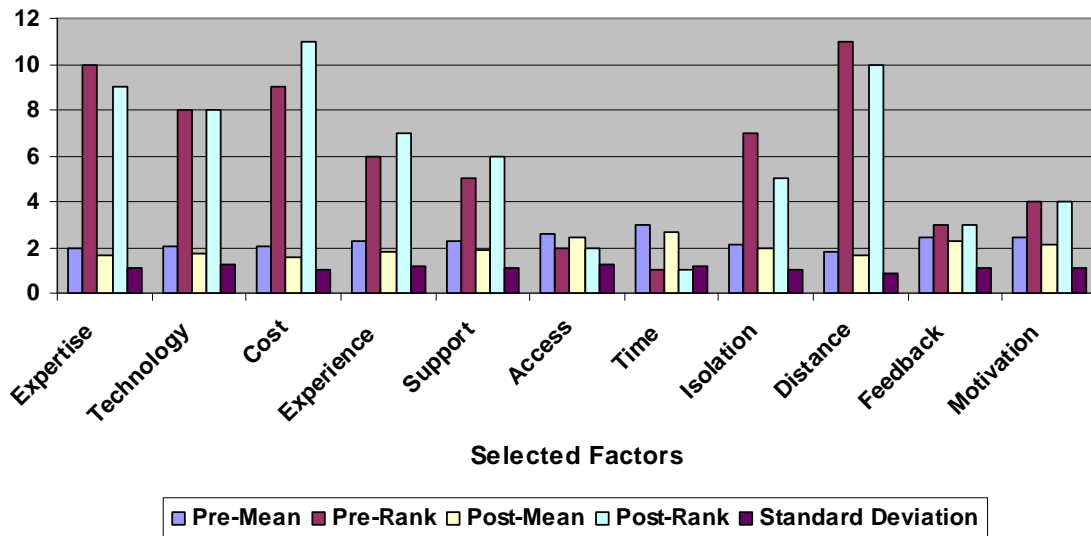
Question 6: To what extent do selected factors encourage or discourage producer participation in Internet-based learning systems. Table 25 and Figure 22 present the means of the pre- and post-exposure ratings and their rankings within each exposure group. It also illustrates the difference in the pre- and post-exposure means for the variables. Only producers that appeared in both the pre- and post survey data as determined by matching their coded surveys were used to measure the change in the population. The independent variables presented in the table for this question are coded as follows:

- Expertise = Level of computer expertise
- Technology = Availability of technology
- Cost = Cost of technology
- Experience = Lack of experience/training
- Support = Support services
- Access = Access to instructors/specialists
- Time = Time constraints associated with job responsibilities
- Isolation = Isolation from other participants
- Distance = Ability to learn at a distance
- Feedback = Feedback and instructor contact
- Motivation = Motivation to participate

The post-exposure means of the variables all fell between the moderate barrier (3.00) and the not a barrier (1.00) categories. Specifically, time, access, feedback, and motivation were determined to be the greatest barriers with respective mean scores of

2.63, 2.40, 2.31 and 2.15. The other seven factors fell between the minor barrier (2.00) and not a barrier (1.00) categories.

**Figure 22. The Extent to Which Selected Factors Encourage or Discourage Producer Participation in Internet-based Learning Systems (N = 308)**



Interestingly enough, all of the mean scores for the variables were lower following the exposure to the Internet-based learning system. The top four ranked pre-exposure barriers, time, access, feedback and motivation, were the same in the post-exposure rankings. The variables to exhibit the greatest change following the exposure to the Internet-based learning system were experience (.49), cost (.48), support (.38), expertise (.38), and time (.36). The variables with the smallest difference between the pre- and post-exposures ratings were feedback (.12), isolation (.14), access (.21), distance (.21), and motivation (.28).

Qualitative Data: Appendix K, Tables 26-29 provide the qualitative responses to the following questions/request:

1. What would encourage you to participate in future Internet-based Learning activities?
2. What do you consider to be the greatest benefits to Internet-based learning activities?
3. What do you consider to be the greatest barriers to Internet-based learning activities?
4. If you have other comments and suggestions please enter them in the space provided.

The responses were summarized and categorized into like themes. In many cases the respondents incorporated several themes into one response; therefore, the total number of theme responses exceeds the total number of responses.

Table 26 lists the responses to the question “What would encourage you to participate in future Internet-based learning activities.” One hundred twenty-one entries were recorded and organized into eight themes. Producers overwhelmingly (82 entries) responded that the availability of “more and relevant topics/information” would encourage them to participate in future activities. Secondly, they noted the availability of “affordable, high speed Internet connections” (27 entries) would be an important contributing factor towards their participation. Time (11 entries) was the third most frequent response. Producers indicated that time was one of their most limiting factors as it relates to job and family responsibilities and as one producer indicated, “I would participate when time permits.” Eight stated that the ability to interact with the

presenter/instructor would be a motivating factor while six indicated a need to interact visually or preferably face to face. Three cited better computers and the ability to print or review the material.

Table 27 presents the responses to the question, “What do you consider to be the greatest benefits to Internet-based learning activities?” One hundred twenty seven producers responded to this question with responses that focused on eight themes. The most popular theme (99 entries) by far was related to the flexibility of this medium. It allowed the producers to access the information based on their needs and schedule rather than specific times required by conventional learning methods. A distant second and third with 31 and 26 entries was the ability to access large amounts of quality, in-depth information and the cost effectiveness of accessing this information as it relates to savings associated with travel and time, respectively. The ability of the learners to gain knowledge at their own self-regulated pace was the fourth most popular response (17 entries). Eleven producers stated the speed to which they could access information was beneficial while 10 noted their ability to review the information as needed was important. Only two respondents stated the ability to interact with specialists/instructors as a benefit.

Table 28 presents the responses to the question, “What do you consider to be the greatest barriers to Internet-based learning activities?” One hundred twenty three producers responded with responses focused in 10 theme areas. The most popular barrier (40 entries) was the isolation from the instructors and other participants. A close second (35 entries) was the availability of affordable, high speed Internet connections. Twenty three people noted self discipline as a barrier and 15 stated their computer skills were a barrier to participation. Eight stated the range of the information that fits their individual

needs and eight stated not knowing where to go or what information is available. The lack of hands-on activities, the lack of written materials and the general age of the agricultural population were all mentioned once. Four respondents reported no barriers.

Table 29 presents the responses to the request, "If you have other comments or suggestions please enter them in the space provided." Fifty seven responses were recorded in 13 categories. The most popular response (18 entries) was a request for more Internet-based learning activities followed by requests (13 entries) for quality, focused information. Nine indicated a desire for computer skill assistance and instructions related to the use of the Internet-based programs. Five each requested better graphics/video and rural high speed Internet service. Four respondents suggested a transition phase to assist producers with the move to the Internet and four said, "Thank you." Three focused on the need for interaction; two requested a central location for this type of information and two of the respondents dislike surveys. One producer liked the ability to repeat the presentations, one indicated that this should not replace the traditional Extension office and one had no suggestions.

#### Summary:

Of the 370 identified producers, 186 usable responses were collected for the pre-exposure survey generating a response rate of 50%. For the post-exposure survey, 160 usable responses were collected resulting in a response rate of 43%.

The responding producers were predominately white (98.36%), males (82.87%) averaging 51 years of age with some college education. Their primary occupation was farm or ranch work (41.71%) with a gross value of agricultural sales of \$100,000 - \$249,999. Nearly 60% conducted Internet agricultural marketing activities; three

quarters purchased agricultural supplies, 43.17% conduct non-agricultural Internet business, and 50% use dialup services to access the Internet. In total, 95.68% of the responding producers access the Internet at least once a week and 31.60% reported previous participation in Internet-based learning.

Producers below 30 years of age considered their lack of experience/training to be less of a barrier than older producers. Time constraints associated with job responsibilities, isolation from other program participants, and their ability to learn at a distance were seen as greater barriers by males than females. Producers listing their primary occupation as other than farming saw time constraints associated with their job as a greater barrier than those retired but still farming. Producers with a high school education generally rated barriers associated with Internet-based learning as greater obstacles than those with advanced degrees. Following an exposure to an Internet-based learning experience, no differences were observed related to the producers' age, gender, primary occupation, and the operation's gross value of agricultural sales and the selected factors.

Producers making agricultural Internet purchases, perceived their motivation to participate in Internet-base learning as less of a barrier than those that did not. Generally, as the producers' Internet use frequency increased, their perception of the barriers was reduced and those with previous Internet-based learning experience saw their ability to learn at a distance as less of a barrier than did those with no experience.

A comparison of pre- and post-exposure data, revealed time constrains associated with job responsibilities, access to instructors/specialists, feedback/instructor contact, and the motivation to participate as the greatest barriers to Internet-base learning. Differences



in pre- and post-exposure assessments confirm that producers' perception of the barriers were worse than actuality.

## Chapter 5

### Summary, Conclusions, and Recommendations

The purpose of this study was to identify the barriers that agricultural producers encounter in Virginia when using the Internet and their preferences when seeking information, tools and skills delivered via the Internet. This study further sought to determine the resources needed for implementing Internet-based learning systems in the agricultural population of Virginia. This research paper is expected to provide Extension educators needed information about the Internet use patterns of agricultural producers and their preferences related to Internet-based learning systems. It is hoped that the outcome and impact of the study will be new opportunities for streamlining educational processes and information delivery to a greater populace than currently served by traditional methods used by Virginia Cooperative Extension.

#### *Population*

The population of this study (N = 370) consisted of the agricultural population of Virginia currently known to be using the Internet as identified by the individual county Agricultural and Natural Resources (ANR) Extension agents listed in the Virginia Cooperative Extension electronic mailing list.

#### *Data Collection*

Data were collected online via an interactive, encrypted Web site: <https://www.survey.vt.edu/>. The surveys were adapted from the National Agricultural

Statistics Service (NASS) 2005 June Agricultural Survey and the “Student/Learner Factors/Barriers” portion of Zirkle’s (2003) work which focused on access factors and barriers to offering distance education courses and programs. Zirkle’s (2003) work is further based on other studies of distance education barriers by Garland (1993), Galusha (1998), Hillesheim (1998), Yap (1996), and Zirkle (2002).

Out of a total of 370 producers identified by the agents, 186 usable responses were collected for the pre-exposure survey, generating a response rate of 50%. For the post-exposure survey, 160 usable responses were collected resulting in a post-exposure response rate of 43%. The producers in the study population represented 68 of Virginia’s 95 counties.

#### *Data analysis*

Collected data were stored on the <https://www.survey.vt.edu/> survey Web site. The data were downloaded from the Website and saved as a text file then imported into Microsoft Excel. The data were then organized to allow for proper export into SAS for final analysis.

#### *Summary of findings*

Six research questions guided this study. The results of the data analysis for each of those research questions are presented in the following discussion.

Question 1: What are the important demographics of agricultural producers who utilize or could utilize the Internet to access agricultural information in Virginia? The producers were almost exclusively white (98.36%) and predominately male (82.87%).

They averaged 51.54 years of age and ranged in age from 25 to 82 years. Most of the respondents, 41.71% indicated their primary occupation as farm or ranch work but another large percentage, 36.57%, also indicated the other category indicating their main employment existed outside the farming operation. For example, respondents in the other category listed their occupation as account managers, business owners, educators, brokers, farm supply sales, and veterinarians among others.

Over 70% of the respondents had at least some college education. A college degree was a common response indicated by 36.96% of the producers. Producers with a masters degree was the second most commonly reported level of education at 16.85% followed closely by respondents with some college at 16.30% and then by those with a high school education at 12.50%.

The most commonly reported level of the gross value of agricultural sales including government payments fell into the \$100,000 - \$249,999 level at 14.84%. The next most common response level was the \$25,000 - \$49,999 at 12.09% and the \$10,000 - \$24,999 at 11.54%. Almost an equal number of operations, thirteen verses fourteen, reported sales and government payments in the \$500,000 - \$999,999 and the \$1,000,000 and over categories as did in the \$2,500 – \$4,999 and \$5,000 - \$9,999 categories respectively. The economic data gathered represented a broad cross section of the agricultural operations present in Virginia. Gross sales plus government payments ranged from none in 2005 to over one million dollars per operation.

Question 2: To what extent are selected demographic factors of agricultural producers related to their Internet access of agricultural information in Virginia?

Selected demographic factors were evaluated both pre- and post-exposure to an Internet-based learning experience.

*Pre-exposure summary-age and gender:* The producers' perception of their lack of experience/training as a barrier was impacted by their age. Producers below the age of 30 considered their lack of experience and training to be less of a barrier than any of the other age categories. Producers below the age of 30 classified did not classify it as a barrier while the remaining age groups rated the factor as a minor barrier. Males as a group perceived the time constraints associated with their job as moderate barrier while their isolation from other program participants and their ability to learn at a distance was categorized as a minor barrier. These three factors were seen as greater barriers by the males than the females in the population.

*Pre-exposure summary-primary occupation:* Data were collected based on the producers' primary occupation. The individuals listing their primary occupation as other than farming and ranching saw time constraints associate with their job responsibilities as a moderate barrier differing from the retired but still farming or ranching group that placed it as a minor barrier. There was no difference in the population listing their primary occupation as farming or ranching and those that were hired managers. Both segments placed time constraints in the moderate barrier grouping.

*Pre-exposure summary-education:* Numerous significant differences were observed in the producers' responses as they related to their level of education. The level of computer expertise, lack of experience/training, support services, access to instructors/specialists, time constraints associated with job responsibilities, isolation from other program participants, and the ability to learn at a distance all varied with the

producers' level of education. Producers with a high school education rated their level of computer expertise as a moderate barrier. Those with vocational training beyond high school, a masters degree, some post masters graduate school and those with a doctorate, medical or law degree viewed it as a minor barrier. Their lack of experience was also an aspect that those with a high school education rated higher. They perceived it as a moderate barrier while the remaining groups saw it as a minor one.

Respondents with a high school education saw support services as a moderate barrier in comparison to those with a masters degree as a minor one. The access to instructors/specialists was perceived by those with a high school education as a moderate barrier while those with vocational training beyond high school or a masters degree as a minor one. Time constraints were seen as a moderate barrier by those with a high school education and those with some college. Producers with vocational training beyond high school and those with some post masters graduate school only saw it as a minor barrier.

Isolation from other program participants was seen as a minor barrier by the individuals with vocational training beyond high school, a masters degree or those individuals with some post masters graduate school. Producers with a high school education perceived it as a moderate one. Finally, the ability to learn at a distance was perceived to be a greater barrier by those with a high school education than by all other groups except for those with some college. High school educated producers saw it as a moderate barrier compared to the other mentioned groups as a minor or not a barrier.

*Pre-exposure summary-gross agricultural sales:* Economic related aspects of the farming operation such as the operations' gross income, the producers' use of the Internet to make agricultural purchases and their use of the Internet to conduct non-agricultural

business were evaluated as factors contributing to the producers' perception of the selected factors as barriers. All factors were not significant except for the multilevel differences observed in the responses related to time constraints associated with job responsibilities and isolation from other program participants. Producers in operations with gross sales in the \$500,000 - \$999,999 range perceived time constraints associated with job responsibilities as a greater barrier than those in the following gross sales ranges: \$2,500 - 4,999, \$5,000 - \$9,999, and those with no sales during 2005. Producers in the \$500,000 - \$999,999 category also perceived isolation from other program participants as a greater barrier than those in all of the other income categories except for those in the \$100,000 - \$249,999 and \$250,000 - \$499,999 ranges.

*Pre-exposure summary-method of Internet access:* The producers' method of Internet access also contributed to their discernment of factors as barriers. Those with dialup service rated their level of computer expertise as a minor barrier, while those that reported their Internet access as other, did not perceive it as a barrier. The primary method of access categorized as other was a T-1 connection although one individual did categorize his wife as "other." Dialup users measured the availability of technology as a moderate barrier in contrast to the dedicated service line/DSL users which did not specify this as a barrier. As it relates to the time constraints associated with job responsibilities, satellite users saw time as a major barrier compared to those with either DSL or using some other method of access perceiving it as a minor to moderate factor.

*Pre-exposure summary-Internet use frequency, agricultural Internet purchases, and non-agricultural Internet business:* The producers' frequency of access to the Internet contributed to how they perceived the factors as barriers to Internet-based

learning. Excluding the group that reported never accessing the Internet, those accessing it less than once every six months perceived their level of computer expertise, the cost of technology, the lack of support services, and the isolation from other participants as an extreme barrier. This group differed from the remaining use frequencies which rated the variables as predominantly minor barriers. This same, less than once every six month group, rated their lack of experience as an extreme barrier however; the rating did not statistically vary from those using the Internet once a month or once every six months. They did on the other hand; vary from the producers with use frequencies of once a week or daily.

Producers that access the Internet once a month or less reported their level of computer expertise, lack of experience, time constraints associated with job responsibilities, and isolation from other program participants as moderate to major barriers. Their responses, significantly higher, differed from those with daily and once a week use frequencies which categorized the same factors as only minor to moderate barriers. Generally, as the use frequency increases, the perception of the factors as barriers is reduced. With this in mind, and as one would expect, those with previous Internet-based learning experience saw their ability to learn at a distance as less of a barrier than did those with no previous experience even though both groups perceived it as a minor barrier.

Not only did the producers' use frequency impact their perception of the factors as barriers but also their use of the Internet to make agricultural purchases. Producers that used the Internet to make agricultural purchases perceived their motivation to participate in Internet-base learning as less of a barrier than those that did not make



agricultural Internet purchases. Those making purchases perceived it as a minor barrier compared to those that did not as a moderate barrier. No differences were observed in the variables as they pertained to the producers' use of the Internet to conduct non-agricultural business

*Pre-exposure summary-agricultural business records on computer and primary users:* No meaningful results were observed between the producers' perception of the variables as barriers and their percentage of the agricultural business records kept on computer. Although there were no relationships established between the use of the computer for the agricultural operations' business records, there was an effect of the primary users of the computer/Internet on the variables. Interestingly enough, the producers that listed their children as the primary users of the Internet in the operation also perceived their isolation from other program participants as a major barrier. This was not the case for the other primary user categories.

*Post-exposure summary:* The second part of this question was to determine to what extent the selected demographic factors related to the producers' Internet access of agricultural information in Virginia following an exposure to an Internet-base presentation. The post-exposure demographics not represented in the pre-exposure analysis included the presentation viewed and the portion of the presentation viewed.

*Post-exposure summary-age, gender, primary occupation and operation's gross income:* No meaningful results were obtained regarding how the producers' age, gender, primary occupation, and the operation's gross value of agricultural sales related to the selected factors as barriers post-exposure.

*Post-exposure summary-education:* The relationship between the barriers as measured after the exposure to an Internet-based learning system and the producers' level of education produced extraordinary results. Producers with a high school education rated their level of computer expertise as a moderate barrier, more significant, than those with any other level of education which perceived it as a minor one or not a barrier at all. Producers with a high school degree rated their lack of experience as a moderate barrier. All other education levels rated it as a minor barrier except for those with a masters degree which saw it as not a barrier. In that same category, those with vocational education beyond high school differed from those with a masters degree determining it to be more of a barrier. Support services were perceived as a moderate barrier by those with a high school education. Those with a masters degree and some post masters graduate school determined support services to be a minor barrier and not a barrier respectively. Producers with some college also differed from those with a masters degree perceiving support services as a more of a substantial barrier.

*Post-exposure summary-presentation viewed and portion of presentation viewed:* Participants were asked to select one of four presentations (forages, soybeans, corn and small grains, and vegetables) to view. The producers selecting the soybean presentation rated their level of computer expertise and lack of experience/training as a greater barrier than did those selecting either the forages or vegetable presentations. Since the soybean presentation was neither the largest nor longest, then file size nor presentation length should have contributed to the differences in the responses.

Producers viewing all of the presentation rated barriers associated with their level of computer expertise as less of a factor than those that viewed a portion or none as

would be expected. The availability of technology was evaluated as a moderate barrier by those viewing a portion of the presentation while the groups that viewed all or none considered it only a minor factor. Producers viewing all of the presentation saw the cost of technology as less of a barrier than those that viewed a portion although it was still only considered a minor barrier. Neither of these groups differed statistically from those that viewed none of the presentation.

The barriers associated with the producers' lack of experience were greatest in the population that viewed none of the presentation. They saw their lack of experience as a moderate barrier while the other two groups viewed their lack of experience as a minor barrier. The availability of support services was perceived as a greater barrier by those that viewed none of the presentation than those that viewed it in its entirety. Neither of these aforementioned groups differed from those that viewed a portion of the presentation. Barriers associated with the ability to learn at a distance followed the same trends as the barriers related to support services. The ability to learn at a distance was viewed as a minor barrier by those able to view none of the presentation and not a barrier by those viewing all of the presentation. Those viewing a portion also considered it a minor barrier but not significantly differing from the other two groups.

Time constraints associated with job responsibilities were rated as a moderate barrier by those that viewed a portion of the presentation and as a minor barrier by those that viewed all of the presentation. The segment of the population that was able to view none of the presentation rated time constraints as a moderate barrier but did not differ significantly from the other factions.

The findings in this section strengthen research by Abbott & Faris, (2000); Baron & McKay, (2001); Gagne & Shepherd, (2001); Mitra & Steffensmeier, (2000) regarding student attitudes toward online learning. They observed that students of all ages who are provided easy access to computer-mediated distance learning classes generally had a positive experience with this type of educational format. Generally speaking, as the producers in this study became more experienced with the medium, the degree to which they saw the factors as barriers was decreased.

As one would expect, equipment, software, accessibility and supportive services played an important role in determining the level of user satisfaction. Data collected by Phipps and Merisotis (1999) recognized that if the student does not have access to the appropriate equipment, the support structure is not adequate, or the computer and software are prohibitive based on cost, then this should not be recommended as an alternative delivery method. Support for Phipps and Merisotis's (1999) research could not be more evident than in the cases where producers were able to view none or a portion of the presentations. By and large, the producers viewing none or a portion of the presentation rated the barriers associated with Internet-based learning as greater barriers than those viewing the entire presentation.

Research by Porter (1994) found teacher mediation increased the completion rate for distance education courses and that students needed support and direction to enable them to make the transition from traditional classroom to self-directed learning environment. This project noted similar results in a portion of the population. There was an interaction between the producers' level of education and a higher assessment of support services, level of computer expertise, and access to the instructors/specialists as a

barrier. Significant relationships were established pre-exposure for the access to instructors/specialists and both pre- and post-exposure for level of computer expertise and support services in the population of producers with a high school education. Also, producers indicating lower Internet use frequencies, perceived the need for support services as a greater barrier before exposure to an Internet-based learning experience.

Porter (1994) also stressed that the incorporation of tools to help students monitor progress and obtain timely feedback on activities was particularly important. Although feedback is mentioned as a factor increasing course completion rates, it did not interact significantly with the demographic variables in either the pre- or post-exposure situations. However, the qualitative responses did include producers' desires to monitor their progress during the presentation as it related to movement in the presentation. Feedback in the more traditional sense could become more of a factor in a prolonged learning experience that includes assignments or requires the producers to complete a series of tasks. In support of Porter's (1994) work, feedback was determined to be the third most important barrier in both the pre- and post-exposure evaluations.

Patricia Cross's (1981, p.98) work described why adult learners do or do not participate in learning activities. She organized the barriers into three categories: situational, institutional and dispositional. Situational barriers are obstructions related to the individual's position in life at any given time and include issues related to transportation, age, time constraints, and family responsibilities. As the data in this study indicates, differential responses were observed related to the producers' gender, primary occupation, and their method of Internet access verses time constraints associated with job responsibilities but only in the pre-exposure population. Time

constraints were also determined to be the most substantial barrier in both the pre- and post-survey data.

Question 3: What are the use patterns of the producers using the Internet? A majority, 74.7%, of the responding producers use the Internet to make agricultural purchases. Half of those Internet purchases were related to the acquisition replacement parts, at 25.1% and farm supplies at 24.9%. The next three most reported agricultural items purchased via the Internet were veterinary supplies (14.0%), machinery (13.1%) and seed (8.0%).

Agricultural marketing activities were conducted by approximately 60% of the respondents. The most common marketing activities were commodity price tracking, on-line market advisories, and the direct sales of commodities. Although almost three quarters of the producers use the Internet to purchase agricultural supplies, only 43.2% of them use it to conduct non-agricultural business.

Access to the Internet is currently dominated by one process. Fifty percent of the producers access the Internet using dialup services. The next most commonly reported method was wireless at 24.7%, followed by DSL at 9.9%, and cable at 7.7%. Satellite was only reported by 5.5% respondents and 2.2% of them use T-1 lines as a means of Internet access. These findings were similar to those reported in the U.S. Department of Agriculture Farm Computer Usage and Ownership Report (2005) for all methods of access except for dialup which was 16 percentage points lower in this study.

Over three quarters of the producers in the study use the Internet on a daily basis. The next most reported use frequency was once a week at 19.5%. In total, 95.7% of the responding producers access the Internet at least once a week. The remaining less

frequent users represented less than 5% of the reporting population. When asked about previous Internet-learning activities, a surprising 31.6% of the responding producers reported previous participation in an Internet-based learning activity.

The most frequent users of the Internet in the farming operation were the respondents themselves representing 75.6% of the responses. Their spouses were the next most common group at 16.1%, followed by the partners in the operation at 3.3%. The producers' children represented a meager 1.7% of the most frequent operation users. When asked who the users of Internet are, the most numerous responses was myself (producer), then their spouse, children and partner at 47.9, 26.8, 12.2 and 5.4% respectively.

The percentage of agricultural business records kept on the computer ranged from 0% to 100%. Once the data were organized into 10% groupings, the two extremes, 0-10% and 91-100%, represented over 60% of the data. The 91-100% grouping embodied 31.8% of the responses and the 0-10% represented 28.5%. The next two most popular category groupings were 71-80% with 11.7% of the entries and the 41-50% group consisting of 10.6% of the responses.

Question 4: What is the level of importance of a) computer and b) the Internet to the producers' agricultural operation? When organized into rankings based on the producers' responses, the computer was the most important of the four variables with a mean score of 3.86. The rapid access to information was next, followed by the Internet and finally Internet-based learning with respective scores of 3.74, 3.45 and 3.23.

Although, Internet-based learning was ranked as the least important of the variables they

all reported means between 3.00 and 4.00 indicating the producers perceived them to be of moderate to major importance to their agricultural operation.

Question 5: To what extent do producers perceive selected factors as barriers to Internet-based learning systems? The producers perceived their ability to learn at a distance as the least of the variables measured in this study. Their level of computer expertise and the cost of technology were also minimal barriers receiving a mean score of 2.00. In contrast, the respondents ranked the time constraints associated with their job responsibilities as the greatest barrier, with a mean response of 3.00. Their access to instructors/specialists (i.e. their ability to ask questions and interact) and their motivation to participate were the second and third highest ranked variables. Regardless of their rankings, the variables were perceived as no more than minor to moderate barriers.

Question 6: To what extent do selected factors encourage or discourage producer participation in Internet-based learning systems? The post-exposure variables were all categorized as moderate to non-barriers. Specifically, time constraints associated with job responsibilities, access to instructors/specialists, feedback and instructor contact, and the motivation to participate were determined to be the most discouraging factors associated with Internet-based learning. Never the less, these factors were only categorized as minor to moderate barriers. The other seven factors evaluated in the study were categorized as minor to non-barriers.

Interestingly enough, all of the mean scores for the post exposure data were lower than the means for the pre-exposure data indicating the producers' perception of the barriers were worse than actuality. The results of this study support Cohen's (2000) assessment of student's proficiency in online courses. He noted that that through



exposure and use of the technology, the students became more proficient as was the case for the producers in this study.

The variables (time, access, feedback and motivation) that were perceived to be the most detrimental in the pre-exposure population were also determine to be the most significant factors influencing the producers' participation in the post-exposure population. As determined by Cross (1981, p.98), these four variables fall into two separate categories. Time constraints associated with job responsibilities is a situational barrier. The desire to have access to instructors/specialists, to have feedback and instructor contact, and the motivation to participate can be categorized as dispositional barriers.

The variables to demonstrate the greatest change following the exposure to the Internet-based learning system were; the producers' lack of experience/training, the cost of technology, access to support services, their level of computer expertise, and their time constraints associated with job responsibilities. Intriguingly, time constraints associated with job responsibilities was one of the four most detrimental factors and also one that showed the most change following a minimal exposure to Internet-based learning. On the other hand, the factors to change the least were; feedback and instructor contact, isolation from other program participants, access to instructors/specialists, the ability to learn at a distance, and their motivation to participate. Of the five variables to change the least, three were established as the most significant barriers to Internet-based learning by the data collected via the per- and post-exposure surveys. These three are also dispositional barriers. Dispositional or tendency barriers related to Internet-based learning can be overcome with exposure and mediation by the instructors and specialists.

As was the case in Liao's (2005) work with the student adoption of a web-based course management system. The system was perceived as advantageous because it led to increased interaction between the students, instructors, and course material and contributed to learning. The ability to overcome these barriers with exposure was indicated by the reduction in the producers' perception of the factors as barriers following the Internet-based learning experience. Through the use of Internet-based methods of interaction such as video, conferencing, discussion boards, email, and blogging the barriers related to instructor feedback and access can further be minimized or potentially overcome.

### *Conclusions*

The conclusions reached are based upon the findings of the study. The conclusions are as follows.

1. The important demographics of the agricultural producers who utilize or could utilize the Internet to access agricultural information in Virginia are that they are predominately white males of approximately 51-years-old. Slightly less than 42% of them indicate their primary occupation as farming or ranching, but this is closely followed by a segment indicating some other primary occupation. Over 80% of them have some level of college education with the highest percentage of the respondents indicating their level of education as a masters degree. The most commonly reported level of gross agricultural sales was between \$100,000 and \$249,000 but there was representation over the entire range of the evaluation scale ranging from \$0 to \$1,000,000 and over.

2. Producers younger than 30 years of age perceived their lack of experience and training as less of a barrier than other age groups pre-exposure. No differences were observed based on age following an exposure to an Internet-based learning experience.
3. Males perceived time constraints associated with their jobs, isolation from other program participants and the ability to learn at a distance as greater barriers than females. No differences were observed following an exposure to an Internet-based learning experience.
4. Producers listing their primary occupation as other than farming or ranching perceived time constraints associated with job responsibilities as a greater barrier than did those with their primary occupation as farming or ranching or retired and still farming or ranching. No differences were observed following exposure to an Internet-based learning experience.
5. Generally, producers with a high school education perceived their level of computer expertise, lack of experience/training, access to support services, access to instructors/specialists, and their ability to learn at a distance as greater barriers than producers with higher levels of education. Following an exposure to an Internet-based learning experience, high school educated producers still viewed their level of computer expertise, lack of experience/training and access to support services as larger barriers than producers with higher levels of education.
6. Producers with higher gross values of agricultural sales as measured in this study have a tendency to perceive time constraints associated with job responsibilities and isolation from other program participants as greater barriers than those

- producers with lower gross values of agricultural sales. No differences were observed following exposure to an Internet-based learning experience.
7. Producers with dialup access to the Internet have a tendency to perceive their level of computer expertise, the availability of technology, and time constraints associated with their job responsibilities as greater barriers than those with other systems of Internet access.
  8. Producers with higher Internet use frequencies have a tendency to perceive their level of expertise, the availability of technology, the cost of technology, their lack of experience, the lack of support services, isolation for other program participants, and the ability to learn at a distance as more negligible barriers than those producers with less frequent use rates.
  9. Producers with previous experience in Internet-based distance learning perceive their ability to learn at a distance as less of a barrier than those with no previous experience.
  10. Producers listing their children as the most frequent users of the Internet in the farming operation perceived their isolation from other program participants as a greater barrier than those listing any other frequent users.
  11. Producers viewing a portion of the presentation or were unable to participate in the experience at all rated barriers associated with their level of expertise, the availability of technology, the cost of technology, their lack of experience, the availability of support services, time constraints associated with job responsibilities, and their ability to learn at a distance as larger barriers.

12. Almost three quarters of the producers in the study use the Internet to make agricultural purchases. A majority of those transactions involve the purchase of replacement parts and farm supplies.
13. Agricultural marketing activities were reported by 60% of the producers. Marketing activities were focused on commodity pricing, on-line market advisories, and the direct sales of agricultural commodities.
14. The primary method of producer Internet access was dialup at 50% followed by wireless at 24.7% and DSL with 9.9%.
15. In total, 95.7% of the responding producers use the Internet at least once a week, of which 76.2% use the Internet daily.
16. Almost a third of the responding population has previously participated in an Internet learning experience.
17. The producers are the most frequent users of the Internet and the most frequently named users of the Internet in the agricultural operation followed by their spouses, children, and then partners.
18. As identified by this study, a majority of the producers keep either 0-10% of their agricultural business records on computer or 90-100%.
19. The responding producers ranked the following variables as moderate to major importance for the farming operation. The computer was ranked highest, followed rapid access to information, the Internet, and Internet-based learning.
20. Producers perceived time constraints associated with job responsibilities as the greatest barrier to Internet-based learning followed by access to instructors/specialists, the motivation to participate, feedback and instructor

contact, and access to support services as the five greatest barriers to Internet-based learning.

21. In all cases, the producers' perception of the barriers to Internet-based learning was greater than the actual barriers.
22. Time constraints associated with job responsibilities, access to instructors/specialists, the motivation to participate, and feedback and instructor contact were the highest ranked perceived and actual barriers to Internet-based learning.

### *Recommendations*

The following specific recommendations were identified to overcome the barriers that agricultural producers encounter in Virginia when using the Internet and their preferences when seeking information, tools and skills delivered via the Internet. These recommendations further seek to identify the resources needed for implementing Internet-based learning systems in the agricultural population of Virginia. The recommendations are:

1. When developing Internet-based learning system, developers should take into account the learner's abilities. Specific instructions and tutorials addressing the access of the information and the use of the software/equipment would be beneficial to resolve issues related to the user's perception of their abilities.
2. Until high speed access is more available and/or affordable for a majority of producers, developers should take into account the user's connection speed and provide file-size options of the same learning experience to accommodate this

- factor. These should include estimated download or access times based on the producers' connection speed so they can plan activities accordingly.
3. When possible the completion of the learning experience should be connected to a form of recognition or certification such as continuing education credits, certified crop advisor credits, or pesticide re-certification.
  4. Producers should have access to more Internet-based learning activities that are relevant and address more topics and information. These should be available in multiple formats including video, audio, print and combinations of the aforementioned.
  5. Extensions Internet-based learning experiences should be easily accessible from a commonly known central location. Links on the Extension home page would serve this purpose and promote simultaneously Extension's other offerings.
  6. Producers should be provided the opportunity to interact with the presenter/instructor via the most acceptable and timely means for both the viewer and presenter.

### *Implications*

The greatest barriers to Internet-based learning systems appear to be the individual's perception of the barriers associated with this medium. As revealed in this study, once the producers were exposed to an Internet-based learning experience the barriers they associated with this medium were reduced, even with a minimal single exposure in most cases. Once these barriers are addressed, this innovation should continue to proceed through the stages of the diffusion of innovation model. The rate of adoption for Internet-based learning will be determined by its characteristics. As stated

by Rogers (1995) these characteristics are its relative advantage, compatibility, complexity, trialability, and observability. In much the same ways, the ground-breaking study by Ryan and Gross (1943) on the adoption of hybrid seed corn in Iowa revolutionized how we look at the diffusion of new products, ideas, and practices around the world, Internet based learning has the potential to revolutionize how we educate our agricultural population.

One of the study respondents indicated, “This should not replace the traditional Extension office.” I agree with his concept in that Extension needs to focus a portion of its attention on this medium, but not to the exclusion of the “tried and true” methods currently in use. Internet-based learning should be another tool in the educator’s tool box. Like any tool, it is suited to accomplish certain specific tasks, but by no measure all tasks.

For the use of this medium to progress, it will take a concerted effort by Extension administration to encourage faculty and agent participation. As the educational tool box is changed, so must the evaluation system that determines a faculty member’s advancement. Assuming this medium continues to progress, systems should be implemented to reward faculty members for their efforts to further the medium, but only if the Internet-based learning is relevant to the needs and aspirations of the clientele.

Based on the findings in this study, it appears that Sherry (1996) was correct in the contention that students may adapt more quickly than teachers to new technology. The students represented in this study have indeed adapted as indicated by their most prevalent responses to the question “What would encourage you to participate in future Internet-based learning activities?” They want “more and relevant topics/information.”



It is the responsibility of Extension to meet this grass root need and to provide them with another opportunity to learn in a manner that fits their individual style and situation.

The following recommendations for future research are based on findings of this study. Future efforts should evaluate the most effective methods, to facilitate new informational knowledge using an e-learning format targeting agricultural producers. They should determine the benefit of follow-up, name recognition of the teacher or presenter, and access to local faculty in new learning via the Internet. They should also determine if the teaching and learning methods are more effective for specific ages, learning styles, commodity interests, and the agricultural producers' location. Future research should determine the factors relevant to Extension specialists and educators in producing internet-based learning modules, sessions, and courses for agricultural producers.

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## Appendices

Appendix A:

Agriculture and Natural Resources  
Extension Specialty Responsibilities Agent List

**Listserv Name: VCE-AGENTS-ANR (VCE ANR Agents Listserv)**

**Address: VCE-AGENTS-ANR@LISTSERV.VT.EDU**

**Automatic Update: NO**

**This listserv is not a sublist of any listservs.**

**This listserv has the following sublists: VCE-CDIST-ANR,VCE-NDIST-ANR,VCE-NEDIST-ANR,VCE-NWDIST-ANR,VCE-SEDIST-ANR,VCE-SWDIST-ANR**

**Direct Subscribers: 0 from query; 3 additional subscribers.**

**Indirect Subscribers (from sublists): 145**

**Mail sent to VCE-AGENTS-ANR will be sent to a total of 148 addresses, which are listed below**

**(addresses with duplicate names will only receive one message).**

**PLEASE NOTE: You will not in most cases receive copies of messages you send to higher level lists that you receive mail from, like VCE-ALLSTAFF or VCE-ALLDIST, because sublist subscribers do not receive copies of messages sent to higher level lists.**

abordas@vt.edu(Adria Bordas)  
adowning@vt.edu(Adam Downing)  
agrove@vt.edu(Alan Grove)  
ahectus@vt.edu(Alison Hectus)  
amhall7@vt.edu(Angie Hall)  
aoverbay@vt.edu(Andy Overbay)  
astraw@vt.edu(Richard Straw)  
bholden@vt.edu(Brenda Holden)  
bjarvis@vt.edu(Leon B. Jarvis)  
board@vt.edu(Barbara Board)  
bowen@vt.edu(Jason Bowen)  
brjones4@vt.edu(Bruce G. Jones)  
brjones8@vt.edu(Brian Jones)  
brobinso@vt.edu(Barry Robinson)  
bworrell@vt.edu(William Worrell)  
cakastan@vt.edu(Christine Kastan)  
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cclarke@vt.edu(C T. Clarke)  
ccstaffo@vt.edu(Carl C. Stafford)  
cestienn@vt.edu(Cyndi Estienne)  
cestienn@vt.edu(Cynthia Estienne)  
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cswanson@vt.edu(Carrie Swanson)  
dalego@vt.edu(Daniel Goerlich)  
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dcuddy@vt.edu(Dave Cuddy)  
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djessee@vt.edu(Denny Jessee)  
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Dsmith57@vt.edu(David Smith)  
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mparrish@vt.edu(Michael J. Parrish)  
mrob@vt.edu(Michael T. Roberts)  
msaphir@vt.edu(McGann Saphir)  
neclark@vt.edu(Neil Clark)  
padavis@vt.edu(Paul H. Davis)  
pblevins@vt.edu(Phil Blevins )  
pblevins@vt.edu(Philip Blevins)  
peaton@vt.edu(Patricia Eaton)  
plwarren@vt.edu(Peter L. Warren)  
plwarren@vt.edu(Peter Warren)  
ppatter@vt.edu(Pamela Patterson)  
preilly@vt.edu(Patricia Reilly)  
raclark@vt.edu(Robert A. Clark)  
rcotten@vt.edu(Rexford Cotten)  
rdustin@vt.edu(Robyn Dustin)  
rduvall@vt.edu(Ronald Duvall)  
rjschalk@vt.edu(Rita Schalk)  
rleech@vt.edu(Rodney P. Leech)  
rojones2@vt.edu(Robert L. Jones)  
rolong2@vt.edu(Bobby Long)  
rprunty@vt.edu(Regina Prunty)  
sajohns2@vt.edu(Samuel M. Johnson)  
sbyars@vt.edu(Scott Byars)  
scbaker@vt.edu(Scott Medford Baker)  
sfeaser@vt.edu(Stephanie Feaser)  
sfrench@vt.edu(Susan French)  
sjerrell@vt.edu(Scott Jerrell)  
smp@vt.edu(Susan M. Puffenbarger)  
ssutphin@vt.edu(Stuart Sutphin)  
stanleyt@vt.edu(Thomas Stanley)  
stegner@vt.edu(Jacob Stegner)  
suedward@vt.edu(Susan Edwards)

thacker@vt.edu(Paige Thacker)  
thbalder@vt.edu(Thomas K. Balderson)  
tihorn@vt.edu(Tina Horn)  
tmize@vt.edu(Timothy Mize)  
ttalley@vt.edu(Traci Talley)  
walexand@vt.edu(Wesley C. Alexander)  
warobins@vt.edu(Walter Robinson)  
wdimock@vt.edu(William Dimock)  
wishockl@vt.edu(William Shockley)  
wmccaleb@vt.edu(William McCaleb)  
wmullins@vt.edu(Brad Mullins)  
wseay@vt.edu(William W. Seay)  
wwhittle@vt.edu(Bill Whittle)

## Appendix B

Email to agents to collect study participants

To: ANR Agents

Over the past few years I have been working towards my PhD. in Career and Technical Education. To complete this process I will need your help. It is my belief that Extension lacks sufficient information about the Internet use patterns of agricultural producers, their preferences and the barriers they encounter when using the Internet. Once we gather this information we will be in a better position to develop Internet-based learning opportunities that meet their needs.

What I am asking from you is a list of your producers that have Internet access, participate in Extension programs and are involved in the production of at least one of the following commodities (listed at the end of this email). I have attached an excel file with the categories of information I will need to complete the project.

Dr. Mark McCann and Jim Riddell have endorsed this project. In addition to their endorsement, the Dean of CALS has listed Distance Education as an area that needs our attention. Your participation in this project will attempt to address that need and help provide our producers with more opportunities to access the critical information they need.

I will send the producers a letter to introduce the project. The letter will explain the project and let them know they will receive an email with the links to the surveys and the breeze presentations and a step-by-step procedure for completing the process. (It should only take them between 30 and 45 minutes to complete the entire process.) If I have not received a response from them in two weeks after the initial email, they will receive a reminder email followed by a telephone reminder a week after that. I will notify you at each step so you will be prepared for any questions you might receive from your producers.

Thank you for your help. **The list you provide will not be used for any other purpose.** If you have questions please call or send me an email.

Thanks so much, Glenn.

**Commodities:**

Winter Wheat

Barley

Field corn (grain)

Other uses of grains (abandoned, silage, green chop, etc.)

Hay (cut or to be cut for hay)

Soybeans

Tobacco

Peanuts

Cotton

Fruit trees, grapes, or nut trees

Vegetables or melons

Any berries including strawberries

Christmas trees

Woodland (not pastured)

Pasture (permanent)

**Livestock**

Hogs or pigs

Cattle or calves

Sheep or lambs

Goats or kids

Equine

Chickens

Bees

Ducks

Rabbit

Appendix C:

Internet-based Learning Survey - Pre exposure

**INTERNET-BASED LEARNING SURVEY - PRE EXPOSURE**

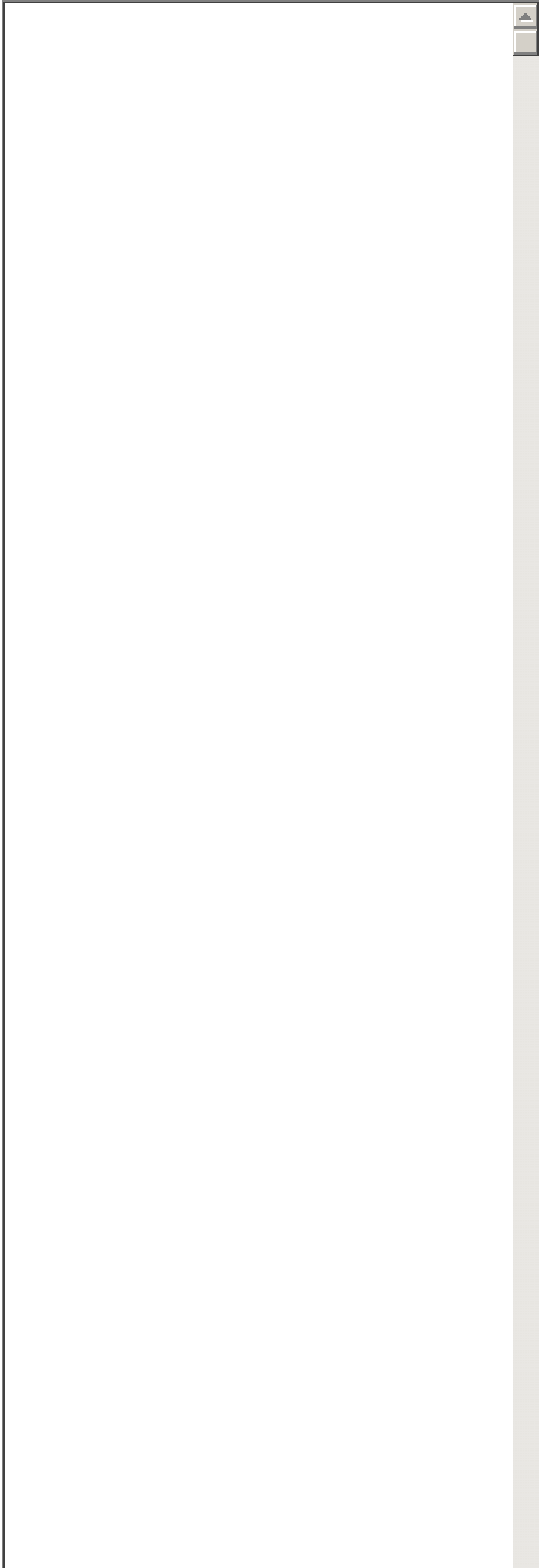
This survey is intended to be filled out by the individual making the day-to-day production decisions for the farming operation. If you as the owner or operator are not making these decisions, please forward this survey to the appropriate person.

**Please enter your six digit survey code.**

**Last name (optional):**

**First name (optional):**

**Mailing address (optional):**





**City (optional):**

**State (optional):**

**ZIP (optional):**

**email address (optional):**

Demographic Section

**1. Your age as of December 31, 2005?**

**2. Race:**

American Indian or Alaska Native

Asian

Black or African American

Native Hawaiian or Other Pacific Islander

White

Latino or Hispanic

**3. Gender:**

Male

Female

**4. What is your primary occupation?**

Farm or Ranch Work

Hired Manager

Retired, but still farming or ranching

Other:

**5. What is the highest grade of school or level of education you have completed?**

No school or kindergarten

Grades 1 - 11

High school

- Vocational or technical school beyond high school
- Some college
- College degree
- Some post-graduate school
- Masters degree
- Any doctorate or medical or law degree
- Other:

#### Economic Data of Entire Operation

Considering:

- Sales of all crops, livestock, poultry, and livestock products (milk, eggs, etc.) sold in 2005
- The value of product removed for all crops, livestock, and poultry produced under contract in 2005
- Sales of all miscellaneous agricultural products in 2005
- All government payments received in 2005
- Landlord's share of government payments and crops sold in 2005

#### **6. What section represents the total gross value of agricultural sales, including government agricultural payments?**

- None during 2005
- \$1 - \$999
- \$1000 - \$2499
- \$2500 - \$4999
- \$5000 - \$9999
- \$10,000 - \$24,999
- \$25,000 - \$49,999
- \$50,000 - \$99,999
- \$100,000 - \$249,999
- \$250,000 - \$499,999
- \$500,000 - \$999,999
- \$1,000,000 and over

#### **7. Indicate which of the following crops you produced in 2005. (Choose all that apply.)**

- Winter Wheat
- Barley

- Field corn (grain)
- Other uses of grains (abandoned, silage, green chop, etc.)
- Hay (cut or to be cut for hay)
- Soybeans
- Tobacco
- Peanuts
- Cotton
- Fruit trees, grapes, or nut trees
- Vegetables or melons
- Any berries including strawberries
- Christmas trees
- Woodland (not pastured)
- Pasture (permanent)

Other:

**8. As of June 1, 2005, indicate which of the following livestock (insects) you owned or raised? (Choose all that apply.)**

- Hogs or pigs
- Cattle or calves
- Sheep or lambs
- Goats or kids
- Equine
- Chickens
- Bees
- Ducks
- Rabbits

Other:

**Computer Use Section**

Please rate the importance of each of the following factors.

- 1 - not important
- 2 - minor importance
- 3 - moderate importance
- 4 - major importance
- 5 - extremely important

**9. How important is rapid access to information to your agricultural business?**

- 1  2  3  4  5

**10. How important is the Internet to your agricultural business?**

- 1  2  3  4  5

**11. How important is the computer to your agricultural business?**

- 1  2  3  4  5

**12. How important is Internet-Based Learning to your agricultural business?**

- 1  2  3  4  5

**13. Did you use the Internet to make any of the following purchases? (Choose all that apply.)**

- No  
 Seed  
 Fertilizer  
 Chemicals  
 Veterinary supplies  
 Feed  
 Machinery  
 Replacement parts  
 Farm supplies

Other:

**14. Indicate which of the following agricultural marketing activities you conducted over the Internet? (Choose all that apply.)**

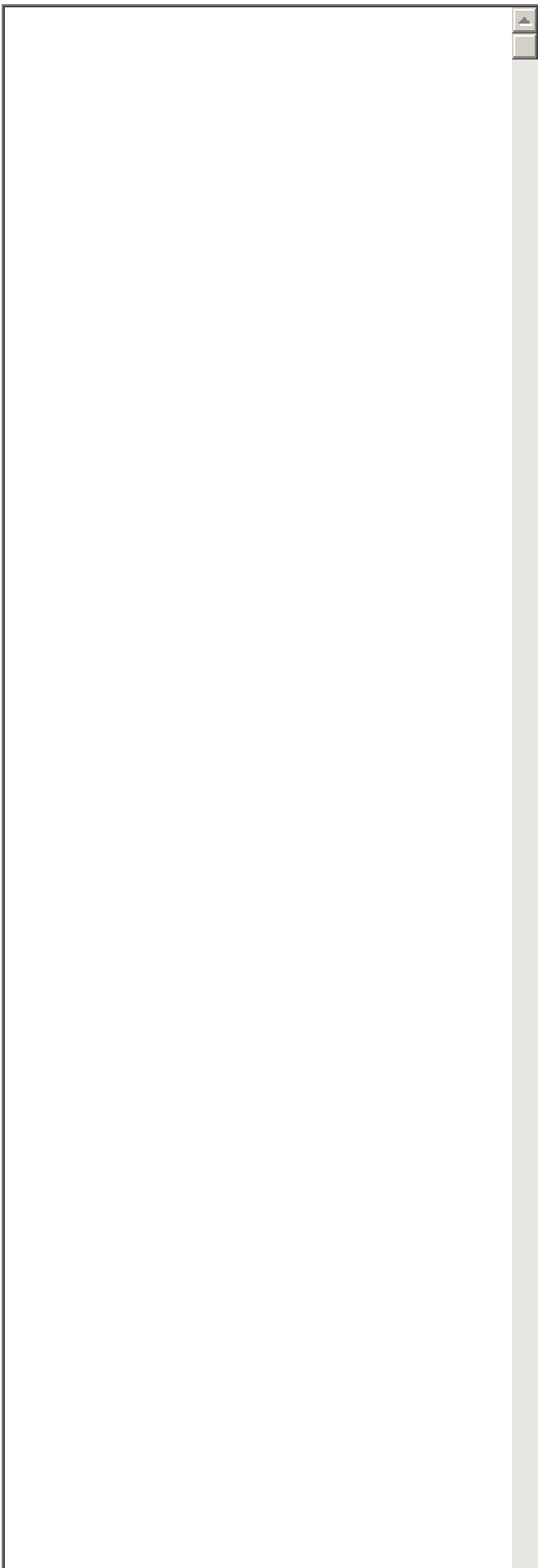
- None  
 Direct sales of commodities  
 On-line crop and livestock auctions  
 On-line market advisory services  
 Commodity price tracking

Other:

**15. Did you use the Internet to conduct any non-agricultural business?**

- No  
 Yes

**If "Yes" please explain:**



**16. What is your primary method of accessing the Internet?**

- Dialup  
 DSL  
 Cable  
 Satellite  
 Wireless  
 Don't Know  
 Other:

**17. How often do you use the Internet?**

- Daily  
 At least once a week  
 At least once a month  
 At least once every six months  
 Less than once every six months  
 Never

**18. Have you ever participated in an Internet-Based Learning activity?**

- Yes  
 No  
 Not sure (explain):

**If "Yes" please explain:**

**19. Who in your farming operation most frequently uses the Internet?**

- Myself  
 Spouse  
 Partner in operation  
 Children  
 Employee  
 other:

**20. Who are the users of the Internet in your farming operation? (Choose all**

that apply.)

- Myself
- Spouse
- Partner in farming operation
- Children
- Employee(s)
- Owner (if other than yourself)

other:

**21. What percentage of your agricultural business records are kept on computer?**

%

Please rate the extent to which the following items are a barrier to your participation in an Internet-based Learning activity:

- 1 - not a barrier
- 2 - minor barrier
- 3 - moderate barrier
- 4 - major barrier
- 5 - extreme barrier

**22. Your level of computer expertise**

1  2  3  4  5

**23. Availability of technology (Internet service, computer access, etc.)**

1  2  3  4  5

**24. Cost of technology**

1  2  3  4  5

**25. Lack of experience/training**

1  2  3  4  5

**26. Support services**

1  2  3  4  5

**27. Access to instructors/specialists (ability to ask questions, interact, etc.)**

1  2  3  4  5

**28. Time constraints associated with job responsibilities**

1  2  3  4  5

**29. Isolation from other program participants**

1  2  3  4  5

**30. Ability to learn the material at a distance**

1  2  3  4  5

**31. Feedback and instructor contact**

1  2  3  4  5

**32. Motivation to participate**

1  2  3  4  5

Thank you for your participation in the first part of this research project. At this time please select and view one of the presentations most relevant to your interests by following the link in your email.

Even if you are unable to view the presentation, we would appreciate your participation in the second survey also linked to your original email message.

Please "Submit" your responses now!



Appendix D:

Internet-based Learning Survey - Post exposure

**INTERNET-BASED LEARNING SURVEY - POST EXPOSURE**

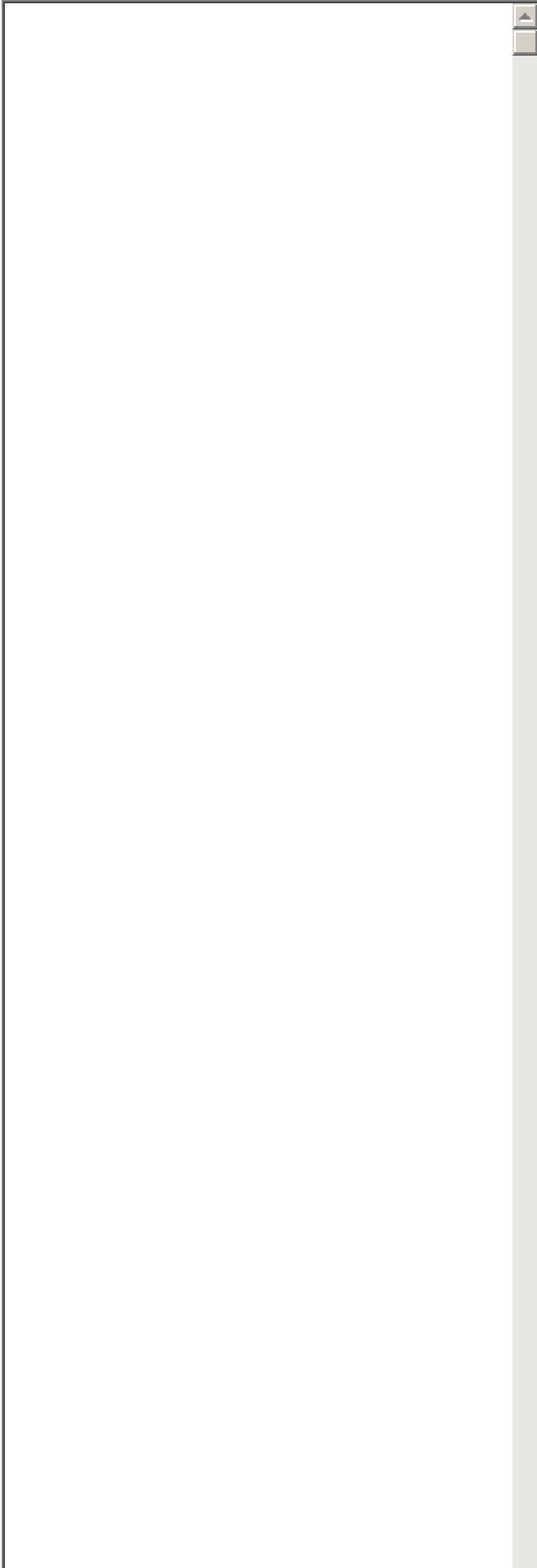
This survey is intended to be filled out by the individual making the day-to-day production decisions for the farming operation. If you as the owner or operator are not making these decisions, please forward this survey to the appropriate person.

**Please enter your six digit survey code.**

**Last name (optional):**

**First name (optional):**

**Mailing address (optional):**



**City (optional):**

**State (optional):**

**ZIP (optional):**

**email address (optional):**

**Presentation viewed (or attempted)?**

- "Forages"
- "Soybeans"
- "Vegetables"
- "Corn and Small Grains"

**1. What portion of the presentation were you able to view?**

- All
- None
- A portion

**If "None" or "A portion" please explain:**

Indicate how strongly you agree or disagree with the following statements.

- 1 - Strongly agree
- 2 - Agree
- 3 - Neutral
- 4 - Disagree
- 5 - Strongly Disagree

**2. I would like to see more Internet-based Learning opportunities in the future.**

- 1  2  3  4  5

**3. I would participate in Internet-based Learning opportunities in the future.**

- 1  2  3  4  5

**4. I believe Internet-based Learning to be an effective way to deliver educational and production information.**

1  2  3  4  5

**5. If given the choice I would prefer to attend a conventional Extension production meeting.**

1  2  3  4  5

Now that you have viewed(or attempted to view)the presentation, please rate the extent to which the following items are a barrier to your participation in an Internet-based Learning activity:

- 1 - not a barrier
- 2 - minor barrier
- 3 - moderate barrier
- 4 - major barrier
- 5 - extreme barrier

**6. Your level of computer expertise**

1  2  3  4  5

**7. Availability of technology (Internet service, computer access, etc.)**

1  2  3  4  5

**8. Cost of technology**

1  2  3  4  5

**9. Lack of experience/training**

1  2  3  4  5

**10. Support services**

1  2  3  4  5

**11. Access to instructors/specialists (ability to ask questions, interact, etc.)**

1  2  3  4  5

**12. Time constraints associated with job responsibilities**

1  2  3  4  5

**13. Isolation from other program participants**

1  2  3  4  5

**14. Ability to learn the material at a distance**

1  2  3  4  5

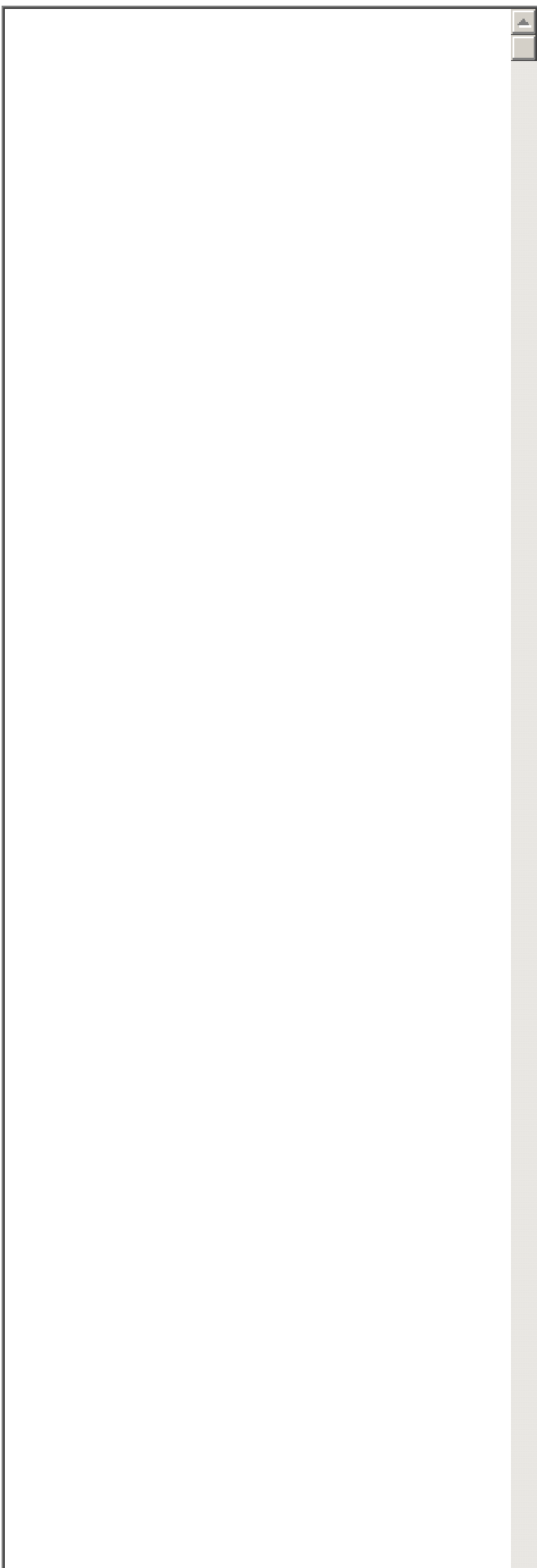
**15. Feedback and instructor contact**

1  2  3  4  5

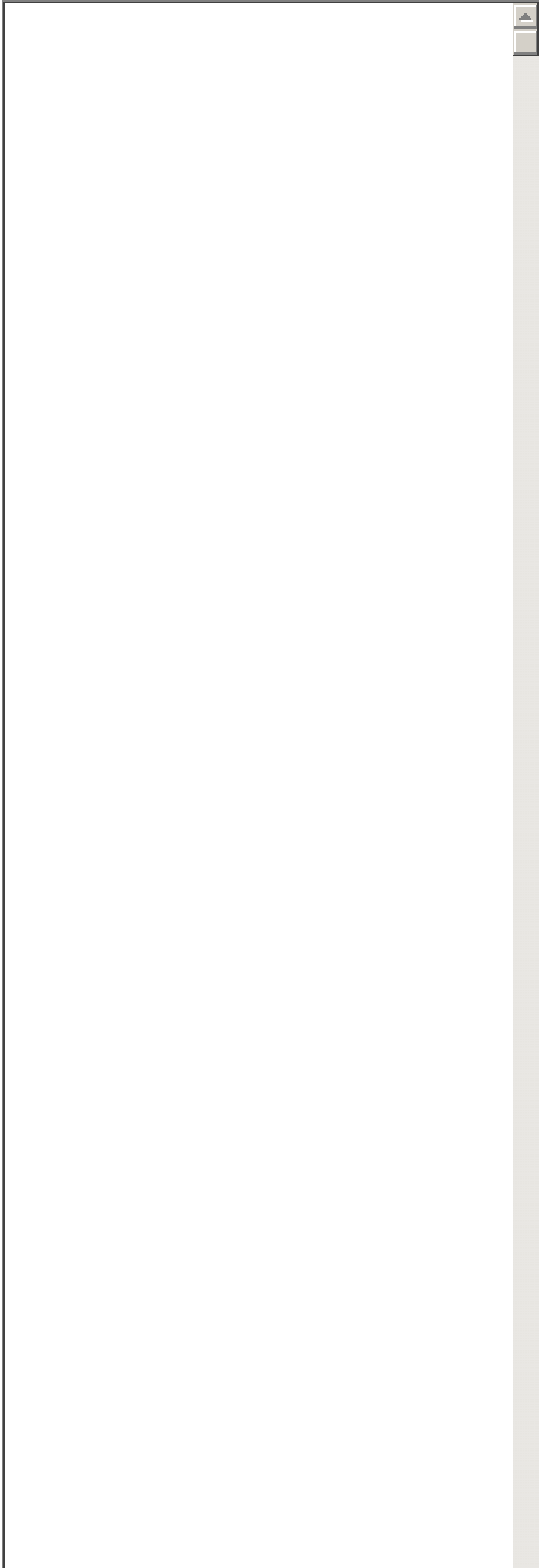
**16. Motivation to participate**

1  2  3  4  5

**17. What would encourage you to participate in future Internet-based Learning activities?**

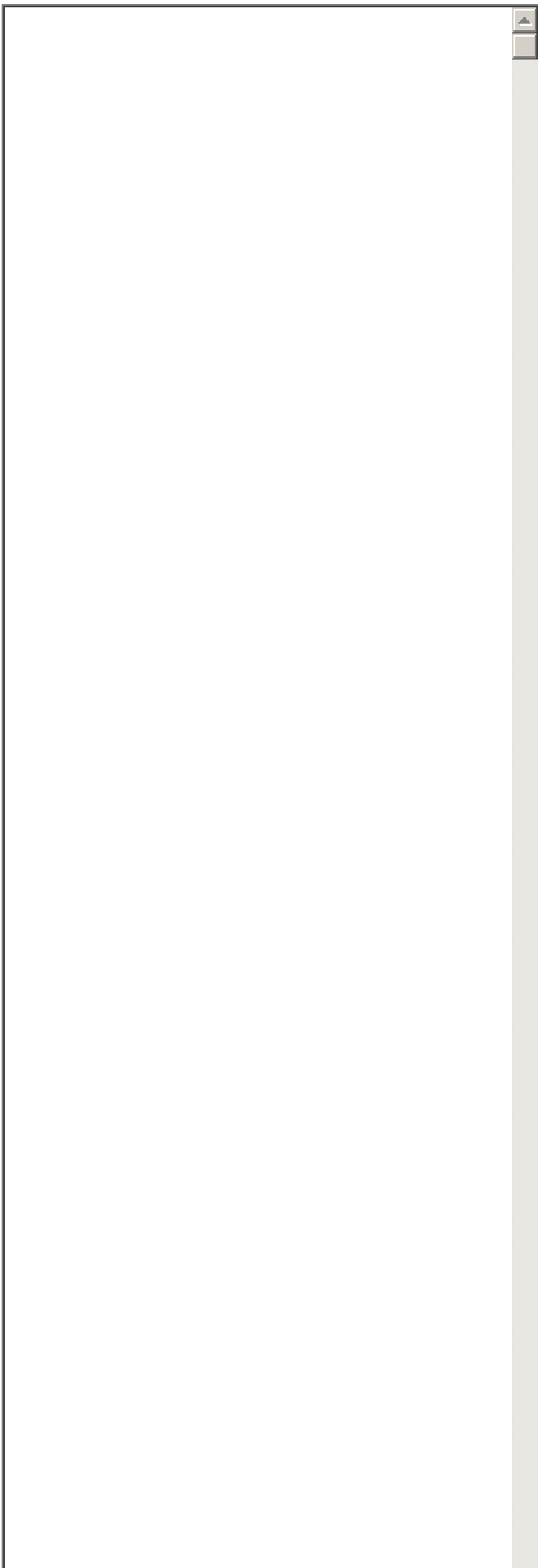


**18. What do you consider to be the greatest benefits to Internet-based Learning activities?**



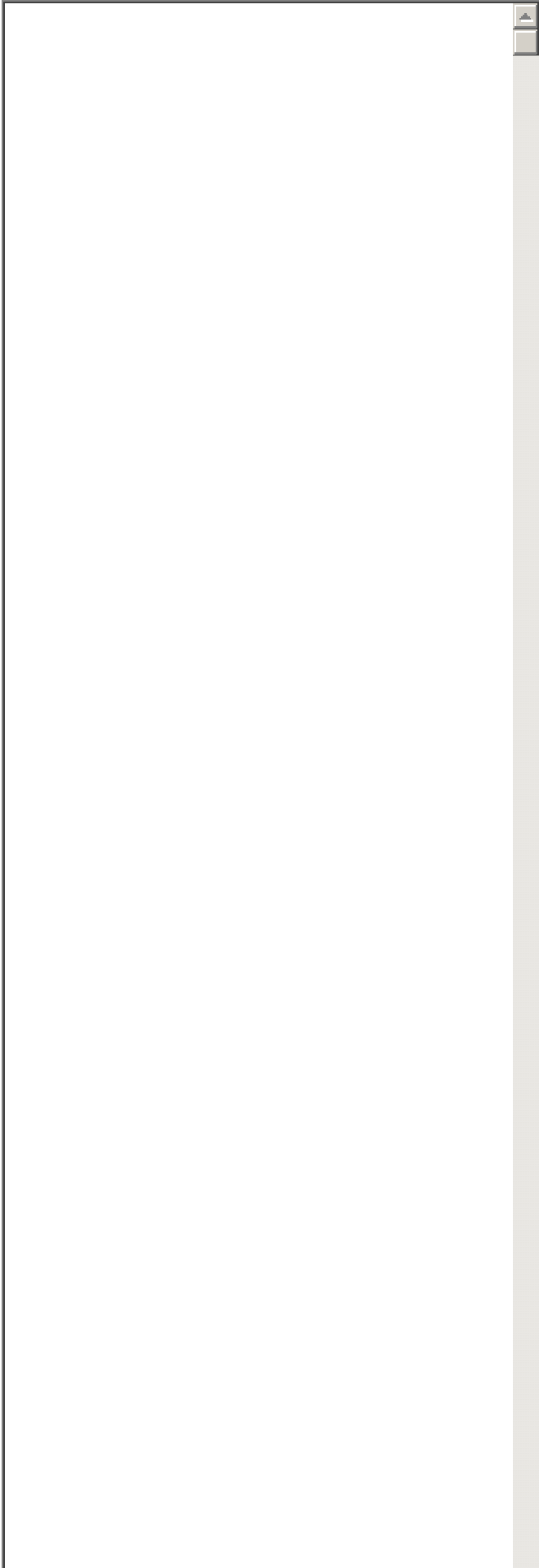


**19. What do you consider to be the greatest barriers to Internet-based Learning activities?**



**20. If you have other comments or suggestions please enter them in the**

**space provided.**



Thank you for your participation in the survey.  
Please "Submit" your responses now.

Appendix E

Letter to participating producers introducing the survey

Prince George Extension Office  
6450 Administration Drive  
P.O. Box 68  
Prince George, VA 23875-2527  
Phone: 804-733-2686 Fax: 804-733-2676  
Mobile: 804-712-6437

September 21, 2006

Dear XXXXX:  
Email address

Virginia Cooperative Extension has a long, rich history of providing in-formal educational programs. Recent advances in technology have made it possible to offer many of these educational opportunities at a distance via the Internet. Unfortunately, Extension personnel lack sufficient information regarding the Internet use patterns of our producers, your preferences related to Internet-based learning systems and the barriers you encounter when using the Internet. Your participation in this research project will help us identify the barriers you encounter when using the Internet and provide Virginia Cooperative Extension with the information we need to develop effective Internet-based learning opportunities. Distance learning via the Internet is attractive because it gives time, situational and place bound learners the opportunity to access information and participate in programs that would otherwise be unavailable. In short, it allows you to access information and programs when you are ready.

The Virginia Tech Institutional Review Board (IRB) has approved this survey (IRB # 06-430). Your participation in this study is voluntary and you may withdraw at any time. All of your answers will be kept in strict confidence and the information will be used only for research and statistical purposes. By law, the data you provide cannot be used for any other purposes without your written consent.

Your local Extension agent identified you as a study participant because you have access to the Internet and are familiar with Extension programs. On **September 28<sup>th</sup>**, you will receive an email with instructions, links to two short surveys and four presentations of which you select only one to view. (If the email address listed above is incorrect, please notify us as soon as possible.) This may sound like a lot of work. However, the questionnaires are designed to move you through the questions rapidly because very little writing is required. Most people find they can complete the entire process in 30 to 45 minutes. We know that you are busy but the information you provide will greatly contribute to our understanding about your preferences related to Internet-based learning and the barriers you encounter when using the Internet. Please assist Virginia Cooperative Extension in providing you with another way to access information efficiently. If you have questions or need help in completing the questionnaire call your local Agricultural Extension Agent or myself. Thank you for your help!

Sincerely yours,

Glenn F. Chappell, II  
Extension Agent, Agriculture and Natural Resources  
Prince George Extension Office



Appendix F

Email to participating producers

Recently you received a letter introducing this research project. Your participation is greatly appreciated and will help us identify the barriers you encounter when using the Internet. It will also provide Virginia Cooperative Extension with the information we need to develop effective Internet-based learning opportunities for your future use. Distance learning via the Internet is attractive because it affords time, situational and place bound learners the opportunity to access information and participate in programs that would otherwise be unavailable. In short, it allows you to access information and programs when you are ready.

The Virginia Tech Institutional Review Board (IRB) has approved this survey (IRB# 06-430), your participation in this study is voluntary, and you may withdraw at any time. All of your answers will be kept in strict confidence and the information will be used only for research and statistical purposes. By law, the data you provide cannot be used for any other purposes without your written consent.

The research questionnaires are designed to move you through the questions rapidly because very little writing is required. Most people find they can complete the entire process in 30 to 45 minutes. We realize that you are busy, but the information you provide will greatly contribute to our understanding about your preferences related to Internet-based learning systems and the barriers you encounter when using the Internet. Please assist Virginia Cooperative Extension in providing you with another way to access information efficiently.

This should be a trouble-free process that can be completed by following the instructions below:

YOUR SURVEY CODE IS:

**After you open the surveys, please enter your survey code at the beginning of each survey so the results can be compared.**

**Step 1.**

Follow the link below to the first survey and complete the pre-exposure survey:

<https://survey.vt.edu/survey/entry.jsp?id=1141498912533>

**Step 2.**

Select one (**only one**) of the following presentations of your choice by clicking on the link below.

Forages: <http://breeze.ag.vt.edu/forages/>

Soybeans: <http://breeze.ag.vt.edu/soybean/>

Vegetable: <http://breeze.ag.vt.edu/vegetables/>

Corn and Small Grain: <http://breeze.ag.vt.edu/cornandsmallgrain/>

**Step 3.**

After viewing or attempting to view one of the presentations please complete the post-exposure survey by following the link below.

<https://survey.vt.edu/survey/entry.jsp?id=1141698259444>

Thank you for your participation. You will be receiving a copy of the results when the research is complete. The presentations used in this project are only a part of a much larger presentation. If you would like to view the entire presentation please send me an email and I will provide you with the link to the full version after the project is completed.

If you have questions regarding this research project, please feel free to contact myself or your local agricultural extension agent.

Glenn F. Chappell, II  
Extension Agent, ANR  
Prince George Extension Office  
P. O. Box 68  
6450 Administration Drive  
Prince George, VA 23875  
804-733-2686 Ext. 215  
Fax: 804-733-2676  
Mobile: 804-712-6437

Appendix G

Post card to participating producers

Dear XXXX,

Recently you should have received a letter and/or an email about a survey that will help Virginia Cooperative Extension understand your preference related to Internet-based learning. Please assist Extension in providing agricultural producers with another way to access information efficiently. If you have questions or need help accessing the online survey, call your local Agricultural Extension agent or myself. Thank you in advance for your support and assistance with this research project.

Glenn F. Chappell, II (gfcii@vt.edu)  
Prince George Extension Office  
Office: 804-733-2686 Mobile: 804-712-6437

Appendix H

REMINDER - Email to participating producers

Recently you should have received an email about a survey that will help Virginia Cooperative Extension understand your preferences related to Internet-based learning. Please assist Extension in providing agricultural producers with another way to access information efficiently. If you have questions or need help accessing the linked online surveys below, call your local Agricultural Extension agent or myself. Thank you in advance for your support and assistance with this research project. **Note: We will be closing the surveys on October 27, 2006.**

The research questionnaires are designed to move you through the questions rapidly because very little writing is required. Most people find they can complete the entire process in 30 to 45 minutes. We realize that you are busy, but the information you provide will greatly contribute to our understanding about your preferences related to Internet-based learning systems and the barriers you encounter when using the Internet. Please assist Virginia Cooperative Extension in providing you with another way to access information efficiently.

This should be a trouble-free process that can be completed by following the instructions below:

YOUR SURVEY CODE IS:

**After you open the surveys, please enter your survey code at the beginning of each survey so the results can be compared.**

**Step 1.**

Follow the link below to the first survey and complete the pre-exposure survey:

<https://survey.vt.edu/survey/entry.jsp?id=1141498912533>

**Step 2.**

Select one (**only one**) of the following presentations of your choice by clicking on the link below.

Forages: <http://breeze.ag.vt.edu/forages/>

Soybeans: <http://breeze.ag.vt.edu/soybean/>

Vegetable: <http://breeze.ag.vt.edu/vegetables/>

Corn and Small Grain: <http://breeze.ag.vt.edu/cornandsmallgrain/>

**Step 3.**

After viewing or attempting to view one of the presentations please complete the post-

exposure survey by following the link below.

<https://survey.vt.edu/survey/entry.jsp?id=1141698259444>

Thank you for your participation. You will be receiving a copy of the results when the research is complete. The presentations used in this project are only a part of a much larger presentation. If you would like to view the entire presentation please send me an email and I will provide you with the link to the full version after the project is completed.

If you have questions regarding this research project, please feel free to contact myself or your local agricultural extension agent.

Glenn F. Chappell, II  
Extension Agent, ANR  
Prince George Extension Office  
P. O. Box 68  
6450 Administration Drive  
Prince George, VA 23875  
804-733-2686 Ext. 215  
Fax: 804-733-2676  
Mobile: 804-712-6437



Appendix I

Letter of Permission to Conduct Study



**Office of Research Compliance**  
1880 Pratt Drive (0497)  
Blacksburg, Virginia 24061  
540/231-4358 Fax: 540/231-0959  
E-mail: ctgreen@vt.edu  
[www.irb.vt.edu](http://www.irb.vt.edu)

FWA00000572( expires 7/20/07)  
IRB # is IRB00000667.

DATE: August 15, 2006

MEMORANDUM

TO: Patricia Sobrero  
Glenn Chappell

FROM: Carmen Green 

SUBJECT: **IRB Exempt Approval:** "Barriers to Internet Based Electronic Learning Systems in the Agricultural Population of Virginia", IRB # 06-430

I have reviewed your request to the IRB for exemption for the above referenced project. I concur that the research falls within the exempt status. Approval is granted effective as of August 15, 2006.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

cc: File

*Invent the Future*

VIRGINIA POLYTECHNIC INSTITUTE UNIVERSITY AND STATE UNIVERSITY

*An equal opportunity, affirmative action institution*

Appendix J

Certificate of Completion - Training in Human Subjects Protection



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# *Certificate of Completion*

This certifies that

*Glenn Chappell*

Has completed

## Training in Human Subjects Protection

On the following topics:

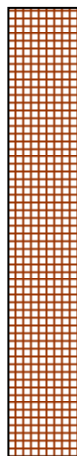
Historical Basis for Regulating Human Subjects Research

The Belmont Report

Federal and Virginia Tech Regulatory Entities, Policies and Procedures

on

*May 22, 2006*



David Moore, IRB Chair



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## Appendix K

The Extent to Which the Selected Demographic Factors of Agricultural Producers  
Related to Their Internet Access of Agricultural Information in Virginia

(Tables 3 – 21)

Table 3

*The Relationship of Agricultural Producers' Age to their Internet Access of Agricultural Information (N = 186)*

Selected factors	Producer age <sup>y</sup>						LSD <sup>z</sup> <i>p</i> = .05
	<30	31-40	41-50	51-60	61-70	>70	
Expertise	1.12	1.76	2.06	1.97	2.34	2.00	ns
Technology	1.25	1.92	2.21	2.11	2.12	1.20	ns
Cost	1.62	1.88	2.18	1.95	2.16	1.20	ns
Experience	1.12 b	2.04 a	2.31 a	2.23 a	2.67 a	2.00 a	.84
Support	1.25	2.36	2.22	2.27	2.61	2.00	ns
Access	1.75	2.32	2.61	2.52	2.91	3.20	ns
Time	3.00	3.00	3.22	2.95	2.91	2.00	ns
Isolation	1.62	1.72	2.29	2.09	2.48	1.60	ns
Distance	1.12	1.60	1.90	1.94	2.00	1.80	ns
Feedback	1.87	2.12	2.43	2.14	2.47	2.75	ns
Motivation	2.12	2.28	2.55	2.35	2.44	3.00	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 3 (continued)

*The Relationship of Agricultural Producers' Age to their Internet Access of Agricultural Information* (N = 186)

---

<sup>y</sup>Means followed by the same letter within rows are not significantly different at P = 0.05 based on Duncan's new multiple range test. <sup>z</sup>LSD = Least significant difference.

Table 4

*The Relationship of Agricultural Producers' Gender to their Internet Access of Agricultural Information (N = 186)*

Selected factors	Producer gender <sup>y</sup>		LSD <sup>z</sup>
	Male	Female	<i>p</i> = .05
Expertise	2.03	1.80	ns
Technology	2.03	2.06	ns
Cost	2.02	2.00	ns
Experience	2.30	2.03	ns
Support	2.32	2.07	ns
Access	2.62	2.26	ns
Time	3.10 a	2.55 b	.45
Isolation	2.21 a	1.64 b	.41
Distance	1.96 a	1.42 b	.38
Feedback	2.32	2.10	ns
Motivation	2.47	2.13	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.



Table 4 (continued)

*The Relationship of Agricultural Producers' Gender to their Internet Access of  
Agricultural Information (N = 186)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. <sup>z</sup>LSD = Least significant difference.

Table 5

*The Relationship of Agricultural Producers' Primary Occupation to their Internet Access of Agricultural Information (N = 186)*

Selected factors	Primary occupation <sup>y</sup>				LSD <sup>z</sup> <i>p</i> = .05
	Farm or ranch work	Hired manager	Retired, still farm/ranch	Other	
Expertise	2.05	1.80	2.27	1.83	ns
Technology	2.12	1.60	1.91	2.05	ns
Cost	2.04	1.60	1.79	2.15	ns
Experience	2.45	1.80	2.45	2.03	ns
Support	2.47	2.00	2.39	2.12	ns
Access	2.72	2.40	2.73	2.45	ns
Time	3.07 ab	2.80 ab	2.42 b	3.25 a	.83
Isolation	2.40	2.50	1.94	1.98	ns
Distance	2.08	1.75	1.72	1.75	ns
Feedback	2.42	2.50	2.31	2.20	ns
Motivation	2.61	2.50	2.18	2.42	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 5 (continued)

*The Relationship of Agricultural Producers' Primary Occupation to their Internet Access of Agricultural Information* (N = 186)

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at P = 0.05 based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 6

*The Relationship of Agricultural Producers' Level of Education to their Internet Access of Agricultural Information (N = 184)*

Selected factors	Level of education <sup>x,y</sup>							LSD <i>p</i> =.05
	1	2	3	4	5	6	7	
Expertise	2.70 a	1.70 b	2.10 ab	2.07 ab	1.50 b	1.62 b	1.83 b	.71
Technology	2.22	1.90	2.22	2.09	1.67	2.62	1.92	ns
Cost	2.26	1.60	2.00	2.12	1.66	2.38	1.92	ns
Experience	3.26 a	1.70 b	2.22 b	2.34 b	1.59 b	2.12 b	2.20 b	.75
Support	2.81 a	1.90 ab	2.42 ab	2.39 ab	1.69 b	2.25 ab	2.25 ab	.81
Access	3.39 a	2.10 bc	2.90 ab	2.46 a-c	1.91 c	2.88 ab	2.67 a-c	.84
Time	3.39 a	2.10 c	3.20 a	3.04 ab	2.91 a-c	2.25 bc	2.92 a-c	.80

Table 6 (continued)

*The Relationship of Agricultural Producers' Level of Education to their Internet Access of Agricultural Information (N = 184)*

Selected factors	Level of education <sup>x,y</sup>							LSD <sup>z</sup> p=.05
	1	2	3	4	5	6	7	
Isolation	2.74 a	1.60 c	2.52 ab	2.07 a-c	1.58 c	1.88 bc	2.50 a-c	.72
Distance	2.65 a	1.78 b	2.06 ab	1.81 b	1.39 b	1.38 b	1.54 b	.65
Feedback	2.54	2.10	2.26	2.28	1.97	2.00	2.83	ns
Motivation	2.74	1.90	2.45	2.48	2.19	1.88	2.50	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

<sup>x</sup>Education – 1 = high school, 2 = vocational/technical school beyond high school, 3 = some college, 4 = college degree, 5 = masters degree, 6 = some post masters graduate school, 7 = any doctorate /medical /law degree. <sup>y</sup>Means followed by the same letter within rows are not significantly different at P = 0.05 based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 7

*The Relationship of Agricultural Producers' Gross Agricultural Sales to their Internet Access of Agricultural Information (N = 186)*

Selected factors	Gross value of agricultural sales including government payments <sup>x,y</sup>											LSD <sup>z</sup> <i>p</i> =.05
	1	2	3	4	5	6	7	8	9	10	11	
Expertise	1.59	2.17	1.86	1.78	1.62	2.00	2.14	2.30	2.00	2.54	2.15	ns
Technology	1.82	2.33	2.36	1.78	1.86	1.73	2.27	2.52	2.20	1.93	1.85	ns
Cost	1.88	2.17	1.93	1.93	1.95	1.91	2.33	2.37	1.73	1.69	2.08	ns
Experience	1.76	2.45	1.93	1.69	1.90	2.36	2.33	2.63	2.53	2.92	2.31	ns
Support	1.56	2.25	2.14	2.08	1.90	2.41	2.64	2.56	2.53	2.42	2.69	ns
Access	2.24	2.33	2.28	2.43	2.20	2.82	2.93	2.67	3.00	2.69	2.77	ns
Time	2.53	3.17	2.36	2.57	3.20	2.64	3.43	3.22	3.07	3.54	3.46	.82
	bc	a-c	c	bc	a-c	a-c	ab	a-c	a-c	a	ab	
Isolation	1.88	2.17	1.86	1.78	1.95	1.95	1.80	2.52	2.43	3.00	2.08	.76
	b	b	b	b	b	b	b	ab	ab	a	b	
Distance	1.65	1.70	2.00	1.26	1.50	1.64	1.93	2.22	2.14	2.31	2.00	ns
Feedback	2.06	2.17	2.38	1.93	2.10	2.23	2.47	2.37	2.21	2.54	2.54	ns
Motivation	2.12	2.83	2.14	2.17	2.20	2.04	2.80	2.59	2.64	2.77	2.46	ns

Table 7 (continued)

*The Relationship of Agricultural Producers' Gross Agricultural Sales to their Internet Access of Agricultural Information (N = 186)*

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Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

<sup>x</sup>Gross value – 1 = None during 2005, 2 = \$1 - \$2499, 3 = \$2500 - \$4999, 4 = \$5000 - \$9999, 5 = \$10,000 - \$24,999, 6 = \$25,000 - \$49,999, 7 = \$50,000 - \$99,999, 8 = \$100,000 - \$249,999, 9 = \$250,000 - \$499,999, 10 = \$500,000 - \$999,999, 11 = \$1,000,000 and over. <sup>y</sup>Means followed by the same letter within rows are not significantly different at P = 0.05 based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 8

*The Relationship between a Producers' Agricultural Internet Purchases and their Internet Access of Agricultural Information (N = 186)*

Selected factors	Agricultural Internet purchases <sup>y</sup>		
	Yes	No	LSD <sup>z</sup> <i>p</i> = .05
Expertise	1.90	2.26	ns
Technology	2.09	1.93	ns
Cost	1.98	2.13	ns
Experience	2.16	2.17	ns
Support	2.25	2.37	ns
Access	2.55	2.62	ns
Time	2.96	3.13	ns
Isolation	2.08	2.32	ns
Distance	1.80	1.98	ns
Feedback	2.25	2.37	ns
Motivation	2.29 a	2.76 b	.37

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.



Table 8 (continued)

*The Relationship between a Producers' Agricultural Internet Purchases and their  
Internet Access of Agricultural Information (N = 186)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at P = 0.05 based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 9

*The Relationship of Agricultural Producer Internet Use to Conduct Non-agricultural Business and their Internet Access of Agricultural Information (N = 186)*

Selected factors	Non-agricultural Internet business <sup>y</sup>		
	Yes	No	LSD <sup>z</sup> <i>p</i> = .05
Expertise	1.92	2.09	ns
Technology	1.97	2.16	ns
Cost	1.91	2.15	ns
Experience	2.19	2.32	ns
Support	2.27	2.27	ns
Access	2.62	2.51	ns
Time constraints	3.00	3.04	ns
Isolation	2.03	2.28	ns
Distance	1.75	1.99	ns
Feedback	2.30	2.28	ns
Motivation	2.43	2.44	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 9 (continued)

*The Relationship of Agricultural Producer Internet Use to Conduct Non-agricultural Business and their Internet Access of Agricultural Information (N = 186)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at P = 0.05 based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 10

*The Relationship of Agricultural Producers' Method of Internet Access to their Internet Access of Agricultural Information (N = 186)*

Selected factors	Method of Internet access <sup>y</sup>						LSD <sup>z</sup> <i>p</i> =.05
	Dialup	DSL	Cable	Satellite	Wireless	Other	
Expertise	2.26 a	1.67 ab	1.78 ab	1.71 ab	1.70 ab	1.25 b	.83
Technology	2.58 a	1.29 b	1.56 ab	2.00 ab	1.90 ab	2.00 ab	.95
Cost	2.30	1.68	1.78	1.87	1.80	1.75	ns
Experience	2.43	2.02	2.11	1.64	2.20	2.25	ns
Support	2.44	2.11	1.94	2.27	2.20	1.67	ns
Access	2.74	2.26	2.33	2.53	2.30	2.25	ns
Time	3.15 ab	2.60 b	2.94 ab	3.67 a	2.70 ab	2.25 b	.93
Isolation	2.17	2.02	2.06	2.33	1.80	2.25	ns
Distance	1.92	1.93	1.61	1.73	1.80	1.50	ns
Feedback	2.32	2.18	2.06	2.73	2.10	2.50	ns
Motivation	2.46	2.25	2.28	2.80	2.70	2.00	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 10 (continued)

*The Relationship of Agricultural Producers' Method of Internet Access to their Internet Access of Agricultural Information (N = 186)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 11

*The Relationship of Agricultural Producer' Frequency of Internet Use to their Internet Access of Agricultural Information (N = 186)*

Selected factors	Frequency of Internet use <sup>y</sup>			LSD <sup>z</sup> <i>p</i> = .05
	Daily	Once week	Once a month or less	
Expertise	1.90 b	2.03 b	3.50 a	.66
Technology	1.95	2.31	2.75	ns
Cost	1.96	2.14	2.12	ns
Experience	2.11 b	2.36 b	4.00 a	.70
Support	2.22	2.34	2.87	ns
Access	2.48	2.75	3.37	ns
Time	2.92 b	2.97 b	4.50 a	.74
Isolation	2.08 b	2.11 b	3.12 a	.69
Distance	1.80	1.86	2.62	ns
Feedback	2.29	2.22	2.25	ns
Motivation	2.38	2.50	2.75	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 11 (continued)

*The Relationship of Agricultural Producer' Frequency of Internet Use to their Internet Access of Agricultural Information (N = 186)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 12

*The Relationship of Agricultural Producers' Previous Participation in Internet-based Learning to their Internet Access of Agricultural Information (N = 186)*

Selected factors	Previous participation in Internet-based learning <sup>y</sup>		LSD <sup>z</sup> <i>p</i> = .05
	Yes	No	
Expertise	1.82	2.08	ns
Technology	2.04	2.05	ns
Cost	1.98	2.20	ns
Experience	2.02	2.35	ns
Support	2.11	2.34	ns
Access	2.36	2.66	ns
Time	3.11	2.94	ns
Isolation	2.13	2.12	ns
Distance	1.62 b	1.94 a	.31
Feedback	2.30	2.27	ns
Motivation	2.21	2.51	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.



Table 12 (continued)

*The Relationship of Agricultural Producer' Previous Participation in Internet-based Learning to their Internet Access of Agricultural Information (N = 186)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 13

*The Relationship of the Most Frequent Users of the Internet in the Agricultural Operation to their Internet Access of Agricultural Information (N = 186)*

Selected factors	Most frequent users of the Internet in the operation <sup>y</sup>						LSD <sup>z</sup>
	Myself	Spouse	Partner	Children	Employee	Other	<i>p</i> = .05
Expertise	1.83	2.55	2.17	2.67	2.50	2.25	ns
Technology	2.01	2.24	2.17	2.67	1.50	2.50	ns
Cost	1.96	2.17	1.67	2.33	2.50	1.75	ns
Experience	2.05	2.96	2.17	3.00	2.50	3.25	ns
Support	2.23	2.46	2.17	3.33	3.00	2.33	ns
Access	2.51	2.72	2.50	3.67	3.50	3.00	ns
Time	2.95	3.28	3.67	3.33	2.50	2.50	ns
Isolation	2.08 b	2.28 b	1.83 b	4.33 a	2.00 b	1.75 b	1.38
Distance	1.79	2.10	1.67	2.67	2.00	1.25	ns
Feedback	2.31	2.24	2.17	2.33	2.00	1.75	ns
Motivation	2.40	2.52	3.00	3.00	1.50	1.50	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 13 (continued)

*The Relationship of the Most Frequent Users of the Internet in the Agricultural Operation to their Internet Access of Agricultural Information (N = 186)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 14

*The Relationship of Agricultural Producer' Percent of Agricultural Business Records on Computer to their Internet Access of Agricultural Information (N = 186)*

Selected factors	Percent of Agricultural Business Records on Computer <sup>y</sup>									
	100	98	90	75	50	30	20	10	1	LSD <sup>z</sup>
	99	95	80	60	40	25	15	5	0	<i>p</i> = .05
Expertise	1.86	2.00	1.90	2.00	1.84	2.00	2.28	1.88	1.00	
	2.00	2.11	2.17	3.00	1.00	2.28	3.00	2.33	2.05	ns
Technology	1.56	2.50	2.27	2.00	1.84	2.67	3.00	2.50	1.00	
	2.25	2.89	1.67	4.00	1.00	2.71	3.00	1.67	2.23	ns
Cost	1.67	3.00	2.64	1.67	1.89	2.00	3.00	2.62	1.00	
	1.50	2.22	2.08	3.00	1.00	1.71	4.00	1.00	2.21	ns
Experience	2.09	2.50	2.09	1.89	2.39	2.00	3.71	2.50	1.00	
	2.25	2.22	2.58	3.00	1.00	2.14	4.00	2.67	2.24	ns
Support	1.86	3.00	2.18	2.11	2.21	2.33	3.00	2.62	1.00	
	2.50	3.89	2.63	4.00	1.00	2.43	4.00	2.67	2.23	ns

Table 14 (continued)

*The Relationship of Agricultural Producer' Percent of Agricultural Business Records on Computer to their Internet Access of Agricultural Information (N = 186)*

Selected factors	Percent of Agricultural Business Records on Computer <sup>y</sup>									
	100	98	90	75	50	30	20	10	1	LSD <sup>z</sup>
	99	95	80	60	40	25	15	5	0	<i>p</i> = .05
Access	2.40	3.00	2.50	1.89	2.47	2.33	2.57	3.12	1.00	
	3.75	3.00	2.75	4.00	1.00	2.29	4.00	3.33	2.63	ns
Time	2.81	2.00	3.60	3.11	3.00	2.67	3.14	3.00	4.00	
	3.25	3.44	3.83	4.00	3.00	3.00	4.00	2.00	2.76	ns
Isolation	1.93	2.50	2.00	2.00	2.42	2.00	2.57	2.12	3.00	
	2.25	2.33	2.50	2.00	3.00	1.71	4.00	1.00	2.13	ns
Distance	1.79	1.50	1.64	1.75	1.82	1.67	2.28	2.12	1.00	
	1.25	2.00	2.33	2.00	1.00	1.57	3.00	1.33	1.97	ns
Feedback	2.07	2.50	2.18	2.25	2.37	2.67	2.43	2.37	1.00	
	2.25	2.44	2.83	2.00	3.00	2.14	4.00	1.33	2.32	ns
Motivation	2.21	1.50	2.91	2.38	2.21	2.33	2.28	3.12	2.00	
	2.25	2.33	2.83	3.00	2.00	2.14	3.00	1.67	2.55	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 14 (continued)

*The Relationship of Agricultural Producer' Percent of Agricultural Business Records on Computer to their Internet Access of Agricultural Information (N = 186)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 15

*The Relationship of Agricultural Producer' Age to their Internet Access of Agricultural Information Post-exposure (N = 154)*

Selected factors	Producer age <sup>y</sup>						LSD <sup>z</sup> <i>p</i> = .05
	<30	31-40	41-50	51-60	61-70	>70	
Expertise	1.00	1.44	1.69	1.43	2.17	1.80	ns
Technology	1.17	1.76	2.02	1.65	1.58	1.40	ns
Cost	1.50	1.36	1.70	1.61	1.43	1.20	ns
Experience	1.17	1.52	1.84	1.71	2.25	1.80	ns
Support	1.33	1.80	2.14	1.78	2.00	2.00	ns
Access	1.83	2.42	2.43	2.37	2.50	2.40	ns
Time	2.17	2.72	2.75	2.67	2.46	2.00	ns
Isolation	1.83	1.96	1.98	1.93	2.17	2.20	ns
Distance	1.33	1.40	1.76	1.54	1.64	2.20	ns
Feedback	1.83	2.52	2.49	2.39	2.39	2.80	ns
Motivation	2.00	2.16	2.09	2.11	2.25	2.60	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 15 (continued)

*The Relationship of Agricultural Producer' Age to their Internet Access of Agricultural Information Post-exposure (N = 154)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at P = 0.05 based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.



Table 16

*The Relationship of Agricultural Producer' Gender to their Internet Access of Agricultural Information Post-exposure (N = 154)*

Selected factors	Producer gender <sup>y</sup>		LSD <sup>z</sup> <i>p</i> = .05
	Male	Female	
Expertise	1.64	1.54	ns
Technology	1.76	1.67	ns
Cost of technology	1.56	1.54	ns
Experience	1.86	1.46	ns
Support	1.97	1.62	ns
Access	2.44	2.12	ns
Time	2.67	2.38	ns
Isolation	2.04	1.70	ns
Distance	1.64	1.42	ns
Feedback	2.42	2.42	ns
Motivation	2.18	1.91	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 16 (continued)

*The Relationship of Agricultural Producer' Gender to their Internet Access of  
Agricultural Information Post-exposure (N = 154)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at P = 0.05 based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 17

*The Relationship of Agricultural Producer' Primary Occupation to their Internet Access of Agricultural Information Post-exposure (N = 154)*

Selected factors	Primary occupation <sup>y</sup>				LSD <sup>z</sup> <i>p</i> = .05
	Farm or ranch work	Hired manager	Retired, still farm/ranch	Other	
Expertise	1.62	1.33	2.15	1.43	ns
Technology	1.73	1.33	1.63	1.87	ns
Cost	1.56	1.67	1.35	1.64	ns
Experience	1.80	1.33	2.26	1.64	ns
Support	1.93	1.00	2.00	1.96	ns
Access	2.60	1.33	2.33	2.38	ns
Time	2.70	2.00	2.18	2.85	ns
Isolation	2.16	1.67	2.00	1.87	ns
Distance	1.66	1.67	1.65	1.55	ns
Feedback	2.56	1.67	2.41	2.40	ns
Motivation	2.14	1.33	2.33	2.12	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 17 (continued)

*The Relationship of Agricultural Producer' Primary Occupation to their Internet Access of Agricultural Information Post-exposure (N = 154)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 18

*The Relationship of Agricultural Producer' Level of Education to their Internet Access of Agricultural Information Post-exposure (N = 154)*

Selected factors	Level of education <sup>x,y</sup>							LSD <sup>z</sup> <i>p</i> =.05
	1	2	3	4	5	6	7	
Expertise	2.80 a	1.88 b	1.63 b	1.53 b	1.13 b	1.33 b	1.54 b	.77
Technology	2.07	2.38	1.74	1.77	1.39	2.17	1.27	ns
Cost	2.00	1.87	1.48	1.58	1.22	1.83	1.27	ns
Experience	2.93 a	2.12 b	1.88 bc	1.70 bc	1.13 c	2.00 bc	1.54 bc	.79
Support	2.60 a	1.88 a-c	2.12 ab	1.92 a-c	1.26 c	1.60 bc	2.00 a-c	.74
Access	2.73	2.75	2.37	2.43	1.91	2.83	2.27	ns
Time	3.33	2.62	2.69	2.55	2.35	2.80	2.27	ns

Table 18 (continued)

*The Relationship of Agricultural Producer' Level of Education to their Internet Access of Agricultural Information Post-exposure (N = 154)*

Selected factors	Level of education <sup>x,y</sup>							LSD <sup>z</sup>
	1	2	3	4	5	6	7	<i>p</i> =.05
Isolation	2.33	2.12	2.11	1.88	1.86	2.00	1.91	ns
Distance	1.71	2.00	1.74	1.58	1.39	1.33	1.60	ns
Feedback	2.80	2.62	2.29	2.43	2.13	2.50	2.60	ns
Motivation	2.47	2.38	2.26	2.12	1.82	2.00	2.00	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

<sup>x</sup>Education – 1 = high school, 2 = vocational/technical school beyond high school, 3 = some college, 4 = college degree, 5 = masters degree, 6 = some post masters graduate school, 7 = any doctorate /medical /law degree. <sup>y</sup>Means followed by the same letter within rows are not significantly different at *P* = 0.05 based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 19

*The Relationship of Agricultural Producer' Gross Value of Agricultural Sales to their Internet Access of Agricultural Information Post-exposure (N = 154)*

Gross value of agricultural sales including government payments <sup>x,y</sup>												
Selected factors												LSD <sup>z</sup>
	1	2	3	4	5	6	7	8	9	10	11	p=.05
Expertise	1.68	1.45	1.36	1.50	1.70	1.56	1.71	1.74	1.91	2.00	1.38	ns
Technology	1.64	1.64	1.73	1.75	2.12	1.44	1.86	2.10	1.91	1.20	1.38	ns
Cost	1.67	1.36	1.09	1.45	1.70	1.33	1.57	2.10	1.54	1.40	1.38	ns
Experience	1.81	1.54	1.54	1.33	1.76	1.78	2.07	2.06	1.91	2.20	1.87	ns
Support	1.91	1.81	2.18	1.58	1.82	1.78	2.23	2.10	2.00	1.50	2.00	ns
Access	2.54	2.18	2.45	2.00	2.24	2.06	3.00	2.68	2.60	1.50	2.37	ns
Time	2.72	2.72	1.91	2.17	3.00	1.94	2.77	2.89	2.91	3.00	3.00	ns
Isolation	2.23	1.91	2.18	1.73	1.94	1.61	1.86	2.10	2.18	2.00	2.14	ns
Distance	1.63	1.45	1.54	1.45	1.65	1.56	1.86	1.56	1.54	1.60	2.00	ns
Feedback	2.64	2.27	2.54	2.18	2.29	2.33	2.78	2.53	2.27	2.00	2.38	ns
Motivation	1.91	2.27	2.27	2.00	2.18	1.76	2.33	2.32	2.54	2.00	2.12	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 19 (continued)

*The Relationship of Agricultural Producer' Gross Value of Agricultural Sales to their Internet Access of Agricultural Information Post-exposure (N = 154)*

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<sup>x</sup>Gross value – 1 = None during 2005, 2 = \$1 - \$2499, 3 = \$2500 - \$4999, 4 = \$5000 - \$9999, 5 = \$10,000 - \$24,999, 6 = \$25,000 - \$49,999, 7 = \$50,000 - \$99,999, 8 = \$100,000 - \$249,999, 9 = \$250,000 - \$499,999, 10 = \$500,000 - \$999,999, 11 = \$1,000,000 and over. <sup>y</sup>Means followed by the same letter within rows are not significantly different at P = 0.05 based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.



Table 20

*The Relationship of Agricultural Producer' Presentation Selection to their Internet**Access of Agricultural Information Post-exposure (N = 154)*

Selected factors	Presentation viewed <sup>y</sup>				LSD <sup>z</sup> <i>p</i> = .05
	Corn and small grains	Forages	Soybeans	Vege- tables	
Expertise	1.88 ab	1.49 b	2.42 a	1.32 b	.61
Technology	1.62	1.76	1.67	1.91	ns
Cost	1.80	1.47	1.83	1.41	ns
Experience	2.00 ab	1.67 b	2.50 a	1.45 b	.63
Support	2.04	1.89	2.17	1.72	ns
Access	2.44	2.37	2.82	2.23	ns
Time	2.88	2.52	2.92	2.59	ns
Isolation	2.00	1.92	2.25	2.00	ns
Distance	1.48	1.61	1.67	1.50	ns
Feedback	2.38	2.54	2.17	2.18	ns
Motivation	2.12	2.11	2.73	1.95	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 20 (continued)

*The Relationship of Agricultural Producer' Presentation Selection to their Internet*

*Access of Agricultural Information Post-exposure (N = 154)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

Table 21

*The Relationship of the portion of the Presentation Viewed by the Agricultural Producer to their Internet Access of Agricultural Information Post-exposure (N = 154)*

Selected factors	Portion of presentation viewed <sup>y</sup>			LSD <sup>z</sup>
	A portion	All	None	$p = .05$
Expertise	2.00 b	1.37 c	2.64 a	.52
Technology	2.76 a	1.52 b	2.09 b	.62
Cost	2.06 a	1.42 b	1.82 ab	.47
Experience	2.12 b	1.56 b	2.73 a	.56
Support	2.00 ab	1.80 b	2.48 a	.52
Access	2.53	2.37	2.41	ns
Time	3.18 a	2.46 b	3.00 ab	.61
Isolation	2.06	1.96	2.09	ns
Distance	1.88 ab	1.50 b	1.95 a	.41
Feedback	2.59	2.46	2.18	ns
Motivation	2.12	2.09	2.38	ns

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Table 21 (continued)

*The Relationship of the portion of the Presentation Viewed by the Agricultural Producer to their Internet Access of Agricultural Information Post-exposure (N = 154)*

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<sup>y</sup>Means followed by the same letter within rows are not significantly different at P = 0.05 based on Duncan's new multiple range test. <sup>z</sup>LSD - Least significant difference.

## Appendix L

Qualitative Responses to the Internet-based Learning Survey - Post exposure

(Tables 26 – 29)

Table 26

*Responses to the survey question, "What would encourage you to participate in future Internet-based learning activities?"*

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1. If I could get affordable Internet access to my home.
  2. A larger choice of topics and instructor feedback.
  3. Access to higher speed Internet. I had to wait for the system but buffer and that is irritating. The material has to be very high quality. I can read crop statistics elsewhere, easier and quicker but if there is material that is directly relevant to production agriculture and has little "fluff" I would be more likely to view it. This isn't about showing what instructors can look up and put in PowerPoint but should be about information that can improve my production.
  4. Topic of need, I know forages List topics available.
  5. Having high speed service
  6. Relevant topics
  7. I LIKE MEETINGS BETTER, BECAUSE I CAN TALK FACE TO FACE WITH PEOPLE.
  8. Topics of interest to me.
  9. If there was an interesting topic i would probably try
  10. Better Internet service
  11. High speed connection. Took over 1.5 hours to down load the presentation.
  12. I consider a faster connection to be the necessary prerequisite. If and when that happens, then I can make a better evaluation of what may be available.
-

Table 26 (continued)

*Responses to the survey question, "What would encourage you to participate in future Internet-based learning activities?"*

---

13. Knowledge of opportunity to get detailed information about subjects I'm personally interested in.

14. A better computer and faster Internet capabilities.

15. An activity that is relevant to my interests.

16. Having activities that cover current problem areas on the farm Expanding to machinery management issues such as calibrating sprayers, setting planters and combines Shop ideas such as tips on welding, tool use and care, storage solutions for parts, lubricants, and hardware Grain storage tips and solutions. Data and engineering information on hydraulics, farm electrical issues, farm road construction, beaver solutions,

17. INTEREST IN THE SUBJECT

18. Opportunity and availability. Time

19. Having it available.

20. Encouraged to participate in any learning activities that will help me in my farming operation primarily livestock.

21. More details

22. Topics which are specific to a problem or production system or are on a timely matter which would allow me to learn about the topic without having to travel or schedule a trip. Information needs to be specific enough to make the time worth while but not so detailed that interaction with an instructor would be necessary.

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Table 26 (continued)

*Responses to the survey question, "What would encourage you to participate in future Internet-based learning activities?"*

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23. If high speed Internet was available in rural areas I would be more interested in programs of this type. We had to fight with our phone company to get the tiny speed we have on dialup. Cable is not coming. DSL is not coming. The only other option we have is satellite which is somewhat cost prohibitive but will probably be the route we go but most likely only when we need a new computer. As Extension sits in their "Ethernet Towers" they need to remember that the majority of rural folks don't have computer speed that is capable of handling these types of programs. I suspect that your urban consumers (who have access to high speed Internet) would love Extension to make available horticulture presentations this way. But when you have slow dialup, you prefer to be able to locate information that is in print without a lot of pictures that take forever to download. Agriculture is generally in your rural areas that do not have high speed Internet. Another advantage of your traditional "real life" programs for rural folks is that they have an opportunity to see each other and talk about farming or local news. Most of us are somewhat isolated from each other and these "real life" programs provide a needed "social" event as well.

24. Informed topics such as what type of forages to grow in my area, where to get seed, how to plant, when to plant, where to obtain equipment needed.

25. Interactive lessons

26. Need to keep up with what is going on in my field.

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Table 26 (continued)

*Responses to the survey question, "What would encourage you to participate in future Internet-based learning activities?"*

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27. Programs that are interesting to my field, Agricultural Education. Also programs that I can pass along to my students and use as a resource for my individual class presentation. Any Internet program that I would find beneficial would have to have a "hands-on" activity to go along with the presentation.

28. An interesting topic

29. The interaction with other producers at meetings is a very important part of the learning process because you are not only learning or reviewing a production practice or practices; you are learning the application the information to this part of Virginia/ to my particular farm.

30. Specific topics that I am especially interested in (cattle production for instance)

31. Need for answers

32. If they worked.

33. Knowledge about the availability of the lessons and how to get to them. I am very interested in learning this way because I can get basic knowledge about the crops and then discuss the details on the phone or in person once I have achieved a basic knowledge.

34. No "live" classes available.

35. Would like to see training for the nursery industry

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Table 26 (continued)

*Responses to the survey question, "What would encourage you to participate in future Internet-based learning activities?"*

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36. I believe strongly in Internet learning and use it if it doesn't take forever to download. No pics! Skip the fancy logos. Just the facts, maam. Have limited time and will only use what I need. Verbosity not desired. Keep info concise and to the point. Pics OK if essential to a vet presentation or something that just has to be seen to be understood. Small pics that won't crash my system. We need cheap, fast service. Am now on dialup which is hopeless, but am not willing to pay one calf per year for a faster service.

37. More in for on research-new varieties of forages, beef management enterprises.

38. Higher speed Internet connection

39. Ability to access information when I have the time. Ability to submit questions to a specialist. Maybe a follow-up site could list all the questions/answers that farmers submit on the presentation. This would give all farmers access to the questions submitted by all farmers and the answers given by the specialist.

40. Worthwhile topics

41. You review it when it is convenient for me. If the topics were of interest to my farming operation.

42. Pilot project (a trial virtual meeting)

43. The limited availability is the only draw back at this time.

44. Having up-to-date information available when I need it.

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Table 26 (continued)

*Responses to the survey question, "What would encourage you to participate in future Internet-based learning activities?"*

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45. Power point presentations are boring. I prefer to read notes on my own, and see photos about a topic while someone is talking to me.

46. Having a presentation that you could save to watch again or print out to go back to for review

47. Programs that would benefit my operation

48. Scope of programs offered

49. Topics offered would need to be informational to our operation and concerns.  
Availability to start and stop presentations if necessary.

50. Programs offered and content

51. A subject that I am interested in.

52. I want to keep up to date with the newest information and technology available to our farm and i do not have the time to drive to an extension meeting that is most often a good distance from our farm, plus i can view this information anytime, at night, like now when it is raining outside, for me its the new way to learn, you should film all your production related meetings and make the info available to those of us who can not attend

53. Important topics that would improve profit or make life easier on the farm.

54. Topics that i think would help make better day today decisions on the farm for income.

55. Topics tuned to areas of interest.

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Table 26 (continued)

*Responses to the survey question, "What would encourage you to participate in future Internet-based learning activities?"*

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56. If it were the only way to get the information.

57. Topics that are important to profitability. Cutting edge technology. Except for local news all info can and should be gained in the timely Internet age.

58. Activities pertinent to our operation/ also those that would apply to our area/market

59. Ability to do things on the computer, my wife operates the computer as I look over her shoulder Was not able to open the "forage program" Vt.edu will not accept e-mail from my server (gemlink)

60. Make sure they are done in off season-during winter months

61. The opportunity to select subject matter to be made available

62. More time with teachers and be able to email stuff to them and find out there point of view

63. Keep programs very simple. Remember, the people that write and develop these Internet programs are experts. I am a simple farmer. I need everything explained to me and I need the information and programs very simple and elementary.  $2+2 = 4$ ... Not,  $1+7=8+8=16-8$  divide by 2 =4.

64. I will if time permits as I farm, but also I am a full time auto technology instructor at a vocational school and sometimes my calendar is full. I would participate when time permits.

65. Relevance to my activities

66. Have the program material on what is needed in my case.

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Table 26 (continued)

*Responses to the survey question, "What would encourage you to participate in future Internet-based learning activities?"*

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67. Being short and not asking to much of my time to participate.
  68. Making sure the info was worth viewing and was up to date and timely
  69. Topics and instructors
  70. More personal time
  71. Specific topics that I would like to have more information about.
  72. Interesting and informative topics no charge power point type presentations are good my employer blocks video unfortunately
  73. I do not need encouragement to participate in the future. I enjoy the task of trying to stay up with the latest technology in my occupation.
  74. Faster Internet service!!
  75. Classes offered
  76. HIGH SPEED INTRNET AT HOME. LOW COST UNDERSTANDABLE LEARNING
  77. High speed Internet.
  78. Being able to access the media player
  79. Availability of Internet connectivity. I connect well under 56k on dial up.
  80. Availability would like to see private applicator pesticide training available online.
  81. New Technology that can help my farming needs.
-

Table 26 (continued)

*Responses to the survey question, "What would encourage you to participate in future Internet-based learning activities?"*

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82. Ability to print material for later review, references that can be reviewed later

83. New Information

84. If I had high speed Internet service. dialup causes me to not surf the web much because it takes so long to download items of interest, so I just don't do it.

85. Being able to load the activities

86. Learning activities that I could access easily & that fit my cow-calf enterprise.

87. More Detailed Pictures with the information

88. Seems like a good venue for presenting good practices for animal husbandry for cow/calf operations

89. It depends on the topics

90. Interesting or relevant topics

91. Better Internet access. In most rural areas of the state the access is not very fast.

Someone should look at DSL/Broadband availability in rural areas before getting to far ahead with Internet learning.

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Table 26 (continued)

*Responses to the survey question, "What would encourage you to participate in future Internet-based learning activities?"*

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92. Good Application would be Pesticide Applicator recertification as long there are short tests interspersed throughout the presentation. This could also work for part of the Beef Quality Assurance Program.

93. Specific topics that are highly focused on my operation - sustainable grass finished beef for retail. Instructors who brought specific experience or research results to the table. Topics that were highly focused on current challenges faced by grass finished beef producers, such as - RFID use, Source Verified calf sales, drought tolerant summer perennials, summer labor for square baling hay and other tasks, etc.

94. To be able to ask specific questions that may apply to my operation and get timely feed back

95. Discussing small ruminants weed identify class

96. More spare time and awareness of opportunities

97. Not having slow dial up would help.

98. High quality programs that match my needs

99. Topics of interest- government subsidy opportunities (conservation) and equine programs

100. Subject matter

101. Timely topics

102. Strawberry presentation

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Table 26 (continued)

*Responses to the survey question, "What would encourage you to participate in future Internet-based learning activities?"*

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103. BQA TRAINING

104. As soon as I get a better service provider (DSL). Short segments, broken down so if you have to come back to it you don't have to listen to the whole thing again.

105. Material or subject matter that I find interesting.

106. If it was tied to certifications that would separate me from other producers ie VQA program. Possibly a cost share program tied to the training for practical application. Giving some type marketing or monetary incentive.

107. If the course is covering something I need to know to further expand and improve my business.

108. A program that would benefit my farm operation.

109. Availability of topics of interest, and applicable to our beginning farming enterprise--I am retiring from USDA this winter. Lots of good material put together throughout the State that could be made available to provide a broader knowledge base particularly as funding and resources get tighter. We purchased our farm in Clarke Co. in 2001 and are getting ready to hire our 4th livestock extension specialist. Would be nice to have access to packages put together by other specialists outside our own district.

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Table 26 (continued)

*Responses to the survey question, "What would encourage you to participate in future Internet-based learning activities?"*

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110. Time

111. Topics of interest to me that I believe would help me to increase my bottom line and become a better steward of the land.

112. availability glossy intro type presentations followed by a menu of more detailed and intense discussion of subjects mentioned in the glossy

113. Time of year when it is made available. Also able to get feed back from question one would might have.

114. Content of subject

115. Activities should be decisive and able to view in a timely manner. They should also be time sensitive to the approaching needs of a season, i.e. pest management.

116. Just let us know

117. Information that is new or hot off the press

118. It's very difficult for me to talk to someone online or in a group discussion.

119. Good variety of topics. Ability to submit questions if necessary.

120. Availability of high speed Internet(not available in my area)

121. Faster Internet connection

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Table 27

*Responses to the survey question, "What do you consider to be the greatest benefits to Internet-based learning activities?"*

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1. Self paced and without interruption.
  2. It is cheap to provide.
  3. Flexible time to view
  4. Information available when I want it.
  5. Being able to do at home
  6. View at own leisure/pace
  7. QUICK
  8. Learning about topics that are important but not general knowledge, e.g., how to control spreading plant pests.
  9. Possibly to do it as time is available
  10. Convenience
  11. Ease of access can be viewed when convenient can repeat areas of interest
  12. Wider access to information. Browsing the Internet indicates to me that the "don't know what you don't know" factor can be reduced.
  13. Accessibility, convenience and affordability - assuming you have the technology and know how to use it
  14. Time you can review and the convenience of your home. If you have to stop the Internet allows you to revisit later at your schedule.
-

Table 27 (continued)

*Responses to the survey question, "What do you consider to be the greatest benefits to Internet-based learning activities?"*

- 
15. We can access information that would be otherwise unavailable due to distance and/or time constraints (We cannot be everywhere at all times)
16. Time flexibility if unable to attend meeting can still access info sometimes need a refresher on what was covered at extension meetings
17. Flexibility and time savings
18. Having access to information that solves a particular problem in a timely fashion. Often, I will get a late answer to a problem that I have either already solved or no longer consider a priority
19. ACCESS TO OTHERWISE INACCESSIBLE INFORMATION
20. I can participate and learn at my convenience. I often miss extension meetings and programs due to farm requirements.
21. Internet-based learning activities give individuals an opportunity to gain knowledge in given areas. It is also a convenient way to gather information.
22. No traveling can use any time.
23. Can usually review as much as needed, can participate at ones own leisure, saves time and effort by doing at home (and money), can choose time to participate, informative.
24. Learning at my own pace and at my availability time
-

Table 27 (continued)

*Responses to the survey question, "What do you consider to be the greatest benefits to Internet-based learning activities?"*

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25. Relieves need to travel and schedule time away from the business for topics which can be communicated via PowerPoint or other methods. Allows flexibility in scheduling time to take the "class". Provides control to how fast topics are covered as apposed to single class/meeting opportunities which can cover a lot of information very quickly.

26. Certainly a huge benefit would be that you can use the Internet when it is convenient for you. If you don't get in the house until 9:00 PM in the summertime you really don't want to stop what you are doing to go to a program that starts at 7:00 PM. It would be nice to be able to get the same information at home at your convenience. However, time is very precious and right now it takes forever to download anything that has sound or lots of pictures. No one wants to sit in front of a computer waiting for it to download anything!

27. Availability, can copy, save info and return as often as needed.

28. Efficient and less time consuming

29. Can learn on you own time and schedule.

30. Knowledge available when time permits as well as knowledge that can be stored or filed for future reference.

31. Availability

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Table 27 (continued)

*Responses to the survey question, "What do you consider to be the greatest benefits to Internet-based learning activities?"*

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32. To get basic information out to interest farmers. Perhaps more detail information!

But I think it is important to meet together as a group to discuss the information because often questions from other participants can give meaning to the information presented by the instructor.

33. Can participate when convenient to me

34. Can do it at my convenience

35. The very best instructors can be used.

36. Availability to learn when the schedule works for me. Because when ever someone schedules a meeting that is when all heck breaks lose here at the house.

37. No time conflicts, view at my leisure.

38. Time

39. You can receive information fast.

40. Vastly better access to current vet info in particular and understanding health issues of cattle (and horses.)

41. At home- own pace- when you find time-selective of material not relevant to personal operation

42. Possibly earning an advanced degree

43. Time savings.

44. Convenience!

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Table 27 (continued)

*Responses to the survey question, "What do you consider to be the greatest benefits to Internet-based learning activities?"*

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45. Can review activities when it is most convenient for me. I do not have to go attend a meeting at a set time and place.

46. Efficient use of time

47. The flexibility of working on your own time.

48. It would allow me to view the material presented when I have time.

49. Good quality photos that can be used to identify weeds, diseases, pests, first aid to animals, etc.

50. WITH LIMITED EXPERIENCE in the process, I guess the greatest benefit would be no travel time, and the ability to complete the training at one's own pace, over a period of hours, or even days.

51. Learned on own time, at own pace

52. Time management. Low expense.

53. Does not interfere with activities and schedules when available at your convenience.

54. Access to educational materials from home

55. No specific time that it has to be viewed.

56. I can do it when my time permits, I tell my children you can always watch TV at night when it is dark , but if the sun is shining you had better take advantage of it and work

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Table 27 (continued)

*Responses to the survey question, "What do you consider to be the greatest benefits to Internet-based learning activities?"*

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57. Learning new ideas.

58. Being able to do it at my convenience

59. Ability to learn at your own pace as time is available

60. It can be accessed at any time.

61. If the informational training is on the edge of technology and value adding then it would be great. If you are dealing with 1972 training you will not hold an audience.

62. Participate in my own home, cuts down on travel and cost for participants and lecturers

63. Access to experts from all universities

64. Can be done at home and easy accessibility

65. Convenience to my schedule

66. You can look at these programs at your own time

67. Instant information informal no travel involved to the meeting. no expense time saved information available to review over and over learn at own level

68. Information on a screen (visual) and a speaker with a pace you can use with the ability to repeat the entire program.

69. I can arrange my schedule

70. I can access programs when it is convenient for me.

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Table 27 (continued)

*Responses to the survey question, "What do you consider to be the greatest benefits to Internet-based learning activities?"*

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71. Speed of learning

72. Can work on it when it works into my schedule.

73. Cutting down on travel and taking employees out of their daily duties

74. Easy access

75. Convenience and ease of access

76. They can be viewed when I have time. I can plan time to view them at my leisure not when the Extension Agent has them scheduled. I can maybe get some advance training that would not be possible in a large group setting or learning opportunity.

77. Convenience

78. Flexibility to "learn" on my schedule. Managing time is very important to my business and this allows me to attend more conventional Ext. meetings.

79. Can do it on my time

80. Ease of participation, time options, my previous education would allow me to participate in certain classes fully and with no introductory classes. One can review the lecture many times and e-mail questions to professor. With a bulletin board one can see responses from others and communicate with class mates.

81. Have access to pertinent information at a particular time.

82. TIME UTILIZATION

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Table 27 (continued)

*Responses to the survey question, "What do you consider to be the greatest benefits to Internet-based learning activities?"*

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83. Knowing how to use and understand them

84. Scheduling

85. Saving of time

86. Hands on when I need it.

87. Availability at various time opportunities with out the constraints of traditional structure

88. Freedom

89. Ability to search for needed information rapidly

90. To save and view later

91. Do it when you want to at any hour of the day.

92. Savings in time of travel, would allow me to move @ my own pace, & more flexibility with scheduling.

93. Pictures

94. Round the clock access - on my schedule

95. The ability to learn mechanical, technical, financial and etc. in relative short time and possibly at less cost.

96. Flexibility

97. Availability. Can be viewed at any time

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Table 27 (continued)

*Responses to the survey question, "What do you consider to be the greatest benefits to Internet-based learning activities?"*

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98. It allows the agricultural producer to learn from the comfort of his or her own home.

All we have to do is look at what places like the University of Nebraska are offering and know that this type of learning can be a successful tool.

99. Efficiency - doesn't require travel to a formal class setting and can be taken during night hours or other times when farm chores or off-farm work isn't affected.

Thoroughness - provides forum in which to present materials in a pyramid outline, enabling the student to dive as deep as they would like, receiving as much detail as they need. Follow-up - if combined with an email contact to which to pose follow-up questions, the IBL activities could provide the student with an ongoing mentoring relationship with the instructor(s). Access - provides late entrants to agriculture, who didn't grow up on a farm or attend Ag school, the opportunity to access materials and teachers who would otherwise be inaccessible.

100. Best fits my schedule for gaining new and appropriate information

101. Time -any in day or night! not having to leave the farm & travel to class

102. Can be done on my time and in my home. Eliminates need to drive long distances.

103. I can learn at my pace in my spare time.

104. Convenient--no travel, lodging, etc. I presume such programs could be viewed at my convenience

---

Table 27 (continued)

*Responses to the survey question, "What do you consider to be the greatest benefits to Internet-based learning activities?"*

- 
105. Being able to do it at a time that suits you
  106. flexible time schedule, ability to replay material, visual aids
  107. Convenience. lower cost
  108. Convenience
  109. I CAN TAKE THE TRAINING WHRN I HAVE THE TIME.
  110. You can do it at your own pace and at your own time.
  111. Time flexibility and self paced.
  112. Time, travel, money/cost however I have also gained much info on classroom and hands on training that has been provided in the past.
  113. I can work at my own pace when I have time available. I can learn from home.
  114. No travel time.
  115. Tool to broaden material available to a broader audience.
  116. Travel
  117. Individuals have the ability to learn it at their own pace. Easy to disseminate the information without dealing with schedule conflicts for both the instructors and the participants.
-

Table 27 (continued)

*Responses to the survey question, "What do you consider to be the greatest benefits to Internet-based learning activities?"*

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118. Save time and expense of travel can take courses when my schedule allows, maybe 6 am maybe 10 pm certainly not 3 pm to 6 pm when i have hay on the ground
119. Timing of information we could receive and also able to get correct information back from someone with experience.
120. Being able to get to the information or class when I have the time instead of having to go somewhere
121. The ability to learn without the trouble of travel and the enormous time savings.
122. More exposure
123. Easy to get information
124. Being able to sit down in your own home and listen to the presentation given by the instructor on line.
125. Can participate when it fits my schedule. Cost & Time savings of travel to meetings.
126. Ability to complete on my schedule
127. 24 hour availability
-

Table 28

*Responses to the survey question, "What do you consider to be the greatest barriers to Internet-based learning activities?"*

---

1. For some, not being computer savvy or owning on out-of-date computer. For me, affordable Internet access to my home.
  2. The lecture needs to be aimed at a more intelligent audience. The vegetable presentation was for first grade yuppies.
  3. Self discipline
  4. Access speed in rural areas, tendency of instructors to give too much background and not enough meat in the presentation.
  5. Remembering where to go on the Internet for the info.
  6. Slow service
  7. Time constraints. People will be more apt to put off taking the time to view materials
  8. CANNOT TALK TO ANYONE
  9. Presentation I saw is geared to the generally uninformed. Need to have an index of topics so I can select my topic of interest or import.
  10. Modem connection.
  11. We can't always schedule a time to watch a live presentation if it is to be interactive. Connection speed would prohibit that for me anyway.
  12. For many people lack of ready access to technology and lifestyle in which computer time is not part of the daily schedule. not being aware of what is available
  13. Immediate questioning opportunity
-

Table 28 (continued)

*Responses to the survey question, "What do you consider to be the greatest barriers to Internet-based learning activities?"*

- 
14. Non contact w/ others and instructor
  15. Slow dial-up service that either locks up the computer or becomes extremely frustrating.
  16. Having the time and energy to engage the process. When I finish a day of work on the farm, I am essentially brain dead and physically beat until the next morning when I have to go out and face the same problems as yesterday.
  17. Probably the possibility of lack of human support when needed, i.e. telephone contact?
  18. It took forever to download the piece I just saw.
  19. Time to sit and do the activities
  20. The activities need to be available.
  21. No face-to-face contact w/instructor. limited ability to ask questions
  22. Cannot experience interaction from live group. Might be limited to asking questions.
  23. No detailed question and answer.
  24. Ability to ask questions of experienced instructors. Hearing questions asked of other participants and the associated answers. Hands on tools which may be presented during a live meeting. Slow Internet speed and dated software which may not work sufficiently to view more modern presentations.
  25. The Lack of High-Speed Internet at a reasonable price in rural areas.
-

Table 28 (continued)

*Responses to the survey question, "What do you consider to be the greatest barriers to Internet-based learning activities?"*

- 
26. Have questions answered and answered in a timely manner.
  27. Connection speed
  28. Sitting down and doing it.
  29. Time and the possibility of making the presentation rather dull when too much basic knowledge is presented.
  30. Poor presentation
  31. Getting participation from mid and older farmers. From a time stand point high speed Internet availability may be a limiting factor.
  32. No direct interaction with instructors. Specific questions cannot easily or at least immediately be answered.
  33. Rural bandwidth shortage
  34. Sometimes the Internet makes it tuff to learn because of lag time or down satellites. The cost of technology sometime hurts us all. However I think in this situation the cost does not out way the benefits.
  35. Not every farmer would have computers or training to use them.
  36. Feedback with instructor
  37. Can not ask questions.
  38. Slow dialup and expensive dish or fast service in relation to what my net income is from the farm.
  39. Dial up - technology cost
-

Table 28 (continued)

*Responses to the survey question, "What do you consider to be the greatest barriers to Internet-based learning activities?"*

- 
40. Internet connection speed
  41. No instructor interaction (questions)
  42. Not being able to ask questions as the presentation is being made
  43. Dial up connection is slow. My typing skills are weak.
  44. Not being able to interact face to face with other learners
  45. Lack of availability
  46. Sometimes, having that interaction with other growers and their experiences is a valuable tool as well. Internet learning may deny that type of group participation.
  47. I spend too much time in my office on the computer to want to spend much time on it once I get home.
  48. Our service is slow (dialup usually 26K or less, even with a 56K modem), so anything audio/visual is not viable if it is "streamed". Links are also subject to interruption, because of frequent disconnects from the Internet, so programs like the one I just viewed needs to be savable.
  49. Time and lack of experience
  50. Interface with experts.
  51. Question and answer period would not be available. Concerns and questions from the presentation possibly would not be addressed. Written material not available to refresh learning process.
-



Table 28 (continued)

*Responses to the survey question, "What do you consider to be the greatest barriers to Internet-based learning activities?"*

---

52. Dial up connection could slow down download and make time more of a constraint
  53. Interaction and computer not cooperating. Like I had to start the per survey the third time because it jumped back to the start-up screen. Typing--I am not a typist.
  54. Not being on site to see the results of new ideas.
  55. Not being able to ask direct questions
  56. Learning about what is available
  57. Lack of ability to interact with instructor.
  58. Time and Connection!
  59. Most farmers unfamiliar with computers, some want instant feedback to follow-up questions, those who only have dial-up Internet access would be a pain in the butt
  60. Inability to use the computer
  61. Unable to ask questions
  62. Lack of communication with others with similar interests
  63. Time to sit down and take the time to do so
-

Table 28 (continued)

*Responses to the survey question, "What do you consider to be the greatest barriers to Internet-based learning activities?"*

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64. Too deep for me. I took the cow/calf program that dr. hall held. I was not able to ask question to my satisfaction. Example. I needed to know how to feed my cows this winter. Local extension agent established a program for me, but I felt I should have gotten it from the course. A course should be geared to each individual. With questions and answers available for each person. One person might be interested in epd's, I might be only interested in how to vaccinate my cows.

65. I have a computer at home and here at school so I have no barriers with the Internet-based learning.

66. Knowledge of what is available

67. Dial-up service slow connection speeds

68. My time

69. Getting help with questions in off hours.

70. Getting employees to take the time to do them

71. The computer can only present material one way and sometimes an instructor can tailor their presentation. I often learn from other people at a meeting and you make valuable contacts

72. Connection speed and mode of connection

73. Time. Just as the computer is a great time saver if used properly it is still something that you have to plan to make time for. That, TIME, is the greatest barrier to all learning opportunities.

---

Table 28 (continued)

*Responses to the survey question, “What do you consider to be the greatest barriers to Internet-based learning activities?”*

- 
74. Lack of networking with peers
75. As with this survey, being able to navigate and open sites.
76. Slow service not able to discuss with others can't type or spell
77. Immediate feedback from instructors during classes and question and answer sessions. Also interaction with peers would be a disadvantage in some ways as one can learn from the experience of others in a class.
78. KEY BOARDING SKILLS NET SPEED SPAM AND JUNK POP UPS
- AVAILABILITY COSTS
79. Time, and understanding
80. Incompatible media player
81. Internet connectivity
82. None
83. Accessibility.
84. Time
85. Motivation?
86. Identifying what is appropriate for me
87. Time constraints and slow Internet service.
88. Slow Internet connection speeds – the best dail-up speed I can get is 24kps or less.
-

Table 28 (continued)

*Responses to the survey question, "What do you consider to be the greatest barriers to Internet-based learning activities?"*

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89. Dial up; with slow Internet service is a real barrier. Phone lines are not great, electric fence charger on farm often interferes with Internet connection. Graphics need to be as simple as possible (more megabytes=more transmission problems). Computer & software are probably not as up to date as they need to be also.
90. Talking to fast.
91. Finding time to do it
92. Broad selection of topics, the motivation for companies to produce learning materials, cost, to educate the public where to go for these Internet learning activities, etc.
93. Lack of interaction with other participants and the instructor during the time of the presentation.
94. Availability of high speed Internet access
95. Certainly the dial up versus modem issue...It all comes down to speed.
-

Table 28 (continued)

*Responses to the survey question, "What do you consider to be the greatest barriers to Internet-based learning activities?"*

- 
96. Curriculum - as in a college syllabus, the courses need to be well described and organized by topic and by difficulty, highlighting pre-requisites where appropriate. If the course list is too short or the courses are too concentrated on specific topics or at specific levels of difficulty, this will limit the potential enrollment. In the college system, a professor's reputation precedes him/her and is passed along from one class of students to another (e.g. stay away from such and such course, it is a waste of time, or apply quickly to so and so's course because it fills up immediately), thus students are able to make informed decisions regarding which courses to weave into their schedule. It would be useful to have an on-line "counselor or academic advisor" to assist students with selecting their course load based upon their experience levels and farming interests.
97. May not always have the appropriate technology
98. None it is great
99. Lack of opportunity to ask questions
100. For me it would be slow dial up.
101. Lack of direct contact with other participants and instructors. A lot is learned during coffee breaks, meals, etc. from other participants--sometimes more than is learned from the instructors. Informal discussion with instructors is often more educational than the formal presentations.
102. Finding the time
103. Interaction with instructor, and potential for computer compatibility problems.
-

Table 28 (continued)

*Responses to the survey question, "What do you consider to be the greatest barriers to Internet-based learning activities?"*

- 
104. Lack of know - how technically
  105. None
  106. Dial-up services, had to wait for buffering, hard to understand sometimes when coming in choppy.
  107. Lack of interaction with instructors
  108. Laziness/trifling you have to be willing to read, study, do independent study. If a person will not do it with books, publications, the Internet learning will not be a silver bullet.
  109. None for me.
  110. With meetings you learn more from other farmers.
  111. Interchange of ideas and the synergies of trying to apply new tools to our operations
  112. Time
  113. Exposure to instructors
  114. Computer hardware and software for most. Being able to get feed back from questions because at open meetings you are able to ask questions or someone else usually would ask them for you.
  115. Not being able to ask a question with instant response
-

Table 28 (continued)

*Responses to the survey question, "What do you consider to be the greatest barriers to Internet-based learning activities?"*

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116. Previously it would have been slow Internet response in the rural setting. However I felt the cost of upgrading to high speed Hughesnet Satellite was certainly worth the investment.
117. Time with the boss in the office
118. Time to sit down in front of computer for a while without any interruptions.
119. Being able to stay updated on the data collected by the extension service on all crops and by having access to the Internet.
120. Lack of interaction with other producers - sometimes the best source of information at meetings.
121. Slow Internet access
122. Slow connection to Internet
-

Table 29

*Responses to the survey question, "If you have other comments or suggestions please enter them in the space provided."*

- 
1. See above and follow instructions.
  2. My time is the scarcest resource available to me. The presentations need to be very focused. This helps cut down on the issues related to access speed and also makes me more likely to view information that is specific to my needs.
  3. I am probably not typical; I was a full time farmer for 30 years that chose a career change which forced me to learn computer skills. In my work I communicate w/ farmers all the time and am frustrated by the 'older' generation that refuses to learn computer skills. Most have access to the Internet via wife or children. An educational course on the practical benefits of Internet skills for farmers might be worth while.
  4. Thank you for trying to ascertain how effective the Internet might be for production agriculture.
  5. I would have liked better graphics on the forage piece. For example a better map, with more detail and easier to read.
  6. The visual aids are crucial to the presentations. They make it seem as though we are at the presentation with the speaker.
  7. It would be wonderful if efforts were made to provide better access to high speed Internet in rural areas. In our area, we don't have the option of cable access or high speed service through our phone lines. My computer locks up often because of the length of time it takes to transmit over the standard phone line. This causes problems with receiving and responding to e-mails, and that reflects negatively upon our business.
-



Table 29 (continued)

*Responses to the survey question, "If you have other comments or suggestions please enter them in the space provided."*

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8. I like the concept. It would be great to have a Virginia farm oriented web site that is daily updated with information that is relevant and timely. I would use that as a home page.

9. In any program I participate, I would like to see more time devoted and space provided to ask specific questions that might only apply to my operations. I do not know a lot about forages. I am thinking about planting some alfalfa. I would like to be able to ask questions and interact with someone who can answer my questions and give me advice and guidance.

10. More detailed information

11. I think Extension would serve the rural citizens much better if they continued the traditional way of giving out information through programs and newsletters, personal visits, etc. More of their printed publications should be made available online so that farmers can view these publications when they have time and would not have to make a special trip in to the Extension Office to pick one up. I viewed the Forages presentation and for the most part the slides were read to me. (at least for as long as I had sound) I can do that! I don't need someone to read it to me. Just make the information available in printed format, have a really good search setup and farmers can "read" the information for themselves when they have time.

12. This is extremely similar to another online Vegetable Course.

13. The idea is a good one and I will be anxious to learn more of the programs.

---

Table 29 (continued)

*Responses to the survey question, "If you have other comments or suggestions please enter them in the space provided."*

- 
14. Let me know where we can take the full length course that we have the beginnings of in this survey.
  15. Keep at it guys and gals. The Universities have made a good start, but search takes time.
  16. A combo of traditional presentations plus Internet-based learning activities would be best until farmers become comfortable with the Internet training.
  17. Internet-based training would be a great addition to extensions tool box, it would allow more people to access the trainings on their own time. I do not think this should be used in place of field days and live training events, but rather an additional tool to enhance the already invaluable contributions of Virginia Cooperative Extension.
  18. Let's try it. We could do a winter extension field crops meeting online. What kind of software would participants need?
  19. While the presentation is presented in an informative way. Learning is a two way-street, a participant from our side need to respond and work with the information being review to fully understand a topic.
  20. I think it could be a very useful tool.
  21. I spend a fair amount of time researching topics on the Internet, and Extension could provide an index of ag. topics and tell people where to find information. As it is, I often rely on a commercial search engine.
-

Table 29 (continued)

*Responses to the survey question, "If you have other comments or suggestions please enter them in the space provided."*

---

22. There were no instructions to maneuver the presentation. It was self starting and I did figure out that I could click on the next slide to move on once I was done reading. I plan to go back to the link and see if the other tabs, thumbs, for example, do anything.

23. I hate surveys.

24. Hope timber management will be included.

25. To me as I mentioned earlier this is the only way for me to learn, it is quick and easy, I try to read as much farm periodicals as I can, and there our some websites like dairy farm management that I read, and I always check the state livestock auctions every week on line , so for us the Internet is invaluable, I really enjoyed the presentation on forages I am hoping I will be able to watch the rest of it, thank you

26. In the sample lessons viewed, I would have liked to see more graphics. For example, the areas of vegetable production should be shown on a map instead of just a list of names. The quantity of production could be presented as graphs to better show relationships. This would really reinforce learning.

27. Are "Boomer Farmers" literate with computers? Most are accustom to killing a mouse by foot or poison. What is more annoying? Your connection speed or your harvester speed? It is all relative.

28. I think this is the next step in providing technology and info to the next generation of computer savvy farmers

29. Have vt.edu accept e-mail from my server

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Table 29 (continued)

*Responses to the survey question, "If you have other comments or suggestions please enter them in the space provided."*

---

30. In taking this survey, I am thinking about planting some alfalfa this year. My local extension agent will establish a program for me. However, I would like to be able to access a program from Tech that gives me the fundamentals of planting a new alfalfa stand. What kind to use, how much, and etc. maybe these programs are available, but I do not know about them or how to access them. I guess the bottom line is, I would like to be able to tap into any information at Tech that you have from doping sheep to working on a leaking pond.

31. Good program and the good thing is I can repeat it at any time, just in case I can't remember any portion of it.

32. Please keep using the net it is a GREAT help. Thanks To ALL

33. My largest problem is that I forget what I have learned because I don't practice what I have learned enough. Once I have used what I have learned one or two times, then I won't need to use that feature for a couple of months-then I forget how to do it--age.

34. In the beginning of the program it would be helpful to know how much time to plan to view the program. Is it a 30 minute, 60 minute, 90 minute commitment? How can I paused the program to step away for a while to take a call, check on something and come back to where I was without having to work my way thru the whole program? Definitely plan to integrate some short videos in the presentation.

35. I would consider Internet learning as a supplement to the traditional hands on learning that Tech provides.

---

Table 29 (continued)

*Responses to the survey question, "If you have other comments or suggestions please enter them in the space provided."*

---

36. I would like to see private applicator pesticide licensure training available online.

Right now, I walk across to the Dept of Ag. from my downtown Richmond office and renew by test each time because I don't have the time to take a classroom renewal course.

37. Still need extension in the counties

38. Most Internet stuff is extremely graphics heavy and therefore extremely difficult for the slow dial-up connection to load. DSL is not available in my locality so is not an option. I live too far off the main road for cable to an economic option also. A slow dial-up is the only option available to a lot of rural people.

39. I regret that I was unable to access the sample forage program.

40. I think the recording of live presentations can add energy and if questions are also recorded, it may answer some that the viewer may have. Here is a link to presentations I have on the web made with Camtasia:

<http://www.ext.wvu.edu/jefferson/RuralInnovation2006/Menu.htm>. I will be working with the University of Maryland to record several presentations from the Mid-Atlantic Crop Management School.

41. Maybe a loaded disk will be helpful

42. More!

---

## Table 29 (continued)

*Responses to the survey question, "If you have other comments or suggestions please enter them in the space provided."*

---

43. VCE, in my opinion need not put together programs similar to what I just viewed, but instead put more valuable information on the web site. This would allow for a convenient resource for attacking problems that would otherwise include a telephone call to your local agent.

44. As a llama breeder, it would be nice to have them included with the information. However, I do realize that the percentage of llama to other livestock is very low, it would be interesting and helpful to see them included in agricultural material.

45. When can we start?

46. Please provide fruit (strawberry) information

47. I have always gleaned a lot from the classes around the state and attend as many as I can during the late fall and winter. Hard to attend spring and summer.

48. Will we be able to request what type of material will be taught? Will it be information useful to a grower/business owner?

---

Table 29 (continued)

*Responses to the survey question, "If you have other comments or suggestions please enter them in the space provided."*

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49. One of the real problems is not being sure if one is getting everything in your educational package. In the forage example, I felt that audio was probably available to explain and expand on the text. I did not have any audio. Overall I believe this is an important educational tool, particularly to supply information on new ideas and tools, increase familiarity before meetings, maybe regional, for additional exploration and exchange of approaches for success--what has worked, what hasn't.

50. I would break up material into 2 or 3 categories. Based on knowledge of grower who might be seeking information. cat.1 basis knowledge cat.2 review of past knowledge and some technical info cat.3 very technical and detailed

51. The students of today take the Internet as normal life but to the rest of us unless forced fed to learn computers are taking two classes at once. One class to learn how to get to the second one and this is if we are willing to spend the money get a computer and another monthly fee for Internet. Good Luck to all that put effort into this program I hope it keeps going.

52. In observing the video I found it hard to adjust the volume to a satisfactory level, unsure whether this was a software or hardware problem. Also thank that in conjunction with the learning being based on production, that a considerable amount of attention should be focused on marketing.

53. They must be quick and to the point.

54. None

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## Table 29 (continued)

*Responses to the survey question, "If you have other comments or suggestions please enter them in the space provided."*

- 
55. Sorry to take so long to respond. We just switched from dial up to satellite.
56. Glenn is the greatest!!
57. The busy season in the fall is a poor time to do a survey.
-



## Appendix M

The Extent to Which Producers Perceive Selected Factors as Barriers and the Extent to Which Selected Factors Encourage or Discourage Producer Participation in Internet-based Learning Systems

(Tables 24 and 25)

Table 24

*The Extent to Which Producers Perceive Selected Factors as Barriers to Internet-based Learning Systems<sup>x</sup> (N = 186)*

Selected factors	Pre-exposure		
	Mean	SD	Rank <sup>y</sup>
Time	3.00	1.18	1
Access	2.57	1.28	2
Motivation	2.42	1.10	3
Feedback	2.27 <sup>z</sup>	1.10	4
Support	2.27 <sup>c</sup>	1.19	5
Experience	2.24	1.15	6
Isolation	2.13	1.09	7
Availability of technology	2.05	1.28	8
Technology	2.00 <sup>z</sup>	1.12	9
Expertise	2.00 <sup>z</sup>	1.07	10
Distance	1.85	0.98	11

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

<sup>x</sup>The entire pre-exposure population was used to calculate the means and standard deviations to an Internet-based learning system. <sup>y</sup>Rank = Rank of mean score, 1 being the greatest barrier. <sup>z</sup>The 1/100<sup>th</sup> place differentiates between these means.

Table 25

*The Extent to Which Selected Factors Encourage or Discourage Producer Participation in Internet-based Learning Systems (N = 308)*

Selected factors	Pre-exposure <sup>a</sup>		Post-exposure <sup>a</sup>		Mean Diff.	SD
	Mean	Rank <sup>b</sup>	Mean	Rank <sup>b</sup>		
Time	2.99	1	2.63	1	.36	1.18
Access	2.61	2	2.40	2	.21	1.22
Feedback	2.43 <sup>c</sup>	3	2.31	3	.12	1.07
Motivation	2.43 <sup>c</sup>	4	2.15	4	.28	1.09
Support	2.29	5	1.91	6	.38	1.10
Experience	2.28	6	1.79	7	.49	1.14
Isolation	2.13	7	1.99	5	.14	1.02
Technology	2.04	8	1.74	8	.30	1.25
Cost	2.03	9	1.55	11	.48	1.02
Expertise	2.00	10	1.62	9	.38	1.09
Distance	1.82	11	1.61	10	.21	0.85

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

<sup>w</sup>Pre and Post-exposure to an Internet-based learning system. <sup>x</sup>Rank = Rank of mean score, 1 being the greatest barrier. <sup>y</sup>The 1/100<sup>th</sup> place differentiate between these means.

<sup>z</sup>Only matched pre and post-exposure data were used in this table

## Appendix N

### Figure Captions

## Figure Captions

*Figure 1.* The level of education of agricultural producers that utilize the Internet to access agricultural information in Virginia (N = 184).

*Figure 2.* Gross value of agricultural sales of agricultural producers who utilize the Internet to access agricultural information in Virginia (N = 182). The gross value of agricultural sales for the production year 2005 includes government payments.

*Figure 3.* The relationship of agricultural producers' age to their Internet access of agricultural information (N = 186). Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier. Means within the same x axis category followed by the same letter are not significantly different at P = 0.05 based on Duncan's new multiple range test. Selected factor(s): Experience = Lack of experience/training.

*Figure 4.* The relationship of agricultural producers' gender to their Internet access of agricultural information (N = 186). Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier. Means within the same x axis category followed by the same letter are not significantly different at P = 0.05 based on Duncan's new multiple range test. Selected factor(s): Time = Time constraints associated with job responsibilities, Isolation = Isolation from other program participants, Distance = Ability to learn at a distance.

*Figure 5.* The relationship of agricultural producers' primary occupation to their Internet access of agricultural information (N = 186). Note. Likert scale: 1 = not a

barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Means within the same x axis category followed by the same letter are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. Selected factor(s): Time = Time constraints associated with job responsibilities.

*Figure 6.* The relationship of agricultural producers' level of education to their Internet access of agricultural information (N = 184). Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier. Means within the same x axis category followed by the same letter are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. Education – 1 = high school, 2 = vocational/technical school beyond high school, 3 = some college, 4 = college degree, 5 = masters degree, 6 = some post masters graduate school, 7 = any doctorate /medical /law degree. Selected factor(s): Expertise = Level of computer expertise, Experience = Lack of experience/training, Support = Support services, Access = Access to instructors/specialists.

*Figure 7.* The relationship of agricultural producers' level of education to their Internet access of agricultural information (N = 184). Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier. Means within the same x axis category followed by the same letter are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. Education – 1 = high school, 2 = vocational/technical school beyond high school, 3 = some college, 4 = college degree, 5 = masters degree, 6 = some post masters graduate school, 7 = any doctorate /medical /law degree. Selected factor(s): Time = Time constraints associated with job responsibilities,

Isolation = Isolation from other program participants, Distance = Ability to learn at a distance.

*Figure 8.* The relationship of agricultural producers' gross agricultural sales to their Internet access of agricultural information (N = 186). Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier. Means within the same x axis category followed by the same letter are not significantly different at P = 0.05 based on Duncan's new multiple range test. Gross agricultural sales value – 1 = None during 2005, 2 = \$1 - \$2499, 3 = \$2500 - \$4999, 4 = \$5000 - \$9999, 5 = \$10,000 - \$24,999, 6 = \$25,000 - \$49,999, 7 = \$50,000 - \$99,999, 8 = \$100,000 - \$249,999, 9 = \$250,000 - \$499,999, 10 = \$500,000 - \$999,999, 11 = \$1,000,000 and over. Selected factor(s): Time = Time constraints associated with job responsibilities, Isolation = Isolation from other program participants.

*Figure 9.* The relationship of agricultural producers' agricultural Internet purchases to their Internet access of agricultural information (N = 186). Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier. Means within the same x axis category followed by the same letter are not significantly different at P = 0.05 based on Duncan's new multiple range test. Selected factor(s): Motivation = Motivation to participate.

*Figure 10.* The relationship of agricultural producers' method of Internet access to their Internet access of agricultural information (N = 186). Note. Likert scale: 1 = not a



barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Means within the same x axis category followed by the same letter are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. Selected factor(s):

Expertise = Level of computer expertise, Technology = Availability of technology, Time = Time constraints associated with job responsibilities.

*Figure 11.* The relationship of agricultural producers' frequency of Internet use to their

Internet access of agricultural information (N = 186). Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier.

Means within the same x axis category followed by the same letter are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. Selected factor(s):

Expertise = Level of computer expertise, Experience = Lack of experience/training, Time = Time constraints associated with job responsibilities, Isolation = Isolation from other program participants.

*Figure 12.* The relationship of agricultural producers' previous participation in Internet-based learning to their Internet access of agricultural information (N = 186). Note. Likert

scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier. Means within the same x axis category followed by the same letter are

not significantly different at  $P = 0.05$  based on Duncan's new multiple range test.

Selected factor(s): Distance = Ability to learn at a distance.

*Figure 13.* The relationship of the most frequent users of the Internet in the agricultural operation to their Internet access of agricultural information (N = 186). Note. Likert

scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier. Means within the same x axis category followed by the same letter are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test.

Selected factor(s): Isolation = Isolation from other program participants.

*Figure 14.* The relationship of agricultural producers' level of education to their Internet access of agricultural information post-exposure (N = 154). Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier. Means within the same x axis category followed by the same letter are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. Education – 1 = high school, 2 = vocational/technical school beyond high school, 3 = some college, 4 = college degree, 5 = masters degree, 6 = some post masters graduate school, 7 = any doctorate /medical /law degree. Selected factor(s): Expertise = Level of computer expertise, Experience = Lack of experience/training, Support = Support services.

*Figure 15.* The relationship of agricultural producers' presentation selection to their Internet access of agricultural information post-exposure (N = 154). Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier. Means within the same x axis category followed by the same letter are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. Selected factor(s): Expertise = Level of computer expertise, Experience = Lack of experience/training.

*Figure 16.* The relationship of the portion of the presentation viewed by the agricultural producer to their Internet access of agricultural information post-exposure (N = 154).

Note. Likert scale: 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier. Means within the same x axis category followed by the same letter are not significantly different at  $P = 0.05$  based on Duncan's new multiple range test. Selected factor(s): Expertise = Level of computer expertise, Technology = Availability of technology, Cost = Cost of technology, Experience = Lack of experience/training, Support = Support services, Time = Time constraints associated with job responsibilities, Distance = Ability to learn at a distance.

*Figure 17.* Internet purchases of agricultural producers who utilize the Internet to access agricultural information in Virginia (N = 350). Other = books, grain marketing, horse tack and equipment, information on supplies, insurance, options, plants, plant plugs, livestock, and research.

*Figure 18.* Internet marketing activities of agricultural producers who utilize the Internet to access agricultural information in Virginia (N = 229). Other = farm website for informational purposes, product information, quality assured beef program, and view sale items

*Figure 19.* Method of Internet access of agricultural producers who utilize the Internet to access agricultural information in Virginia (N = 182).

*Figure 20.* Records kept on computer of agricultural producers who utilize the Internet to access agricultural information in Virginia (N = 179). The producers were asked what percentage of their agricultural business records are kept on the computer. The responses ranged from 0.00% to 100.00%. The data were organized into 10% response groupings.

*Figure 21.* The extent to which producers perceive selected factors as barriers to Internet-based learning systems (N = 186). The entire pre-exposure population was used to calculate the means and standard deviations to an Internet-based learning system. Mean is based on a five-point Likert scale with 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier and the standard deviation is based on that mean. Rank = rank of mean score, 1 being the greatest barrier and 11 the least.

*Figure 22.* The extent to which selected factors encourage or discourage producer participation in Internet-based learning systems (N = 308). Mean is based on a five-point Likert scale with 1 = not a barrier, 2 = minor barrier, 3 = moderate barrier, 4 = major barrier, 5 = extreme barrier and the standard deviation is based on that mean. Rank = rank of mean score, 1 being the greatest barrier and 11 the least. Only matched pre and post-exposure data were used in this table.