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Forestry Extension in Tennessee: Comparing Traditional and Web-Based Program Delivery Methods

Samuel Wayne Jackson
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To the Graduate Council:

I am submitting herewith a dissertation written by Samuel Wayne Jackson entitled "Forestry Extension in Tennessee: Comparing Traditional and Web-Based Program Delivery Methods." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Natural Resources.

George M. Hopper, Major Professor

We have read this dissertation and recommend its acceptance:

Wayne K. Clatterbuck, Timothy Cross, J. Larry Wilson, Julie K. Little

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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FORESTRY EXTENSION IN TENNESSEE: COMPARING TRADITIONAL AND WEB-BASED PROGRAM DELIVERY METHODS

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Samuel Wayne Jackson
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DEDICATION

To Mom, Thank you for always showing me that you can do anything you want, no matter what may stand in your way.

To Daphne and Noah, my life and my joy!

To Tommy, Thank you for all you did to support me!

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Finally, I owe all I have to the Lord. I am grateful for each blessed day he has given me.

Abstract

As the traditional forestry Extension clientele in Tennessee changes, Extension professionals need to adapt and deliver programs in such a way as to reach the maximum audience while ensuring the educational benefit of the program and remaining within budget. The development of the Internet and associated web-based programs presents a new tool by which Extension professionals can develop and deliver educational programs to clientele.

This study compared two Extension program delivery methods, web-based and traditional field-based. A series of field workshops were held and participants were surveyed. From these field workshops, a web-based program was developed and was marketed to a similar audience; these participants were also surveyed. Demographic information, learning preferences, and other measures of program preference were collected.

Ninety-seven percent of participants in the field-based program and 68% of the web-based sample preferred a field program over a web-based program. If only a web-based program was made available to participants, at least 50% of each sample would be interested.

Educational level was the only demographic characteristic that was significantly different between those who chose a web-based program and those who chose a field-based program. Participants with higher educational levels were more likely to choose a web-based program. Educational level was positively correlated with income level, computer ownership, and Internet access. Educational level was negatively correlated with age.

Knowledge gain was significantly higher in the field-based sample. Web-based participants showed average knowledge gain of 12.2 to 28.7% whereas the knowledge gain for people attending the traditional field day program averaged 16.5 to 46.1%.

Level of computer ownership was high in both samples as was the use of the computer on a regular basis. Internet access was high in both groups. The web-based sample had significantly higher levels of high-speed access. Those with high-speed connections were more likely to choose a web-based program, although both groups used the computer/Internet regularly for gathering information.

Current forestry Extension clientele preferred a field-based program delivery method. Some clientele, though, preferred web-based programming and these types of programs should be offered when suitable. Using a variety of delivery methods, Extension can adapt programs to a wide range of learning styles to reach new audiences, including younger generations who are more comfortable with Internet learning.

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I. INTRODUCTION AND REVIEW OF RESEARCH

The Relationship between Natural Resources and Adult Education

The future of natural resources in Tennessee and the nation depends on sustainable management. Society benefits from natural resources, whether from derived products, recreational experiences, or the ecosystem services that the forests, waters, or wildlife provide. The impact of resource usage is significant. Forestry and the forest products industry annually contribute 184,000 jobs with a total economic impact of more than $21.7 billion to the state's economy (English et al. 2003), representing 6.6% of the total state economy. The forest industry sector draws its raw material base from Tennessee's 14.4 million acres of forested land or 55% of the state's total land base (Schweitzer, 2000). Sustaining and protecting the quantity and quality of benefits from these resources requires knowledgeable management decisions and practices.

Historically, Tennessee's wood products have come from national and state forests, private industry lands, and private non-industrial lands. However, with the environmental movement that has developed since the late 1970's, less and less harvesting has occurred on public lands although demand for forest products has dramatically increased. In the last decade, harvesting from state and federal lands has declined (Smith et al. 2001) and most of the timber harvested in Tennessee is from non-industrial private forest (NIPF) lands. The increasing demand for forest products is placed on Tennessee's NIPF landowners. Farmers and forest landowners who own more than 100 acres of land have traditionally represented these landowners. However, in the last 50 years, the size of the average private land holding has decreased. The number of landowners has increased as large tracts have become more parcelized. In Tennessee

today, there are an estimated 500,000 NIPF landowners (Tennessee Department of Agriculture, Division of Forestry, 2005). These landowners control about 79% or almost 11 million acres of the state's forestland. However, relatively few NIPF landowners control the majority of the NIPF land base. About 12% of NIPF landowners with ownerships of more than 50 acres account for 63% of the total land base in private ownership (Schweitzer, 2000).

Wildlife-related recreation, hiking and camping, and general aesthetics also provide economic value from natural resources to the state and enhance the quality of life for residents and visitors. In Tennessee, 15% of residents fish and 6% hunt on a regular basis (U.S. Department of the Interior, Fish and Wildlife Service, 2007). Many residents are also wildlife-viewing participants. More than 1.8 million residents view wildlife from home while 1 million view wildlife away from home. This exceeds the numbers of hunters and fishers combined (1.2 million) (U.S. Department of the Interior, Fish and Wildlife Service, 2007). Hunters and fishermen spend almost $1.1 billion annually in the state while wildlife watchers spend a similar amount (U.S. Department of the Interior, Fish and Wildlife Service, 2007). All of these activities depend upon well-managed forests and natural resources.

Educating landowners about sound natural resource management protects the quality of the natural resources and ensures sustainable use in the future. In an effort to reach private forest landowners, the University of Tennessee (UT) Extension provides research-based information and education so that landowners have the knowledge to make wise land-use decisions. Within natural resources, UT Extension state and county faculty deliver educational programs, develop publications, and provide general

assistance and technical support to private landowners across the state. Programs are offered as field days, evening meetings, or personal on-site visits. No matter what type of educational opportunity is provided, the UT Extension mission is the same, i.e. to positively impact and improve natural resource management in the state of Tennessee. This mission is accomplished by utilizing sound education principles and techniques, beginning with a solid understanding of the adult learner.

Understanding Adult Education and the Adult Learner

Although adult education was founded as an academic field in 1926, the term commonly used to label adult education, "andragogy," was not coined until 1968 (Merriam, 2001). That year, Knowles (1968) published his well-known work that gave adult learning a separate name from pedagogy, or the education of what he referred to as preadults. Andragogy's basic tenets are that as adults age, they become more self-directed or self-motivated and thus, the instructional practices that are applied must change. Knowles (1980) and Knowles (1984) used five characteristics to describe the adult learner: 1) the adult learner is an independent being who can self-direct their learning, 2) an adult learner has life experiences that will provide a basis for learning, 3) the adult learner has specific educational needs that relate to the changes in societal roles, 4) adult learners have specific educational needs or problems to solve and want to implement what they learn immediately, and 5) adult learners are motivated by internal factors and not external pressures as commonly found in preadults.

In the sixth edition of the book *The Adult Learner*, Knowles et al. (2005) expanded upon these characteristics and added a sixth characteristic about adult learners. The more developed characteristics are:

1. They want to know why they need to learn something before undertaking the learning.
2. They are to be treated as capable and self-directed.
3. They will apply their experiences to their learning.
4. They need to learn something to cope with real-life situations.
5. They have a will to learn to help them perform everyday tasks or deal with problems.
6. They are self-motivated.

Considerable research has been conducted and debated during the last few decades concerning andragogy and its place as a theory of adult learning. Merriam (2001) noted that the main point of contention was whether or not it was an actual theory or simply good practice guidelines. Many researchers hypothesize that Knowles' needs of adult learners may also apply to preadults as well. Multiple studies (Hanson, 1996; Merriam et al. 1996) have shown that many of these needs are also related to children. When asked if teaching adults should be different from teaching preadults, Imel (1989) agreed there may be some overlap between the two groups. All of the debate led Knowles (1984) to describe pedagogy and andragogy as not separate ideas altogether, but more of a gradient of educational practices that change as a person matures. Merriam (2001) noted that this description by Knowles resulted in andragogy as more defined by the learning situation rather than by the learner. Regardless, andragogy has become the common framework upon which most adult educators have based their programs.

Other theories of adult education have been practiced, many in conjunction with the principles of andragogy. These theories have included Cross's CAL (Characteristics of Adult Learners), wherein personal and situational characteristics separate child and adult learners (Cross, 1981). Other theories include McClusky's Theory of Margin (McClusky, 1963), Knox's Proficiency Theory (Knox, 1980), and Jarvis's Learning

Process (Jarvis, 1987). Merriam and Cafferella (1999) state that all of these theories focus on the adult learner's characteristics, the adult learner's life situation, or both. All of these theories serve to better describe the concept of adult learning, and show that people learn in different ways.

Self-Directed and Transformational Learning

Self-directed learning is a concept built upon Knowles' (1984) assumption that as adults mature, they become more self-directed. Self-directed learning is a form of learning that has been practiced for hundreds of years but was only recently described and researched. Hiemstra (1994) defined self-directed learning as "any study form in which individuals have primary responsibility for planning, implementing, and even evaluating the effort." Brockett and Hiemstra's (1991) model of Personal Responsibility takes into account human nature as related to self-directed learning. In their model, the learner took primary responsibility for their own learning experiences while the educator served as a facilitator. Merriam and Cafferella (1999) outlined three goals of self-directed learning. One goal was to enhance the ability of an adult learner to be self-directed in their educational activities. Another goal of self-directed learning was to promote "emancipatory" learning as an integral part of learning. Learning new skills and information can help the learner achieve goals not previously possible. The third goal was to foster transformational learning as a key component to any self-directed educational situation.

Transformational learning is often seen as a third line of inquiry into adult education, in addition to andragogy and self-directed learning (Merriam and Cafferella, 1999). Transformational learning looked at adult education through the cognitive process,

stressing change in beliefs and attitudes (Mezirow, 1991). Mezirow's basic premise was that learners use new information and prior experiences to change their perspective on a particular topic. The learner's experiences, development, and ability to critically reflect on new knowledge all played a role in "transforming their beliefs and activities."

Though some of the learning processes for adult learners differ from those of preadults, other processes are similar. Cantor (1992) noted there are four critical elements to adult learning that also applied to preadults. The first of these included motivating the adult learner. An adult learner must be motivated to learn. These motivations included social pressures, professional advancement, personal escapes, and a basic interest in learning. Another critical element of adult learning was reinforcement of learning. Adult learners needed to receive rewards, encouragement, or other types of feedback to remain engaged in the learning process. The third critical element to adult learning was the retention of learned information. Educational programs should be designed to integrate activities that will help learners retain what they learn. Finally, the last critical element to adult education included the transfer of learning or the use of learned information in everyday life. For education to be effective, the learner must be able to integrate the new knowledge or skills into their existing knowledge base, as well as implementing it in their lives.

Special Considerations for the Adult Learner

Barriers that may not be common to other educational groups, such as pre-adult learners, can hinder adult education. Cantor (1992) lists several barriers to adult learning. Other research has also noted the same barriers (Scott et al. 1998; Fairchild, 2003). These barriers are:

1. Other responsibilities (family, career, etc)
2. Lack of sufficient time and scheduling conflicts
3. Lack of sufficient financial resources
4. Lack of child care
5. Lack of transportation
6. Lack of self-confidence
7. Forced learning

To develop a successful adult education program, educators should take into account these types of barriers and assist learners in overcoming them. Though difficult, this holistic approach to adult education may improve program outcomes

Diversity of learning styles must also be considered in developing adult learning programs. Men and women approach learning differently (Perry Jr., 1968). Male thought has been viewed to see the world as more "black and white, more certain." Female thought processes have been described as being more open and seeing the world in more subjective terms (Belenky et al. 1986). Beyond gender, ethnicity can have an impact on preferred learning styles, something that will affect the type of programs in which they are interested (Anderson, 1988). Understanding the differences in learning styles will help educators develop appropriate programming for learners. Tools that are available to identify individual learning styles include Kolb's Theory of Learning Styles (Kolb, 1984) and Gardner's Multiple Intelligences (Gardner, 1993), two models for classifying a student's learning style. Kolb's model is based on a four-stage learning cycle. The stages of the cycle are: 1) concrete experience or feeling (CE), 2) reflective observation or watching (RO), 3) abstract conceptualization or thinking (AC), and 4) active experimentation or doing (AE). The model also includes four types of learning styles that are based upon a combination of each of the four stages of the cycle. These learning styles fall on a gradient from thinking/feeling to watching/doing. These four learning

types are: 1) diverging (CE/RO), 2) assimilating (AC/RO), 3) converging (AC/AE), and 4) accommodating (CE/AE). Gardner's Multiple Intelligences model classifies learning styles into seven different styles or "intelligences" and each "intelligence" has a preferential learning method. These include 1) linguistic (words and language), 2) logical (logic and numbers), 3) musical (sound and rhythm), 4) bodily-kinesthetic (body movement), 5) spatial-visual (images and space), 6) interpersonal (other people's feelings, and 7) intrapersonal (self-awareness). A successful educator must understand how to deliver an educational program that appeals to and impacts a diverse group of learning styles.

Paulsen (1995) described four methods or tools that can be used to individualize educational programs, thus addressing diverse learner needs. The "one-alone" method is simply providing the appropriate information for learners who learn best alone. These resources can be readings, solo activities or other items. The "one-to-one" method is where the instructor interacts solely with the learner. Examples include individual learning sessions and correspondence studies. This method is also referred to as the "email paradigm". The "one-to-many" method or "bulletin board paradigm" is where learners interact with the instructor in larger group settings through lectures, symposia, and other methods. The "many-to-many" method is where the instructor and students interact interchangeably throughout the group. This method can occur in discussions and group projects. Ota et al. (2006) discuss the importance of integrating many methods, such as lectures, problem-based learning, case studies, educational games, role-playing, and discussion, into adult educational programs. The goal is to develop effective programs that meet a wide range of learner needs.

With a thorough understanding of the adult learner, successful educational programs can be developed that not only deliver information, but also impact lives and transform thought processes. The program content, educational process, and the needs of the learner should be considered/evaluated when establishing the learning environment. Imel (1994) described an ideal adult learning climate as "a nonthreatening, nonjudgmental atmosphere in which adults have permission for and are expected to share in the responsibility for their learning."

Developing Successful Web-Based Adult Education

Imel (1998) said, "like any other instructional tool, technology can serve to perpetuate poor educational practice or it can become a means for transforming learning." While technologies in distance education have evolved, effective programs still depend upon sound educational practices.

Distance education has been in existence in one form or another for at least the last 200+ years was developed (Nasseh, 1997). Correspondence courses were in use in the late 19th century. Projection, such as slides and early motion pictures, were technologies that were used for education in the early 1900's (Nasseh, 1997). Throughout the 20th century, distance education expanded with the advent of televised educational programs and courses (Jones, 2000). This development has continued through the age of videocassette recorders, CD-ROMs, and DVDs. In the past 10 years, the Internet has rapidly grown to fill a unique niche in adult education. Web-based education started as a passive tool, through which the learner would simply read and view information (Jones, 2000). However, web-based learning has been shown to provide an interactive educational opportunity to learners in synchronous or asynchronous

environments that may or may not be in a classroom. Moore and Kearsley's (1996) definition of distance education, "planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements," fits web-based learning very well.

Savenye (2004) provided discussion on the need to differentiate two types of distance education. The first type described a distance education program as an extension of the existing classroom. When instructors implement distance education using this type of course, they usually have not made many changes from the way in which they deliver knowledge in the classroom. The second type of course described the correspondence-type course, or one where the distance education program is completely separate from the classroom. Savenye (2004) stated that this type of course requires the instructor to develop a different process of instructional design that transforms learning to the new medium. This transformation makes distance education more effective for adult learners. Both types of distance education, classroom extension and correspondence-type courses, can take advantage of web-based programming. A website can be used for outside the classroom discussion, document sharing, and other types of interaction. A website can also be used as a virtual classroom, with live lectures, video, etc. Web-based programming can be a powerful tool, regardless of course type.

Before planning and implementing a web-based educational program for adults, the educator should recognize the factors that motivate an adult to want to participate in web-based activities and the factors that make them not want to participate. Adults

participate in web-based educational programs for a variety of reasons, but primarily for the time and geographical flexibility they provided (Chyung, 2000). Adults typically work full-time or have other activities that have not allowed them to focus on their learning. Web-based education allowed them to participate at their own schedule and at a location convenient for them.

Adults choose not to participate in web-based learning for a similar variety of reasons (Chyung, 2000):

1. The learner's interests and course structure/content do not match.
2. The learner is not confident with technology and the distance learning environment.
3. The learner has achieved their educational goals and no longer has that motivation.

A web-based educator may never determine whether each learner's interests match the course or not. Not every adult will be interested in the same topics. However, targeting learners who may be most interested in a course will increase successful enrollment. A needs assessment is an important tool that should be used before developing programs to identify learner needs (Nieto et al. 1997). Training provided to learners prior to a web-based educational course is a good technique to improve their confidence in the technology. Finally, learners who achieve their educational goals should be seen as success stories. However, educators should seek to offer programs that continue to expand the learner's knowledge base and keep learners interested. Most adults are lifelong learners who learn skills and information through formal and informal learning experiences (Swick and Miller, 1977). Lifelong learning can take place in a classroom, on the Internet, or simply through a life experience. This inherent desire to

learn new things helps attract adult learners to new programs, provided they offer new and useful knowledge to the learner.

Giguere and Minotti (2003) developed ten guidelines for providing a high-quality web-based learning experience for adult learners. Many of the guidelines are similar to the basic andragogical guidelines. However, these guidelines can be applied somewhat differently in web-based education. The first guideline is that the experience must provide a learner-centered curriculum. The authors recommended employing a guided discovery or inquiry approach. In this approach, the learner is presented with a predetermined pathway through the material. This pathway, however, offers the learner the opportunity to "discover" new information and relate it to his or her own experiences. The level of control of the learning process is dictated by the learner's skill level and the complexity of the content (Driscoll, 2002). Therefore, the learner "constructs" his or her own knowledge throughout the process, which gives the learner responsibility for the educational experience these are both factors in the success of web-based education (Alley, 2001).

Moore (2003) found that a web-based course should provide activities appropriate to the andragogical needs of the learner. Adult learners, as discussed, often come to an educational setting with the hope that a personal need will be met by the educational session. Any learning activity must help the learner apply the new knowledge gained to their real-life situation.

Other guidelines for web-based adult education include easily accessible content (educational site meets accessibility standards) and content in multiple formats (ensure all participants can access content). Many standards exist for developing web-based

educational programs. Website accessibility or usability for those users with disabilities was outlined by the United States Section 508 Standards and the Web Content Accessibility Guidelines of the Web Accessibility Initiative (World Wide Web Consortium, www.w3.org). Simple web design standards, including fonts, colors, and navigation are key to web-based adult education. A variety of design standards exist including layout, color, etc. However, Leavitt and Shneiderman (2006) have developed a comprehensive publication titled Research-based Web Design and Usability Guidelines that incorporates all aspects of web design as well as writing content for websites. These guidelines are based entirely on comprehensive research.

In a broader scope, the American Distance Education Consortium (ADEC) has developed principles for distance teaching and learning, including principles that apply to web-based education (ADEC, http://www.adec.edu/admin/papers/distance-teaching_principles.html). These principles, though similar to those discussed by Knowles et al. (2005) and Giguere and Minotti (2003), apply to the instructional process or the way the program delivers that material. These principles include:

1. The educational experience must have a clear purpose with focused outcomes and objectives.
2. The learner must be actively engaged.
3. The learning environment makes appropriate use of a variety of media
4. Educational environments must include problem-based as well as knowledge-based learning.
5. Educational experiences should support interaction and the development of learning communities.
6. The practice of distance learning contributes to the larger social mission of education and training in society.

The ADEC also described several characteristics that have appeared in quality web-based educational programs. An effective web-based program fosters the learner's

ability to make his or her own meaning of the information and participate knowledgeably in discourse on the subject. Such a program provides a learner-centered, learner-controlled system for reciprocal teaching. Reciprocal teaching is an instructional method that involves a dialogue between teachers and students regarding the information being studied, using four strategies: 1) summarizing, 2) question generating, 3) clarifying, and 4) predicting. Through higher level thinking skills, such as analysis, synthesis, and evaluation, a web-based program encourages learners to participate with the instructor to construct their own knowledge. A successful program promotes active, collaborative, and cooperative learning. All web-based educational programs should focus on solving the learner's real-world problems. This can be achieved by using multiple levels of interaction to deliver information.

Giguere and Minotti (2003) also discussed the adult learner's need for shorter, more focused training. Adults will often cite convenience and immediate need for knowledge as the primary reasons for participating in a web-based educational activity (Cassidy, 2001; Frey, 2003; Giguere and Minotti, 2003). In many adult-learning situations, distance education is necessary due to geographical, temporal, or economic considerations for the student (Abrami and Bures, 1996). McClusky's (1963) Theory of Margin documented that the ability, motivation, or margin of an adult for education is determined by the relationship of their demands of living to their resources (time and money for example). In other words, learning fits into a learner's life after all other critical demands are met. Addressing barriers (reducing demands, increasing resources) in adult education can increase participant success. In the last forty years, prior to email and the Internet, distance courses were conducted via mail, satellite, and videotapes

without much synchronous interaction. The use of web-based education and its associated tools allow for adults to continue their education with convenience and ease in both synchronous and asynchronous environments. Cantor (1992) noted that the most significant barriers to adult learning included lack of time, scheduling, childcare, and transportation problems. The use of web-based technologies can alleviate many of these barriers. They can log-in from their office or home to participate in synchronous events as well as use asynchronous interaction tools, such as email and discussion boards. Web-based courses provide access to classroom information at all times allowing coursework to conform to an adult learner's schedule, especially when the learner balances work, family, and class (Ritter and Lemke, 2000).

Ritter and Lemke (2000) also noted that with convenience comes a potential hazard in web-based learning. Instructors must take care to provide accurate and directed materials to supplement the course. Allowing students to simply browse the Internet for information relating to class topics can be distracting and an ineffective use of time. They suggested providing concise materials on the class website while leaving the student with the choice to seek more information in a less efficient manner.

Giguere and Minotti (2003) discussed the need for a sense of community (interaction) for the learner and for ongoing assessment and feedback. In this sense, the authors are referring to interaction being the "ability of learners to interact with classmates around content" and the "ability of learners to communicate with and receive feedback from their instructors" (Moore, 2003). Adult learners who have shown a strong preference for web-based courses note that interactions among students and between the student and the instructor are vital to the success of their learning experience (Frey,

2003). Web-based technology has greatly expanded our communicative abilities. In traditional classroom and educational settings, faculty and student contact was typically limited to in-class communication, feedback on assignments, and occasional office visits. These limitations are more pronounced in adult education, with classes typically meeting less frequently and with less contact between the instructor and student. With the virtual communication tools available today, constant and immediate communication is available. Email, chat, discussion boards, and live conversations via the web have revolutionized the ability to conduct web-based distance education. Testa (2000) stated "no other technological application since the office hour has promoted student faculty contact more than electronic mail." Feedback on questions and/or assignments can be almost immediate. In their study, Atamain and DeMoville (1998) found that participants in an undergraduate course who communicated with their instructor through web-based methods reported that the format made the instructor more available to them when compared with traditional office hours. These technologies have also allowed instructors another way to share information and resources with students.

Chickering and Ehrmann (1996) noted that student comfort was greater with digital communications than with face-to-face communications. The digital method provided students comfort in discussing personal concerns and issues in writing. Communicating digitally combined the speed of oral communications with the convenience of time to compose thoughts and messages in writing before sharing them. Examples of tools for digital interaction between instructors and students include email, online journaling, chat (online office hours and student-student interaction), discussion boards, and assignment turn-in and feedback mechanisms. Applying these ideas and tools

in adult education is no different than with undergraduate education and, in fact, essential to future success. Statistics show that while 33% of adults 65 years of age and older in the United States use the Internet for various purposes, 83% of those 18-29 years old utilize the resource (Pew Internet & American Life Project, 2007). Seventy-six percent of children ages 3-17 have access to a computer at home and 42% use the Internet regularly (Child Trends Databank, 2003). The next generation of adult learners is being developed on a technology-based educational system. Henke (2008) found that 88% of 9-12 graders and 80% of 6-8 graders use online technology at school for research. The same study showed that 20% of 9-12 graders and 21% of 6-8 graders had participated in an online or distance learning class. Additionally, over 20% of each group was interested in taking an online course. Educators must provide desired types of learning activities to successfully educate and web-based tools are important for the next generation. Digital communication may actually be easier to apply to adult learners than to traditionally aged (university) students. In their review of the differences between adult and preadult education, Beder and Darkenwald (1982) found that adults made greater use of discussion time than pre-adult students and that the instructors often adjusted course content based upon feedback from the course, thus providing a more learner-centered/driven experience.

According to King and Doerfert (1996), interaction must be designed into a web-based educational program, that is, it will not just happen on its own. Synchronous interaction, (i.e. interaction occurring in real time) offers several potential tools in the online environment. Asynchronous interaction, interaction that does not depend on the instructor or student being present, offers different tools (Berge, 1999). Synchronous

interaction can be conducted online in live-video lectures and instruction, live chats (audio or text), and other types of conferencing. Asynchronous interaction can be achieved through discussion forums, email, previously recorded podcasts, and other forums. Building both types of interaction into a web-based learning experience is critical for success (Berge, 1999).

Beyond the normal student-instructor interaction, group and team work interaction between adult students enhances the learning environment. Team projects and group work between adult learners can also be facilitated with web-based technology to create an interactive learning experience between students who may be hundreds of miles apart (Testa, 2000). Adult learners come with many life experiences that help shape their learning motivations and styles. By encouraging group work, learners can share experiences, which make the learning more meaningful.

Web-based instruction provides increasingly efficient opportunities for adult learners to work in groups and develop these collaborative skills. Web-based collaborative tools such as time, place, and distance break down barriers to adult education (Testa, 2000). The design of tasks to be accomplished by groups is an integral part of learning. A good group task or activity is one that cannot be solved by one person alone, but must be tackled by a group of individuals with different skills and experiences (Cohen, 1994). Instructors in online settings must be careful to design the activities appropriately to “forcefully” facilitate group work. Testa (2000) found, through educator surveys, that when students participated in group activities in web-based environments, they were more likely to seek out new information on the web than in traditional formats.

Web-based technologies also facilitate assessment of group work more efficiently. Research in traditional classrooms indicated that individual contributions to group work decline when no method of identifying those contributions apart from group work exists (Harkins, 1987). Web-based technologies allow for easy tracking of individual submissions, through recorded chats, discussion board postings, or digital document submissions. Web-based technologies have also made each member of a group more accountable for their contributions to the larger whole.

For feedback purposes, web-based technologies have improved document storage, review, and evaluation of assignments in web-based courses. This ease in review of documents provides faster feedback to the student. In a program at the University of Pittsburgh, Frey (2003) found that adult learners who had been out of school for a period of time had the most anxiety about the instructor's evaluation of their work. In the focus groups of the study, the most often requested item was feedback from the instructor. Adult students need feedback for success.

Finally, Giguere and Minotti (2003) discussed the adult learner's need for an expert web-based facilitator/trainer and for immediate online/offline technical support. The instructor conducting the learning activity must be experienced, organized, and able to facilitate discussions and activities with a diverse group of learners. Berge (1995) cited four key roles of a facilitator/instructor in the online environment. These roles are pedagogical (the "educational" facilitator spurs student growth through questions and discussion), social (creates a friendly social environment for learning), managerial (sets the agenda, objectives, and other procedures for the educational program), and technical (makes participants comfortable with the technology used in the course).

Inevitably, in any technology-related practice, technical support becomes necessary. Learner frustration with difficulty in learning new technologies has been cited as a primary cause of course attrition (Hara and Kling, 2000). In some cases, pre-course training may be necessary for learners to acclimate them to the tools used. Web-based, stand-alone tutorials are excellent methods to provide this training asynchronously. Providing Frequently Asked Questions (FAQs) and other sources of answers to problems encountered during the course is also part of learner success. Support can be provided via email, phone, or other method of contact throughout the training.

Imel (1994) pointed out that adults vote with their feet. If an adult learner does not feel that an educational program fits their needs, they will go somewhere else. Creating and implementing successful programs is imperative to reaching and retaining adult learners.

Roots of Natural Resources Extension Education

The roots of Extension are tied to the need to educate a growing society. Agricultural societies and farmers' institutes were the first audiences that developed across the country in the mid-to-late 1800's. These groups were formed to encourage agricultural development (teach farmers new practices) and to promote experimentation (Seevers et al. 1997). With the Morrill Acts of 1862 and 1890, land-grant universities provided a place for research and education related to agriculture and the mechanical arts. The Hatch Act of 1887 laid the framework for what is now the Agricultural Experiment Station system, the system that provides facilities and funding for agricultural and natural resource research.

The Agricultural Extension Service was established with the passage of the Smith-Lever Act on July 1, 1914. At that time, many states were already involved in demonstration and education work. The origins of that work were the agricultural societies, and later the farmers' institutes (Seevers et al. 1997).

The first data on the role of forestry (natural resources) in Extension are found in 1915. Money was spent on forestry programs in several states. The United States Department of Agriculture (USDA) spent $3,965.44 on these programs during the 1915 fiscal year (United States Department of Agriculture, 1926). Out of approximately 16 different programming areas, forestry ranked 14th in funding. As the United States entered World War I, increased emphasis on using natural resources led to more funding for forestry education. Woodlands on farms supplied wood for the war effort. Propellers for airplanes, treenails for ships, spokes for vehicle wheels, and gunstocks are a few of the needs that led to the increased demand for wood (United States Department of Agriculture, 1919). The contribution Extension made to the war effort greatly improved the prestige of the service (Government Printing Office, 2001). The 1918 Yearbook of Agriculture (United States Department of Agriculture, 1919) made note that increased emphasis on forestry knowledge when hiring county agents was crucial to planning for the "future needs" of the country.

The United States Senate and the USDA Forest Service (USFS) developed and enacted the Clark-McNary Act on June 7, 1924. This action broadened federal involvement in partnerships to better manage and protect forestland. The Act extended acquisition of forestland from watersheds to all timber producing lands and broadened the fire protection assistance from the government. States were given small appropriations

for farmers to grow trees and to advise farm-forest owners. These state appropriations were used by some state Agricultural Extension Services to educate farmers about forest management. This Act provided more direct funding to educational programs in natural resources.

Natural resources Extension activities did not get its next boost in federal support until the Norris-Doxey Farm Forestry Act was passed in 1937. This Act was specifically aimed at improving forest practices on small farm woodlands. The Act authorized up to $2.5 million per year in appropriations to provide forest advice, plants, and other help to woodland owners (United States Department of Agriculture, 1950). The complete cooperation with the USFS, the states, and their Extension programs was incorporated and extended within the act. Extension forestry programs were able to hire some of the first specialists in the field with this funding.

The early Extension forester was trained to conduct short courses for farmers, to prepare publications on forestry research findings and their relation to farmers, and to lead youth in projects involving forestry that focused on fire control, pest control, watershed care, and reforestation. Building upon these educators' programs, the Cooperative Forest Management Act of 1950 essentially updated and replaced the Norris-Doxey Act of 1937. This Act widened the scope of forestry assistance programs to landowners who were not farmers and provided more assistance to forest product processors (United States Department of Agriculture, 1950).

The next advance in natural resources Extension was the passage of the Renewable Resources Extension Act (RREA) in 1978 (106th Congress Public Law 95-306). This legislation provided the mandate and funds for Extension to expand its role in

renewable resource management and conservation. The act was designed to begin building a “critical mass” of natural resource Extension professionals around the country. Originally authorized for $15 million, RREA has routinely been funded at approximately $3.5 million annually. Funding in 2008 increased to $4.3 million and was distributed based on a formula to all states. Currently, these funds are used at 73 different land-grant universities. Almost 30 years old, RREA continues to be a major contributor to natural resource Extension.

Natural Resources Extension Education Now and in the Future

Extension education has traditionally used county-based, face-to-face programs for delivering educational content. Research-based information has been passed on to Extension specialists and county agents from universities. These specialists and agents then provide instruction to the general public via face-to-face workshops, informative mailings, one-on-one meetings, and other types of programs such as fair booths and trade meeting displays. Traditional natural resource Extension clientele have been rural residents who generally live on the land they own.

Today, however, the Extension clientele is changing. Nationally, the number of private forestland owners increased 11% between 1993 and 2003 (Butler and Leatherberry, 2004). The largest increase in number of owners was in ownership of tracts 50 acres or less, a change attributed to more urban residents moving to rural areas. The average age of the forestland owner is increasing, with the number of landowners older than 65 increasing by 34% in the same 10-year period (Butler and Leatherberry, 2004). This group controls almost half of the family forestland in the United States.

The increase in forestland owners indicates more first-time landowners. The increase in forestland owner age also suggests that a large increase in the amount of forestland on the market in the future or transferred to younger family members may occur. This transfer will introduce even more new landowners. Typically, the new landowner has an increased educational and income level. Today, 65% of private forestland owners hold college degrees (Butler and Leatherberry, 2004).

In specific states, this demographic change is even more evident. In Minnesota, a survey found that the average age of a private forest landowner is 55 years, half of which have held their land for at least 25 years (Baughman et al. 1998). For landowners who acquired their land in the last five years, the average age is 43, a much younger audience. Of all the forest landowners in Minnesota, 47% are absentee landowners, i.e., owners that do not live on their forestland (Baughman et al. 1998). The larger number of absentee landowners is also reflected in other states. Absentee landowners are less likely to be familiar with Extension programs and less likely to receive natural resource educational information. Measells et al. (2006) found that 69% of Tennessee forest landowners had never received information on forestry.

In Tennessee, absentee landowners own approximately 41% of private forestland. The number of landowners has also been increasing and now is estimated to be about 500,000. Almost 91% of all private forestland owners hold tracts of less than 50 acres and account for only 37% of the total private forestland in the state (Tennessee Department of Agriculture, Division of Forestry, 2005). This fragmentation of forestland into smaller parcels makes it more difficult to provide educational programs as the potential audience continually grows and falls outside the traditional Extension clientele

group. Other demographics of forest ownership in Tennessee are similar to Minnesota. Over 41% of the private forestland acreage has been owned by the same individual or family for over 25 years (Butler et al. 2008). Seventy four percent is held by persons aged 55 or over and 41% is held by persons with over $50,000 per year in income. Almost 66% of private forestland in Tennessee is owned by someone with at least some college coursework, 40% by someone with at least a bachelor's degree. Fifty-six percent of private forestland in the state is held by owners who own less than 100 acres of forestland.

Butler et al. (2008) surveyed Tennessee forestland owners about how they received management information for their property. Only 9% of landowners in that study, representing 26% of private forestland acres, had ever received management advice. The top three sources of advice were: 1) the state forestry agency, 2) loggers, and 3) private consultants. Extension ranked sixth on the list. The top five methods by which Tennessee forestland owners preferred to receive information were: 1) publications and books, 2) newsletters, newspapers and magazines, 3) talking with a natural resource professional, 4) video tapes, and 5) the Internet (Butler et al. 2008). Just over 1% of the study's respondents, representing 9% of the private forestland acreage had a written management plan. The top five reasons of owning forestland in Tennessee were: 1) as part of home or vacation home, 2) privacy, 3) to enjoy beauty or scenery, 4) to protect nature and biologic diversity, and 5) to pass land on to children or other heirs. Changing demographics of clientele and the increasing number of landowners makes the delivery of research-based information in workshops and meetings more difficult and costly to organize and conduct. In light of the costs of training agents, the increasing

number and diversity of the clientele base, and increased costs of traditional Extension programming, many states have begun searching for program delivery alternatives.

Few, if any budget increases exist for additional Extension programming. Summer et al. (1995) noted that for an organization like Extension to be responsive to changing demographics, there must be a continuous assessment of program effectiveness and efficiency and quality program planning to meet the needs of the changing clientele. Through this assessment and the desire to serve the clientele, many Extension programs have begun to view the Internet as a convenient and cost-effective delivery alternative for Extension programming.

The first steps toward offering web-based Extension education and programming have been made by using the Internet to provide continuing education and training to Extension Agents. Many state Extension programs have planned, provided, and/or participated in web-based continuing education since the mid-1990s.

With the advent of the Cooperative Extension Curriculum Project (CECP) in 2001, the development of web-based courses and training for Extension educators took a large step forward. Supported by the Southern Regional Extension Directors and the 1890 Extension Administrators, this project is a multi-state curriculum development program for the Southern Region. The initial focus was for training to develop professional competencies within Extension. The effort recognized that educational professionals within the Extension system developed a host of educational products each year. These same professionals routinely required continuing education programs to maintain their competencies on a broad range of topics. Traditionally, there has been little multi-state collaboration in these efforts. In a time of budget constraints, there was a need to reduce

duplication among universities and states. CECP promotes wider collaboration across the southeast region of the US. More collaboration also ensured that more consistent educational products would be available to clientele across the south. To date, there have been seven professional development courses on forestry offered through the CECP system, though exact user numbers are unavailable. Users can visit the online campus at http://cecp-online.org/, register, and utilize the educational modules.

Web-based educational material for general Extension clientele has developed more slowly. However, with increased public access to computers and the Internet, web-based learning has developed rapidly and several successful web-based programs have been developed for Extension clientele. Examples include:

- Aquaculture Network Information Center: http://aquanic.org/ (Swann and Einstein, 2000).
- Web-based Options for Woodland Owners course: http://www.cnr.vt.edu/forestupdate/ (Jenkins, 2002).
- National Learning Center for Forest and Range Landowners: http://www.forestandrange.org (Jackson et al. 2004)

A nationwide effort, eXtension, has been underway since 2002 to create a national framework for Extension materials and resources that are available online for landowners and other clientele. Supported by the Extension Committee on Organization and Policy, the program has developed a common vision and goal for web-based Extension so that a national, comprehensive web-based educational network can be established for both current and future Extension clientele. Funded through an assessment on each state's Extension budget, eXtension provides access to research-based information to any one

with Internet access, 24 hours a day, 7 days a week. This effort moved Cooperative Extension to the forefront of information delivery by enabling professionals to respond to clientele more quickly and efficiently, to use the newest technologies for program development, and to expand the types and amounts of resources that can be provided to clientele.

eXtension was structured around “Communities of Interest” that address specific subject areas (www.extension.org/main/about). Within these communities, a variety of resources are available to users. Tools such as frequently asked questions, ask the expert, education modules, publications, and others are in each community. The first eight communities are currently active and more are under development. Each year, federal grants will be distributed for the development of additional Communities of Practice. Overall, eXtension will provide a more efficient means of interacting with a larger clientele. Currently, plans are in place to move professional development content from the CECP program to the eXtension system. This will occur over the next two to three years and will be centrally located with the eXtension clientele programming.

The development and practice of web-based education for both Extension educators and Extension clientele provides a clear opportunity for future Extension efforts. Currently, with few web-based educational programs available, there are many opportunities to develop new programming for web-based Extension programs. Web-based education is much more than making booklets and brochures available in digital format. A successful web-based program should be interactive, make use of the unique features of the Internet such as video and sound, and deliver information that a user needs in a timely manner (Berge, 1999; Carnevale, 2000).

Web-based Extension, however, has been met with some resistance. Many are concerned that replacing traditional methods and tools will alienate one audience for another. Rodewald (2001) noted that printed information such as newsletters and factsheets remain more preferable to a majority of agricultural landowners than web-based education and that Extension should not overlook these clientele preferences. However, Rodewald (2001) also noted that web-based programming is preferred by a section of agricultural landowners and that Extension should not limit the diversity of its programming. Eberle and Shroyer (2000) considered the evolution of tools such as radio and television during the last one-hundred years with the development of computer technologies during the last twenty years. Their perception of new technologies was that they are simply new tools that we can use to supplement traditional strategies, such as face-to-face meetings and print materials, to deliver educational programs. They stressed that the educational methods employed have not changed, but that educators simply have more tools to employ when using the various educational methods. With the ever-diversifying clientele Extension faces each day, educators must use a variety of tools to satisfy the various learning preferences of clients. Adding new technologies to the toolkit will simply increase the effectiveness of educational programs (Rodewald, 2001).

Advantages and Disadvantages of Web-Based Extension Education

Studies (Biggs and Grove, 1998; Lippert and Plank 1999; Cassidy 2001; Muske et al. 2001) have shown several benefits of web-based learning, such as interactivity in the learning process, convenience in not having to travel, cost savings, the availability of information on the Internet long after the class, and allowing educators to return repeatedly for reference information.

Biggs and Grove (1998) noted that web-based technology provides a learning environment where the student has more control of the instructional materials than the instructor, generating a more interactive, learner-centered environment. Tennessen et al. (1997) made the case that web-based technologies allow for more community building and improved communication between learners, removing traditional psychological barriers that exist in face-to-face instruction.

Cecil and Feltes (2002) estimated that the costs of delivering a program via distance methods were significantly less than those of the same program delivered face to face. Eliminating all preparation costs, travel costs alone for the face-to-face program were $3,800 per program and took an additional two-hundred ten hours in travel time (for presenters and participants). Similarly, the costs associated with creating and publishing materials, from notes and handbooks to factsheets and guides, are much lower for web-based programs as they can be placed online and left for long periods of time to allow the participant to have continuous access. The distance education course had none of these printing and distribution costs. However, maintaining websites and web-based educational products can be expensive. In a review of twenty-one different websites and programs, Sagor (2005) found that the average annual maintenance cost for education websites was $15,625 and took the equivalent of 0.25 of a full time equivalent (FTE). The flexibility of web-based educational programs allows participants who may be prevented from traveling due to work, family, or other concerns, to participate (Lippert and Plank 1999; Cassidy 2001; Muske et al. 2001). This reduction in constraints and costs allows Extension educators to reach their clientele more effectively in an era of limited budgets and growing numbers of clientele.

A common disadvantage to web-based educational programs has traditionally been access to the Internet and connection speed (bandwidth). Early studies indicated bandwidth was the primary problem in offering web-based learning (Bates, 1995; Hall, 1997; Driscoll, 2002). Other studies have indicated that web-based educational programs for low-bandwidth clientele were accomplished by reducing the number and resolution of graphics, eliminating plug-ins, and other tools (Samson, 1998). However, creating learning for low bandwidths can limit the creativity or interactivity of a web-based program. This issue has become less of a barrier in the last several years. In 2007, approximately 71% of adults in the United States used the Internet regularly (Pew Internet & American Life Project, 2007). Specifically, 73% of urban and 60% of rural adults used the Internet. As of February 2007, the Pew Internet & American Life Project estimated that 47% of adult Americans have high-speed, broadband Internet access. That represents a 12% growth rate since 2006. Broadband access in rural homes in particular increased 6% in the last year to 31%. In Tennessee, 53% of households had Internet access (United States Department of Commerce, 2008). Seventy-eight percent of these homes had some type of broadband access and 22% had dial-up access. When including Internet access outside the home, 65% of Tennessee's households had Internet access. Thirty-four percent of Tennessee households had no Internet access and 1% did not know if they had access.

Beyond simple advantages and disadvantages, some educators argue that new technologies will remove the values Extension has represented during the last one-hundred years. Simeral (2001) stated that by holding less face-to-face activities, Extension programs lose benefits such as building long-term relationships, providing

opportunities for socialization, and encouraging family development. Simeral (2001) also stressed the importance of the role Extension holds as a "conduit" for developing social and interaction skills. However, educational programs that integrate web-based programs with traditional methods (field days, etc) have been very successful (Jenkins, 2002). Some researchers have found that web-based activities can encourage social interaction and communities (Tennessen et al. 1997).

Extension Clientele Learning Preferences

Extension programming has traditionally been offered to clientele in face-to-face and hands-on settings because this has been an effective method throughout the life of the organization. Richardson (1994) showed that 70% of Extension clientele in North Carolina preferred learning "by doing" more than any other method. Similarly, when evaluating preferred learning method combinations, he found that more clientele (20%) chose "seeing and doing" more than any other combination. Clientele in the present study ranged from 30 to 65 years of age and about one-third had a college degree.

Similarly, Downing and Finley (2005) surveyed private forest landowners about their preferred educational methods. The landowners primarily chose active delivery styles, including workshops, demonstration areas, and skill demonstrations. Those same landowners rated learning how to apply knowledge as the most important aspect of any learning program. In this survey, the landowner pool was 87% male, averaged 57 years old, and 84% owned less than two-hundred acres. More than 50% of the population had completed a two-year degree and 20% had completed a graduate degree. More than 40% had annual household incomes greater than $50,000 per year and 33% were retirees. Magill et al. (2004) found that 68% of West Virginia forest landowners preferred

technical assistance more than any other assistance delivery method. In a study of longleaf pine forest owners, 54% were over 55 years of age and a little more than one-third of the population had a college degree (Radhakrishna et al. 2003). The largest group of this population was retirees (34%). Out of nine choices, the landowners ranked newsletters, publications, and field tours as their top three methods of receiving educational programs, the Internet ranked last. The study also found that there was a significant negative correlation between age and high-technology delivery systems.

Howell and Habron (2004) surveyed landowners in Michigan who participated in a watershed educational program concerning their preferred methods of learning. All participants surveyed participated in a traditional workshop. Landowners preferred written newsletters and publications (76%) and personal, face-to-face communication tools (57%) as methods of educational program delivery. Internet usage ranked last with only 18% of respondents favoring that style of learning. This study also related age to communication strategy preferences. Generally, preferences for written and face-to-face strategies remained the same across the three age groups (20-40, 41-60, and 61+ years of age). However, preferences varied for media (video and audio) and Internet. The preference for media sources decreased from 58% in the younger age group (20-40) to 31% in the 61+ age group. The preference for Internet education decreased from 42% in the 20-40 age group to 6% in the 61+ group. Similarly, preference for Internet increased with increasing levels of education (0% for grade school education to 42% for post graduate degree work) and income level (7% for $15,000-25,000/yr to 28% for $75,000+/yr).

Beyond these example studies, several others have found corresponding results. Gloy et al. (2000) and Tavernier et al. (1996) both found that farmers had the least preference for modern communication technologies, including computers, email, and the Internet. Westa et al. (2005) found that when offering a website alone as an educational tool, clientele were less likely to participate than if an additional educational tool, such as a CD-ROM or other mailing, was employed to direct users to the site. Riesenberg and Gor (1989) and Hall et al. (2003) both found that younger, more educated clientele had higher preferences for innovative technologies.

Other studies have had more positive responses. Cecil and Feltes (2002) conducted a series of short web-based courses on insect identification. More than one-hundred seventy participants rated the Internet program and its effectiveness on a scale of 1-5, with 5 being highest. The participants rated the Internet distance education format 4.14 and the overall effectiveness of the program 4.07, which is comparable to any face-to-face program. Approximately 94% of the participants indicated they would participate in a similar program in the future.

The Virginia Tech Department of Forestry has been offering a web-based Woodland Options for Landowners since 2002. This course integrates web-based instruction with in-the-field activities. This integration has been very successful (Jenkins, 2002). The initial course had sixty-two participants and subsequent courses have exceeded one-hundred participants from multiple states (Jenkins, Personal Communication).

Bardon et al. (2007) found that 25% of North Carolina forestland owners prefer mail and web-based educational programs. The demographics of this group indicated that

they were younger, more likely to be married and have children, and less likely to be retired than those who preferred written communications, short programs, and other tools. Approximately two-thirds of those that preferred the web-based programs had at least a four-year college degree and 60% earned more than $60,000 per year (Bardon et al. 2007).

Additional studies, Decamp et al. (2001) and Pocewicz (2005), have found that Extension clientele are receptive to web-based technologies and would utilize them in the right opportunities. Pork producers indicated that there were not technological limitations, but that there was more of an exposure problem when using web-based educational tools (Decamp et al. 2001). Idaho forestland owners indicated high rates of Internet usage (86% at least weekly) but still preferred to receive information in-person or by phone (Pocewicz, 2005). The average age of these landowners was 59. The author hypothesized that this age may partially explain the high rate of Internet usage but low preference for using the Internet to receive educational information, as this age group may have had less experience with web-based education.

O'Neal et al. (2007) studied the web-based learning in comparison with traditional classroom learning for teaching educators about special education. The study found no significant difference in knowledge gain between the two programs based on a pretest/post-test evaluation. The same study also found no significant difference in knowledge gain when self-reported by the learner. A similar study found that web-based programming was used for health education, participant knowledge levels and behavior changes occurred in similar levels to the previous traditional education programs (Oenema et al. 2001). Lockyer et al. (1999) found that collaborative learning techniques

employed in a web-based disease education course were more effective than when used in the traditional classroom. In a review of literature, Boud and Falchikov (1989) examined self-assessment ratings compared to instructor ratings of student knowledge. Their work found a wide variation in self-assessment of knowledge gain with a nearly equal number of studies finding it accurate as those finding inaccurate.

Although methods for program delivery have improved, little is known regarding user preferences and characteristics. For example, why would a person prefer a traditional workshop program instead of a web-based program? As discussed, the use of key demographic factors to predict one's preference for one type of program or the other is a possible way to further refine program development and marketing activities.

II. OBJECTIVES

The present research conducted studied the methods by which UT Extension delivers programming concerning natural resources to private landowners across the state. The research compared two different methodologies of delivery, web-based and traditional face-to-face workshops, and evaluated both knowledge gained and the characteristics of learners who prefer one or the other of these methods. The results will permit the use of demographic factors to predict landowner preference for types of educational programming and allow Extension professionals to better understand the dynamics and differences of the two methods. By being able to predict the preferences based on demographics, Extension educators can more efficiently target, develop, and market programs to selected groups of clientele. The knowledge gained from this study improves Extension educators' abilities to more efficiently reach clientele. The comparison allows for detailed analysis of learner characteristics and why learners preferred one method of instruction instead of another.

The objectives of this research were to provide Extension educators with an increased knowledge base to better choose their program delivery method by comparing two delivery methods for a natural resource program: 1) web-based and 2) a traditional workshop. The research tested the postulate that absentee, younger, wealthier, and/or more educated landowners preferred web-based Extension programs instead of traditional programming. The research also tested the postulate that NIPF landowners who are regularly and actively seeking information on the management of their natural resources will be more likely to choose web-based program options.

III. METHODS

To conduct this comparative research, a planned educational program developed by University of Tennessee (UT) Forestry, Wildlife and Fisheries Extension was evaluated. The Tennessee Healthy Hardwoods Field Workshop series was a series of workshops aimed at educating Tennessee forest landowners about hardwood forest management. Funding from the Tennessee Department of Agriculture, Non-point Source Program (US Environmental Protection Agency Assistance Agreement #C994674-04-0) was used to deliver six field workshops across the state. The first phase of workshops focused on hardwood forest regeneration. The first in a continuing series of workshops, it was offered three separate times at locations across the northern section of the state. These dates and locations included:

- August 12, 2006 – Natchez Trace State Forest
- August 19, 2006 – Stewart State Forest
- August 26, 2006 – Standing Stone State Forest

Content for the workshops was developed by three state Extension Specialists and the Tennessee Division of Forestry. Participants were divided into two groups at the beginning of each workshop. Participants in Group One experienced four lecture/poster type presentations that lasted twenty minutes each. During that time, the participants in Group Two were led on a van tour to show different examples of hardwood forest management: regeneration, young stands, mature stands, and harvesting. At the end of the allotted time, the groups switched areas and the process was repeated.

At the end of the field workshops, participants were surveyed to determine their knowledge gain and proficiency within the covered subject (Appendix A). Knowledge

gain was measured by asking participants to rate their level of knowledge prior to attending the workshop on a scale of one to five, with five being the most knowledgeable. They were then asked to complete the same exercise rating their level of knowledge after the workshop. These two ratings were compared to determine the percent gain in knowledge. This evaluation approach has been shown to be an accurate indicator of actual knowledge gained (Boud and Falchikov, 1989; Dochy et al. 1999).

This survey also gathered demographic information and information related to their preferences in educational programs, i.e., web-based versus field-based. This survey tool was developed with assistance of the Human Dimensions Research Lab in the Department of Forestry, Wildlife and Fisheries. Survey questions and materials were developed by utilizing previously conducted surveys as well as including new, specific questions. These studies were conducted by Esham (1999), Butler and Leatherberry (2004), Howell and Habron (2004), High and Jacobson (2005), and Sagor (2005). The survey tool was approved by the UT Internal Review Board for Human Research and is attached in Appendix A.

The workshops were marketed to the members of the County Forestry Associations (CFA) in each region, through the Tennessee Division of Forestry, the Tennessee Forestry Association, and local newspapers. CFA's were the primary marketing area as there are 34 CFAs in the state representing 43 counties. These CFAs have an average membership of 47 per association. The members of the CFAs have, in general, participated in natural resource management education programs in the past and have a base of knowledge that will enable them to fully engage in the field workshop series.

During the presentations at the field workshops, each speaker and/or session was digitally filmed and all presentations and handout materials were collected. Following the conclusion of the traditional workshop, the video and materials were utilized to construct an asynchronous web-based version of the same program.

The asynchronous Internet course covered the same materials as the traditional workshop. Videos of the traditional field day were transcribed and the script was edited for use on the web. Photos and videos from the field day sites were also captured. Macromedia Dreamweaver (Dreamweaver, 2006) was used to edit web-pages based in a template developed by UT Extension web designers. Proper web design standards, as developed by Leavitt and Shneiderman (2006), specifically colors and navigation, were used. Materials were organized following a similar outline of the field workshop. These materials included readings, video clips, interactive exercises, and activities that the user could conduct away from the computer. Even though the web-based course was asynchronous, activities such as the quiz, the downloadable field-based activity, and videos were included to provide interactivity to the learner. The quiz provided immediate feedback on the response provided by the learner to meet some of the requirements an adult learner may have when using the course. Video was edited using i-Movie (i-Movie, 2007) and photos were edited using Macromedia Fireworks. The completed Internet course was housed on a University of Tennessee web server at http://www.healthyhardwoods.com.

To survey and evaluate participants of the Internet course, the same survey used in the field workshops was edited for web-based use and input into the web-based survey software, mrInterview (SPSS Inc., 2007), provided by the University of Tennessee

Statistical Consulting Center. At the completion of the web course, participants were asked to complete the survey. As an incentive, a drawing for a UT prize pack (hat, tree ID book, etc.), was conducted to motivate participants into completing the survey. To enter their name, participants were asked to enter their email address, with the assurance that no information would be tied to their survey responses. A copy of the web-based survey is attached in Appendix B.

The web-based version of the workshop was marketed toward the CFA organizations as well. However, in the announcement and request for participants, recipients were notified that they must not have attended the field workshop and must have access to a computer with an Internet connection. Additional marketing was done through the Tennessee Forestry Association and direct mailings to two-hundred eighty seven CFA members in Coffee, Dickson, Fayette, Grundy, Henry and Wayne counties. Areas of the state targeted for marketing were those that were not closely associated with the field workshops in an effort to get a diverse population. Each of the direct mail pieces was sent to the name and address of a CFA member who had not registered for or participated in the field day program. Though not absolute, all measures to prevent duplication (i.e., survey a participant in a field day program and the same person in the web-based program) were taken. A goal of one-hundred twenty participants for the web-based workshop was established.

Statistical analysis was conducted using the SPSS 16.0 statistical software package (SPSS, 2007). Analyses for mean separations were conducted by using ANOVA and MANOVA where appropriate. The ANOVA tests were utilized for two specific reasons. First, the tests are robust to violations of normality and equal variance. The data

in this study contained variables that had non-normal distributions and unequal variance. Second, when conducting the ANOVA tests, results were used from the Type III Sums of Squares because this analysis can effectively handle data groups with unequal sample sizes. For analyses related to knowledge gain, ANOVA Repeated Measures was used. Correlation analyses were conducted using the Kendall's tau_b analysis technique, which was well-suited for data that were not normally distributed.

Analyses of text responses to questions were conducted using SPSS Text Analysis for Surveys 2.0 (SPSS Inc, 2007). A linguistic text analysis, which is a categorical keyword search and grouping tool, was used to place participant comments into categories for description. The analysis looked for keywords that matched among the responses and grouped those responses together. The categories were then manually reviewed to ensure the categories were accurately structured.

IV. RESULTS

Sample 1 – Field Day Program

Basic Demographics

The field version of the Healthy Hardwoods Workshops had a total field attendance of 125 over the three offerings. Of these 125 attendees, 116 completed the survey, a completion rate of 93%.

The sample was 78% male and 18% female, with 4% not providing a response. Sixty-nine percent were members of a County Forestry Association. In describing how they viewed themselves when participating in the field day, 75% of participants identified themselves as forest landowners and 25% identified themselves as interested citizens. Another 18% of participants identified themselves as either a consulting forester or state agency forester. Other identifications included logger (4) and industrial forester (3).

Sixty percent of participants were over the age of 55 (Figure 1). Another 26% were 45-54 years of age. Other age categories included 25-34 (4%), and 35-44 (9%). Fifty-four percent had a bachelor's degree or higher (Figure 2). Another 26% had completed vocational/technical training, an associates degree, or college coursework. Household income varied, with 37% reporting an income of $50,000 to $99,999 per year and 19% reporting an income over $100,000 per year. Thirty-two percent had an annual income between $25,000 and $49,999 per year and 5% had an income below $25,000 annually.

Of the participants, 92 (81%) identified themselves as forest landowners. Sixty-nine percent had purchased the land themselves, and another 26% had inherited the land.

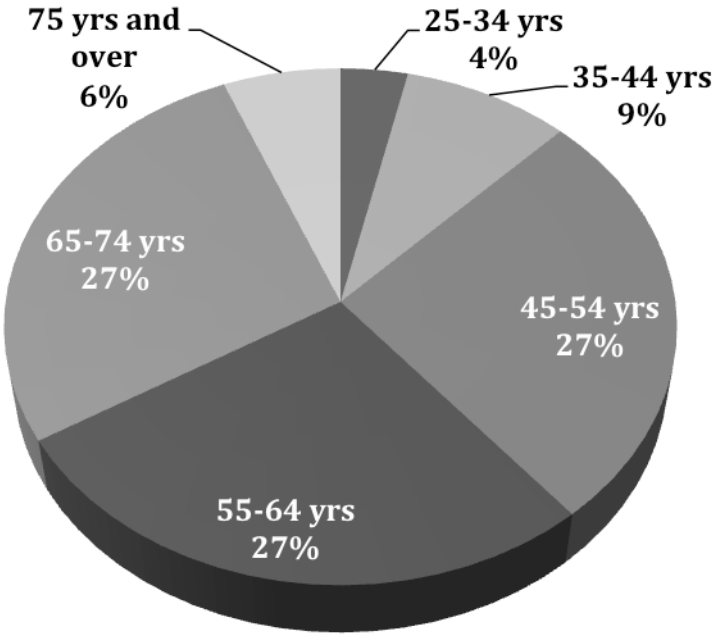

Figure 1. The age distribution of Healthy Hardwoods field day participants by category.

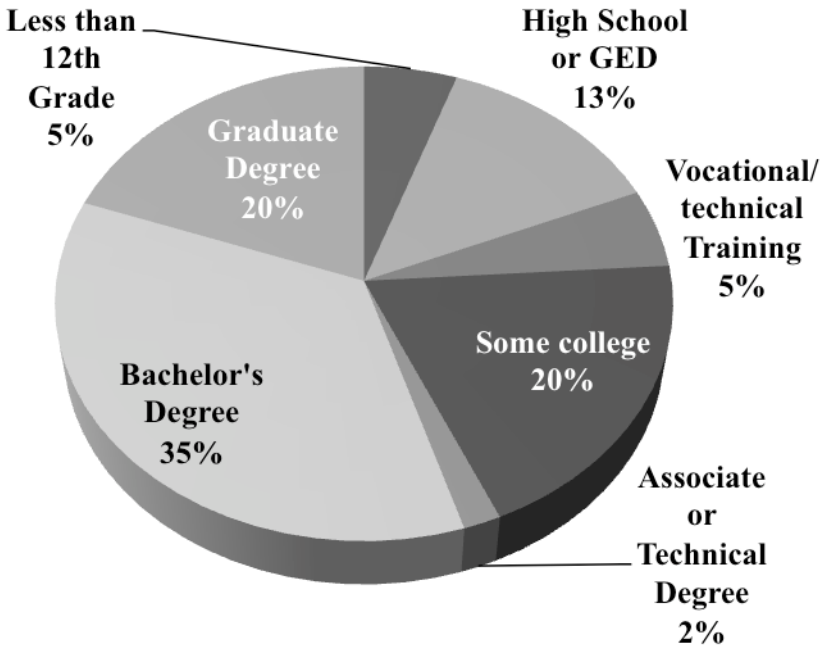

Figure 2. Educational level of Healthy Hardwoods field day participants by category.

The minimum number of acres of total land owned or managed was 5 and the maximum was 7500, with a mean of 447 acres. Total acres of forestland owned or managed varied from 5 to 7500 acres as well, with a mean of 317 acres. These lands had been in possession of the owner or owner's family for periods varying from 1 year to over 100 years. Individual ownership ranged from 1 year to 70 years. The mean duration of individual land ownership was 23 years.

Forest landowners also provided reasons why they owned their land (Table 1), ranking each reason on a scale from 1 to 5, with 5 being the most important. The top three reasons were: 1) to enjoy the beauty or scenery of the land (4.6 average importance ranking across sample participants), 2) as part of their home, vacation home, or farm (4.4), and 3) to protect nature and biodiversity (4.4). Other top reasons included recreation other than hunting or fishing (4.32); land investment (4.3); to pass the land on to their children or other heirs (4.2); privacy (4.2), and the production of sawlogs, pulpwood, or other forest products (4.1). Some respondents chose reasons that included horseback riding, independent lifestyle, and relaxation.

Of the 92 forest landowners, 25 (27%) had a written management plan. Eighty-four percent of those with a written management plan were following it.

Computer and Field Day Experiences

Seventy-eight percent of participants owned their own computer while 18% did not. Another 4% indicated they utilize a computer somewhere other than their home. Sixty-five percent used a computer on a daily or weekly basis (Figure 3). Eight percent of participants indicated they never use a computer. In rating their level of ease when

Table 1. Average ranking of Healthy Hardwoods field day participants' reasons for owning their land. Reasons are ranked 1-5, with 5 representing the most important reason.

Attribute or Reason	Rank (1-5)
To enjoy beauty or scenery	4.6
As part of my home, vacation home, or farm	4.4
To protect nature and biological diversity	4.4
For land investment	4.3
For privacy	4.2
To pass land on to my children or other heirs	4.2
For production of sawlogs, pulpwood, or other forest products	4.1
For hunting or fishing	3.8
For recreation, other than hunting or fishing	3.5
For cultivation or production of non-timber forest products	2.6
For production of firewood or other fuel woods	2.4

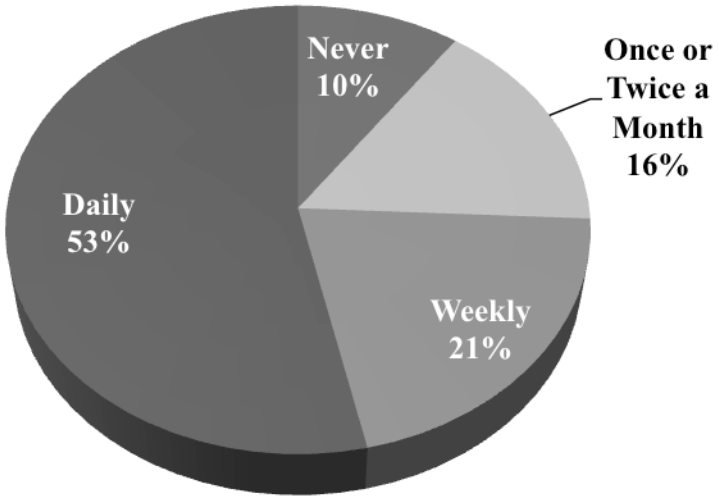

Figure 3. Frequency of computer use by Healthy Hardwoods field day participants by category.

working on a computer, 51% felt somewhat confident or confident in their skills (Figure 4). Eighty-five (75%) participants had Internet access. Of these, 29% used some type of high-speed connection (DSL, cable modem, broadband). Thirty-nine percent had dial-up access. The remainder did not know type of Internet connection they used.

Thirty percent of the participants had not participated in a field day in the past. Thirteen percent had participated in one and 28% had participated in up to five field days. Another 26% had attended more than 5 field days in the past. At the completion of the event, 101(89%) said they would participate in another field-based program. Eight percent indicated they were not sure.

When asked if they would be interested participating in a program like the field day if it were offered as an web-based program, 56% said “Yes” and 31% said “No”. If given a choice between a field day and a web-based program, 3% would choose web-based and 78% would choose the field day.

Participants were also asked to give a reason for their choice. Linguistic text analysis identified five categories of reasons for their expressed preference (Table 2). They are family (1 response), hands on learning (8), interaction (30), technology (7), and field tour (20).

Methods of Learning

The top four methods by which participants prefer to learn about forest management were: 1) face-to-face talk with a forester or other natural resource professional (4.6 average participant ranking across sample participants), 2) field

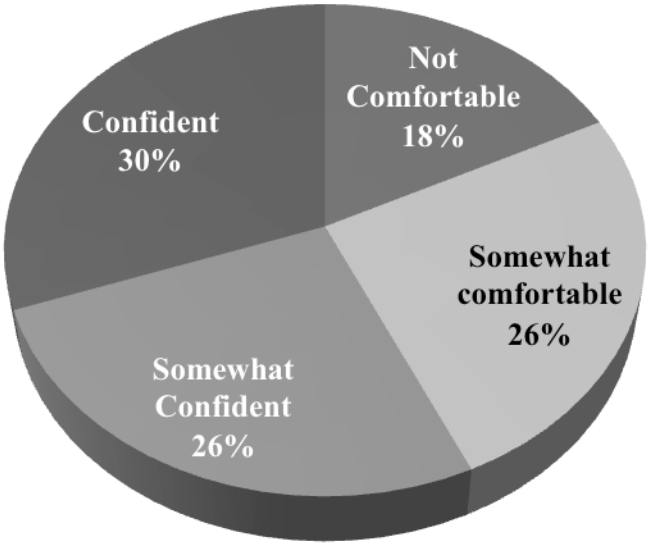

Figure 4. Healthy Hardwoods field day participants' perceived level of comfort in using a computer by category.

Table 2. Categorized responses of Healthy Hardwoods field day participants on the reasons provided for choosing a field-based program over an web-based program. Responses were taken directly from participant surveys and not edited for spelling or grammar.

Category	Response
Family	1. More fun, can see the practices in person, can bring my teenager to educate him in forest management
Hands On Learning	1. Hands on 2. Hands on and chance to ask questions 3. More hands on in the woods (outdoors); however an occasional online class would be okay 4. See and o has a greater impression on me 5. There's nothing like hands-on and being outdoors 6. More hands on, you see and meet real people 7. Met professionals and other landowners, Benefit from seeing examples hands on 8. Hands on is better
Interaction	1. Able to discuss ideas and information 2. Can get personal answers to questions 3. Human element 4. I enjoy meeting the people 5. I learn etter seeing the speakers present 6. I learn more from it - not to mention a free meal 7. I like the personal interaction with other attendees 8. Interaction 9. Interaction and insight from foresters 10. Interaction with attendees 11. Interaction with Professionals 12. Meet People 13. More hands on, you see and meet real people 14. More interaction 15. More interactive 16. More seeing and less imagining. I also enjoy the social interaction. 17. One on One 18. Personal Contact 19. Personal contact 20. Personal contact and interaction 21. Personal Interaction 22. To meet and learn from other landowners 23. To meet and talk with other people 24. You get to meet and get to know a lot of people in the forestry profession 25. Met professionals and other landowners, Benefit from seeing examples hands on 26. I prefer to get outside, see people and demonstration sites, but online might be more convenient. 27. Difficult to adequately get feel for visual aspects on a computer monitor. Face to face interaction with professionals

Table 2. Continued.

Category	Response
	28. Direct observation of forest, direct interaction with speakers, fellowship of participants, opportunity to see different parts of the state
	29. Field tour is very valuable and interaction with forestry people and landowners is a learning experience
Technology	1. Dial-up is slow and impersonal 2. No computer 3. What we did today could not be duplicated online 4. Would prefer both - have learned due to interfacing with others 5. Some field experience is essential, but much of the material could be delivered via the Internet 6. More hands on in the woods (outdoors); however an occasional online class would be okay 7. I prefer to get outside, see people and demonstration sites, but online might be more convenient.
Field Tour	1. Because I like the outside 2. Being in the woods while learning about forestry stays with me longer 3. Being there is like a picture 4. Difficult to adequately get feel for visual aspects on a computer monitor. Face to face interaction with professionals 5. Direct observation of forest, direct interaction with speakers, fellowship of participants, opportunity to see different parts of the state 6. Field tour is very valuable and interaction with forestry people and landowners is a learning experience 7. Forest Tour 8. get out in the field - see a forest 9. Hands on is better 10. I like the onsite tour 11. I prefer to get outside, see people and demonstration sites, but online might be more convenient. 12. I think you learn better with live programs 13. Met professionals and other landowners, Benefit from seeing examples hands on 14. Nothing matches field experience 15. People need to see the actual forest to understand 16. Prefer to be in natural surroundings, enjoy nature 17. Some field experience is essential, but much of the material could be delivered via the Internet 18. You learn more by visibly seeing BMPs in the field 19. You need to be in the woods to talk forestry 20. More fun, can see the practices in person, can bring my teenager to educate him in forest management

days/workshops (4.5), 3) face-to-face talks with other landowners (4.4), and 4) print publications (4.3) (Table 3). Web-based information resources (3.5) and web-based training (3.1) ranked near the middle or bottom of the choices. Other less-preferred methods were television or radio programs (3.4), CD-Rom or DVDs (3.3), online discussion with other landowners (3.2), and video conferences (2.9).

Knowledge Gain

In comparing knowledge levels of participants before and after the field day, knowledge gains were measured across all categories (Table 4). For water quality protection, knowledge increased 17% from pre-field day levels. Similarly, knowledge of incentives and cost share programs (23%), regeneration systems in timber harvesting (30%), differences between natural and artificial regeneration (26%), planting hardwood seedlings (30%), and forest management practices on state forests (46%) all increased.

To assess behavior changes, participants were asked in which area they would implement practices on their own land. Forty-one percent indicated they would implement practices for water quality protection. Other levels of implementation include incentives and cost share programs (49%), regeneration systems in timber harvesting (53%), differences in artificial and natural regeneration (29%), planting hardwood seedlings (36%), and forest management on state forests (19%).

Correlation Analysis of Selected Variables

A Kendall's tau_b Correlation was conducted on selected demographic and computer/web variables. Participant choice of course type, web-based or field-based, was not significantly correlated with any variable (Table 5). Most significant correlations

Table 3. Average ranking of Healthy Hardwoods field day participants' preferred methods of learning about forest management. Methods were ranked 1-5, with 5 being the most preferred method.

Method of Learning	Rank (1-5)
Talk with a forester or other natural resource professional face-to face	4.6
Field days/workshops	4.5
Talk with other forest landowners face-to face	4.4
Print publications (books, pamphlets, newsletters, magazines, or newspaper)	4.3
Evening workshops/meetings	3.8
Web-based information resources (websites, newsletters, publications, etc.)	3.5
Talk with a forester or other natural resource professional online (email, chat, discussion, etc.)	3.5
Video tapes for home viewing	3.4
Television or radio programs	3.3
CD-ROM or DVD program distributed by mail or at workshops	3.3
Talk with other forest landowners online (email, chat, discussion, etc.)	3.2
Web-based training (interactive lessons or courses)	3.1
Video conferences	2.9

Table 4. Average ranking and percent change in Healthy Hardwoods field day participants' knowledge levels before and after the field day. Participants rated their knowledge on a scale of 1-5, with 5 being the most knowledgeable.

Subject Area	Knowledge level		% Change
	Before	After	
Water quality protection	3.4	4.0	16.5
Incentives and cost share programs	3.1	3.8	23.4
Regeneration systems in timber harvesting	3.2	4.1	29.7
Differences between natural and artificial regeneration	3.2	4.0	25.9
Planting hardwood seedlings	3.1	4.1	30.1
Forest management practices on state forests	2.7	4.0	46.1

Table 5. Results of the correlation analyses of selected Healthy Hardwoods field day participant variables. Variable key is outlined in Appendix A in the response options to each question.

Variable		Gender	Age	CFA Membership	Education	Income	Forestland Ownership	Own a Computer	Frequency of Computer Use	Level of Comfort with Computer	Internet Access	Type of Internet Access	Choice of Online or Field Program
Gender	Correlation Coefficient	1.000	-.085	.125	.034	.014	-.220*	-.057	-.074	-.097	-.019	-.237*	.059
	Sig. (2-tailed)	.	.327	.199	.692	.879	.023	.558	.441	.298	.850	.034	.584
Age	Correlation Coefficient	-.085	1.000	-.191*	-.233**	-.233**	-.211*	.318**	-.361**	-.419**	.351**	.045	.065
	Sig. (2-tailed)	.327	.	.027	.002	.005	.013	.000	.000	.000	.000	.653	.496
CFA Membership	Correlation Coefficient	.125	-.191*	1.000	-.045	.017	.011	-.056	-.018	.012	-.118	.036	-.123
	Sig. (2-tailed)	.199	.027	.	.605	.853	.905	.563	.854	.894	.230	.746	.248
Education	Correlation Coefficient	.034	-.233**	-.045	1.000	.338**	.159	-.307**	.330**	.294**	-.276**	.235*	-.117
	Sig. (2-tailed)	.692	.002	.605	.	.000	.062	.000	.000	.000	.002	.018	.223
Income	Correlation Coefficient	.014	-.233**	.017	.338**	1.000	-.135	-.337**	.166	.221*	-.347**	.147	-.056
	Sig. (2-tailed)	.879	.005	.853	.000	.	.141	.000	.067	.012	.000	.168	.586
Forestland Ownership	Correlation Coefficient	-.220*	-.211*	.011	.159	-.135	1.000	-.177	.328**	.284**	-.079	.310**	-.095
	Sig. (2-tailed)	.023	.013	.905	.062	.141	.	.065	.000	.002	.417	.005	.368
Own a Computer	Correlation Coefficient	-.057	.318**	-.056	-.307**	-.337**	-.177	1.000	-.471**	-.409**	.814**	.181	-.061
	Sig. (2-tailed)	.558	.000	.563	.000	.000	.065	.	.000	.000	.000	.100	.562
Frequency of Computer Use	Correlation Coefficient	-.074	-.361**	-.018	.330**	.166	.328**	-.471**	1.000	.643**	-.498**	.207*	.046
	Sig. (2-tailed)	.441	.000	.854	.000	.067	.000	.000	.	.000	.000	.049	.652
Level of Comfort with Computer	Correlation Coefficient	-.097	-.419**	.012	.294**	.221*	.284**	-.409**	.643**	1.000	-.413**	.135	.020
	Sig. (2-tailed)	.298	.000	.894	.000	.012	.002	.000	.000	.	.000	.185	.840
Internet Access	Correlation Coefficient	-.019	.351**	-.118	-.276**	-.347**	-.079	.814**	-.498**	-.413**	1.000	.	-.064
	Sig. (2-tailed)	.850	.000	.230	.002	.000	.417	.000	.000	.000	.	.	.541
Type of Internet Access	Correlation Coefficient	-.237*	.045	.036	.235*	.147	.310**	.181	.207*	.135	.	1.000	-.049
	Sig. (2-tailed)	.034	.653	.746	.018	.168	.005	.100	.049	.185	.	.	.654
Choice of Online or Field Program	Correlation Coefficient	.059	.065	-.123	-.117	-.056	-.095	-.061	.046	.020	-.064	-.049	1.000
	Sig. (2-tailed)	.584	.496	.248	.223	.586	.368	.562	.652	.840	.541	.654	.

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

detected were weak (<0.5). Gender was correlated with forestland ownership (males more likely to own forestland) and Internet access type (males more likely to have high-speed access). Forestland ownership was negatively correlated with frequency of computer use, level of comfort with a computer, and type of Internet access. Age was positively correlated with CFA membership, forestland ownership, and computer ownership. Age was negatively correlated with educational level, income level, frequency of computer use, level of comfort with a computer, and Internet access. Education level was positively correlated with income, computer ownership, frequency of computer use, level of comfort with a computer, Internet access, and type of Internet access.

Income was positively correlated with computer ownership, level of comfort with a computer, and Internet access. As would be expected, computer ownership, frequency of use, level of comfort with a computer, Internet access, and access type were all positively correlated.

Sample 2 – Web–based Program

Basic Demographics

The web-based version of the Tennessee Healthy Hardwoods Workshop received 116 unique visitors from the time it launched to June 15, 2008. Of these 116 visitors, 75 began the survey and 31 completed it. The survey completion rate was 28% of visitors to the website or 11% of the landowners to which it was directly marketed. None of those who started but did not complete the survey answered any of the questions, so no incomplete surveys could be utilized for any data analyses.

The sample of the population (31 participants who completed the survey) was 84% male and 16% female. Eighty-seven percent were members of a County Forestry Association. In describing how they viewed themselves when participating in the web-based module, 23% of participants identified themselves as forest landowners and 39% identified themselves as interested citizens. Other identifications included logger (2), agency forester/Extension agent (6), industrial forester (2), Natural Resources Conservation Service employee (1), conservationist (1), and wildlife biologist (1).

Forty-five percent of participants were between the ages of 55-64 (Figure 5). Another 29% were 45-54 years of age. Other age categories included 25-34 (3%), 35-44 (6%), and 65-74 (16%). Seventy-four percent had a bachelor's degree or higher educational level (Figure 6). Household income varied, with 16% having an income of $100,000 per year or more, $50,000-99,000 (58%), $25,000-49,999 (19%), and less than $25,000 (3%).

Of the participants, 25 (81%) identified themselves as forest landowners. The minimum number of acres of total land owned or managed was 6 and the maximum was 10,000, with a mean of 1334 acres. Total acres of forestland owned or managed varied from 6 to 10,000 acres as well, with a mean of 1,275 acres. These lands had been in possession of the owner for periods varying from 1 to 50 years. The mean duration of land ownership was 22.7 years.

Forest landowners also provided reasons why they own their land (Table 6). The top two reasons were to enjoy the beauty or scenery of the land (4.7 average importance ranking across sample participants) and to pass the land on to their children or other heirs (4.32). Other top reasons included for recreation other than hunting or fishing (4.32); to

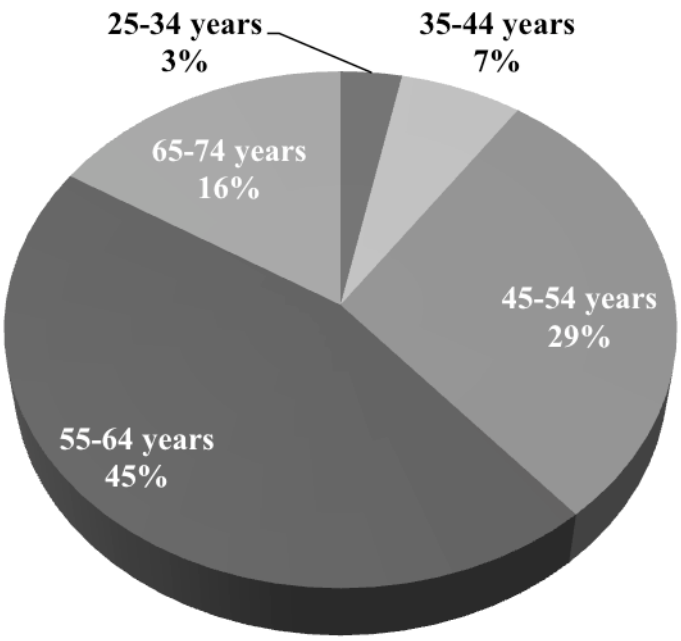

Figure 5. The age distribution of Healthy Hardwoods web-based module participants by category.

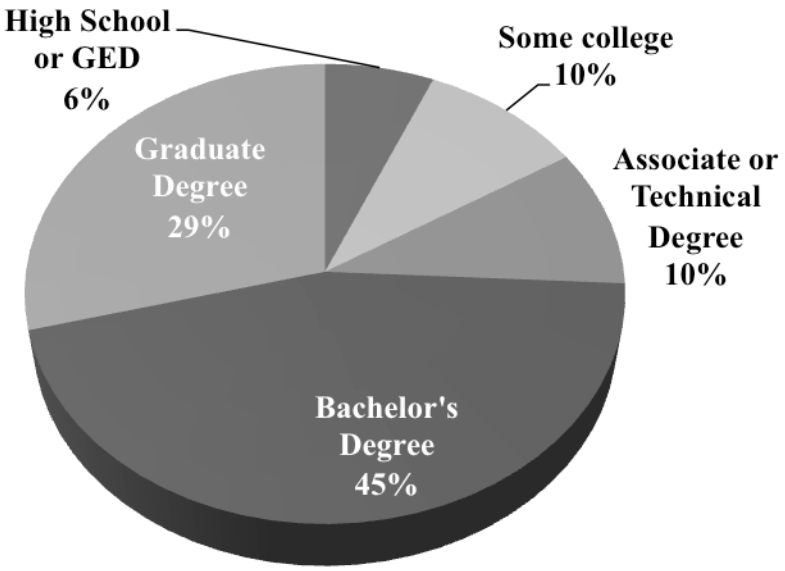

Figure 6. Educational level of Healthy Hardwoods web-based module participants by category.

Table 6. Average ranking of Healthy Hardwoods web-based module participants' reasons for owning their land. Reasons are ranked 1-5, with 5 representing the most important reason.

Attribute or Reason	Rank (1-5)
To enjoy beauty or scenery	4.7
As part of my home, vacation home, or farm	4.4
To pass land on to my children or other heirs	4.3
For production of firewood or other fuel woods	4.3
To protect nature and biological diversity	4.2
For land investment	4.1
For privacy	4.1
For cultivation or production of non-timber forest products	3.8
For recreation, other than hunting or fishing	3.8
For hunting or fishing	2.7
For production of sawlogs, pulpwood, or other forest products	2.5

protect nature and biological diversity (4.3); land investment (4.2); the land is part of my home, vacation home, or farm (4.1); and for privacy (4.1).

Of the 25 forest landowners, 16 (64%) have a written management plan. Ninety-four percent of those who have a written management plan are following it.

Computer and Web Experiences

Ninety percent of participants owned their own computer. The remaining 10% utilized a computer somewhere other than their home. Eighty-one percent used a computer on a daily or weekly basis (Figure 7). Two participants indicated they never used a computer. In rating their level of ease when working on a computer, 68% felt somewhat confident or confident in their skills (Figure 8). Twenty nine (93%) participants had Internet access, 74% of which is some type of high-speed connection (DSL, cable modem, broadband). Only 19% had dial-up access.

Fifty-five percent of the participants had not participated in a web-based module in the past. Eight percent had participated in one and 6% had participated in up to five web-based programs. At the completion of the module, 24 (77%) said they would participate in another web-based program**.**

When asked if they would be interested participating in a program like the module if it were offered as a field day, 97% said “Yes.” If given a choice between a web-based program and a field day, 32% would choose web-based and 68% would choose the field day.

Participants were also asked to provide a reason for their choice. Linguistic analysis categorized the responses for interpretation. In the responses indicating the

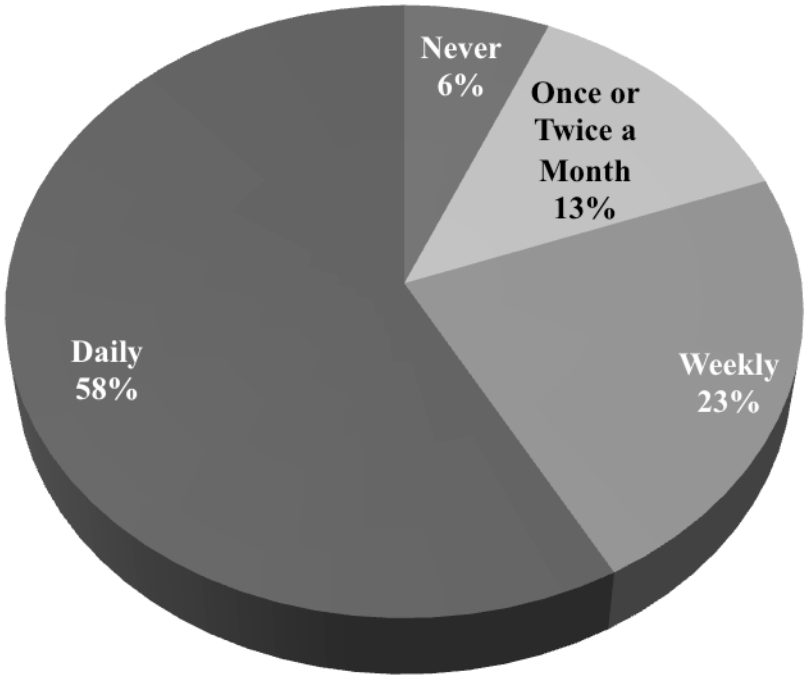

Figure 7. Frequency of computer use by Healthy Hardwoods web-based module participants by category.

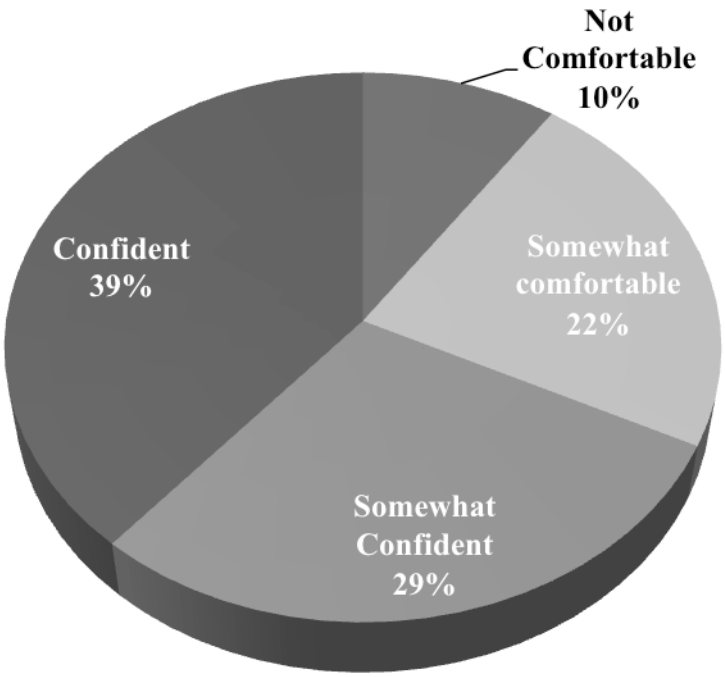

Figure 8. Healthy Hardwoods web-based module participants' perceived level of comfort in using a computer by category.

participant would choose an web-based program, three major categories were identified (Table 7). These were convenience (6 responses), understanding (1), and information access (1). An analysis of the 22 participants who indicated they would choose a field-based program developed five over-arching categories of responses (Table 8). These categories are technology barriers (2 responses), hand's on learning (2), personal interaction (9), ability to ask questions (4), and field examples (6).

Methods of Learning

The top three methods by which participants wanted to learn about forest management were: 1) a face-to-face talk with a forester or other natural resource professional (4.6); 2) print publications (4.45), and 3) field days/workshops (4.3) (Table 9). Web-based information resources (3.83) and web-based training (3.71) ranked in the middle of the choices. The least preferred methods were television or radio programs (3.4), online discussion with other landowners (3.1), and video-conferences (3).

Knowledge Gain

In comparing knowledge levels of participants before and after the module, knowledge gains were detected across all categories (Table 10). In knowledge of water quality protection, knowledge increased 13% from pre-module levels. Similarly, knowledge of incentives and cost share programs (26%), regeneration systems in timber harvesting (25%), differences between natural and artificial regeneration (20%), planting hardwood seedlings (12%), and forest management practices on state forests (29%) all increased.

Table 7. Categorized responses of Healthy Hardwoods web-based module participants on the reasons provided for choosing an web-based program over a field-based program. Responses were taken directly from participant surveys and not edited for spelling or grammar.

Category	Response
Convenience	1. Convience 2. Current health problems make it difficult for me to attend some programs. 3. Time restraints, more information in one area 4. Convient, and time saving. 5. Can take at my convenience, no driving, less time. 6. Convienence 7. Easier to schedule.
Information Access	1. Quick access to find answers to a particular problem to stay current
Understanding	1. Just finished a cattle certification class with Jeff Via our county agent it was the most informative class and I could understand the topics discussed

Table 8. Categorized responses of Healthy Hardwoods web-based module participants on the reasons for choosing a field program instead of an web-based program. Responses were taken directly from participant surveys and not edited for spelling or grammar.

Category	Responses
Ability to Ask Questions	1. There is a much greater benefit in being able to ask subject matter experts question directly and follow up with a group discussion. 2. Listining to questions and experiences of others attending field days. Getting to ask questions. 3. It is easier to understand what the speaker is talking about if you can see and touch things. Also one can ask questions about particular problems they have had. There is also interaction with other people who tell how they have dealt with problems. 4. Chance for interaction with the speakers, ask questions, etc.
	5. More interaction with the professional forester with opportunities for questions and answers in a group setting. Seeing mgt activities in person is always more revealing than watching Utube.
Field Examples	1. Being in the field actually seeing examples of the topic discussed tends to make the topic more interesting. 2. An online program is very informative and useful, but it is not a substitute to actually seeing the practices implemented in the field. 3. Easier to understand principles in person 4. Better Understanding
Hand's On Learning	1. Better to see and learn on site 2. Hand"s On 3. So, I can get outside.
Personal Interaction	1. Enjoy getting out with other persons of like interest. 2. People seem to retain more information from field days. 3. Listining to questions and experiences of others attending field days. Getting to ask questions. 4. Enjoy interaction etc with other intrested and interesting persons 5. More informative and personal participation 6. It is easier to understand what the speaker is talking about if you can see and touch things. Also one can ask questions about particular problems they have had. There is also interaction with other people who tell how they have dealt with problems. 7. Out door activities are fun , meet people with same interests ,better examples on site 8. More interaction with the professional forester with opportunities for questions and answers in a group setting. Seeing mgt activities in person is always more revealing than watching Utube. 9. Chance for interaction with the speakers, ask questions, etc.
Technology Barriers	1. Computer programs use too small of print on information to be read from a screen. Larger print would help. Video does not show what being in a forest shows. 2. I aint a high tech redneck :)

Table 9. Average ranking of Healthy Hardwoods web-based module participants' preferred methods of learning about forest management. Methods were ranked 1-5, with 5 being the most preferred method.

Method of Learning	Rank (1-5)
Talk with a forester or other natural resource professional face-to face	4.6
Print publications (books, pamphlets, newsletters, magazines, or newspaper)	4.5
Field days/workshops	4.3
Talk with other forest landowners face-to face	4.1
Web-based information resources (websites, newsletters, publications, etc.)	3.8
Evening workshops/meetings	3.8
Web-based training (interactive lessons or courses)	3.7
CD-ROM or DVD program distributed by mail or at workshops	3.6
Video Tapes for home viewing	3.6
Talk with a forester or other natural resource professional online (email, chat, discussion, etc.)	3.5
Television or radio programs	3.4
Talk with other forest landowners online (email, chat, discussion, etc.)	3.1
Video conferences	3.0

Table 10. Average ranking and percent change in Healthy Hardwoods web-based module participants' knowledge levels before and after completing the module. Participants rated their knowledge on a scale of 1-5, with 5 being the most knowledgeable.

Subject Area	Knowledge level		Percent Change
	Before	After	
Water quality protection	3.9	4.5	13.1
Incentives and cost share programs	3.4	4.2	26.0
Regeneration systems in timber harvesting	3.5	4.4	24.8
Differences between natural and artificial regeneration	3.7	4.5	19.8
Planting hardwood seedlings	3.7	4.2	12.2
Forest management practices on state forests	3.0	3.9	28.7

Of the practices described in each of the above areas, participants were asked in which area they would implement practices on their own land. Forty-two percent indicated they would implement practices for water quality protection, incentives and cost share programs (39%), regeneration systems in timber harvesting (48%), differences in artificial and natural regeneration (16%), planting hardwood seedlings (32%), and forest management practices on state forests (6%). Fifty-two percent indicated they plan to implement practices within the next five years.

Correlation Analysis of Selected Variables

A Kendall's tau_b Correlation was conducted on selected demographic and computer/web variables (Table 11). Participant choice of course type, web-based or field-based, was significantly correlated with the type of Internet access that the participant used. The higher the connection speed, the more likely a participant would choose a web-based program. Education was positively correlated with income level and frequency of computer use. Computer ownership was positively correlated with frequency of computer use and Internet access. Frequency of computer use was positively correlated with Internet access, type of Internet access and comfort level with a computer.

Comparison of the Two Samples

Basic Demographics

In comparing the basic demographics of the two population samples, few significant differences were detected (Table 12). Sex, age, county forestry association membership, income level, and forestland ownership were not significantly different

Table 11. Results of the correlation analyses of selected Healthy Hardwoods web-based module participant variables. Variable key is outlined in Appendix A in the response options to each question.

Variable		Sex	Age	CFA Membership	Education	Income	Forestland Ownership	Own a Computer	Frequency of Computer Use	Level of Comfort with Computer	Internet Access	Type of Internet Access	Choice of Online or Field Program
Sex	Correlation Coefficient	1.000	-.046	-.175	-.036	.016	.000	-.149	-.067	.000	-.120	-.334	-.293
	Sig. (2-tailed)	.	.790	.345	.835	.926	1.000	.422	.704	1.000	.520	.062	.115
Age	Correlation Coefficient	-.046	1.000	-.089	.029	-.206	-.336	.246	-.077	-.255	.106	.048	-.062
	Sig. (2-tailed)	.790	.	.604	.854	.203	.051	.152	.634	.109	.537	.774	.719
CFA Membership	Correlation Coefficient	-.175	-.089	1.000	.118	.148	.049	-.131	.292	.066	-.105	.124	-.171
	Sig. (2-tailed)	.345	.604	.	.492	.396	.792	.481	.096	.700	.572	.488	.357
Education	Correlation Coefficient	-.036	.029	.118	1.000	.469**	.053	-.147	.353*	.055	-.161	.196	.130
	Sig. (2-tailed)	.835	.854	.492	.	.004	.760	.394	.030	.731	.350	.241	.452
Income	Correlation Coefficient	.016	-.206	.148	.469**	1.000	.030	-.134	.052	.180	.016	.224	.070
	Sig. (2-tailed)	.926	.203	.396	.004	.	.862	.441	.750	.265	.926	.182	.687
Forestland Ownership	Correlation Coefficient	.000	-.336	.049	.053	.030	1.000	-.167	.000	-.033	-.134	-.127	.145
	Sig. (2-tailed)	1.000	.051	.792	.760	.862	.	.369	1.000	.849	.472	.478	.433
Own a Computer	Correlation Coefficient	-.149	.246	-.131	-.147	-.134	-.167	1.000	-.496**	-.225	.802**	.175	.218
	Sig. (2-tailed)	.422	.152	.481	.394	.441	.369	.	.005	.191	.000	.327	.240
Frequency of Computer Use	Correlation Coefficient	-.067	-.077	.292	.353*	.052	.000	-.496**	1.000	.467**	-.414*	.401*	-.117
	Sig. (2-tailed)	.704	.634	.096	.030	.750	1.000	.005	.	.004	.018	.019	.504
Level of Comfort with Computer	Correlation Coefficient	.000	-.255	.066	.055	.180	-.033	-.225	.467**	1.000	-.068	.165	-.049
	Sig. (2-tailed)	1.000	.109	.700	.731	.265	.849	.191	.004	.	.694	.320	.775
Internet Access	Correlation Coefficient	-.120	.106	-.105	-.161	.016	-.134	.802**	-.414*	-.068	1.000	.	.175
	Sig. (2-tailed)	.520	.537	.572	.350	.926	.472	.000	.018	.694	.	.	.346
Type of Internet Access	Correlation Coefficient	-.334	.048	.124	.196	.224	-.127	.175	.401*	.165	.	1.000	.446*
	Sig. (2-tailed)	.062	.774	.488	.241	.182	.478	.327	.019	.320	.	.	.013
Choice of Online or Field Program	Correlation Coefficient	-.293	-.062	-.171	.130	.070	.145	.218	-.117	-.049	.175	.446*	1.000
	Sig. (2-tailed)	.115	.719	.357	.452	.687	.433	.240	.504	.775	.346	.013	.

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 12. Comparison of selected variable means between the two Healthy Hardwoods program population samples. Differences are significant at the 0.05 (95%) confidence level and are indicated by an asterisk.

Variable	Field Day	Web-Based	F Value	P-Value
Sex				
Mean	1.18	1.17	0.169	0.682
N	109	30		
Std. Dev.	0.389	0.379		
Age				
Mean	4.82	4.63	0.311	0.578
N	114	30		
Std. Dev.	1.252	0.964		
CFA Membership				
Mean	1.28	1.13	2.81	0.097
N	110	30		
Std. Dev.	0.452	0.346		
Education				
Mean	4.83	5.8	7.531	0.007*
N	113	30		
Std. Dev.	1.894	1.324		
Income				
Mean	2.75	2.97	0.316	0.575
N	106	30		
Std. Dev.	0.849	0.809		
Forest Landowner				
Mean	1.19	1.2	0.031	0.861
N	113	30		
Std. Dev.	0.391	0.407		

between the two population samples. Educational level was significantly higher in the web-based sample when compared to the field day sample (P>0.009).

The data did show that there were significant differences between the two population samples in terms of total acres of land owned or managed (F=8.58, P=0.004; Figure 9) and acres of forestland owned or managed (F=10.3, P=0.002; Figure 10). Participants in the web-based module owned or managed significantly more land and forestland than the field day participants.

The field day program participants had significantly fewer written management plans than the web-based participants (F= 12.1, P>.001). Numerically coded where 1 equals “Yes” and 2 equals “No”, the mean of the field day program was 1.71 (N=85, SD=0.458) and the mean of the web-based program was 1.33 (N=24, SD=0.482). Of those in each sample who had a written plan, no statistical difference was found in the number of individuals who followed that plan (F=0.400, P=0.531). The mean of the field day sample was 1.13 (SD=0.338) and the mean of the web-base sample was 1.06 (SD=0.250).

Computer and Web Experiences

In evaluating the computer usage experiences of the participants, the data showed that there was no significant difference in computer ownership between the two samples (F=1.56, P=.214, Table 13). In the field day sample, 75% of participants owned their own computer while 90% of the web-based sample owned one. The frequency of computer use (F=0.000, P=0.989, Table 13) and ease at using the computer (F=0.035, P=0.353, Table 13) did not significantly differ between population samples.

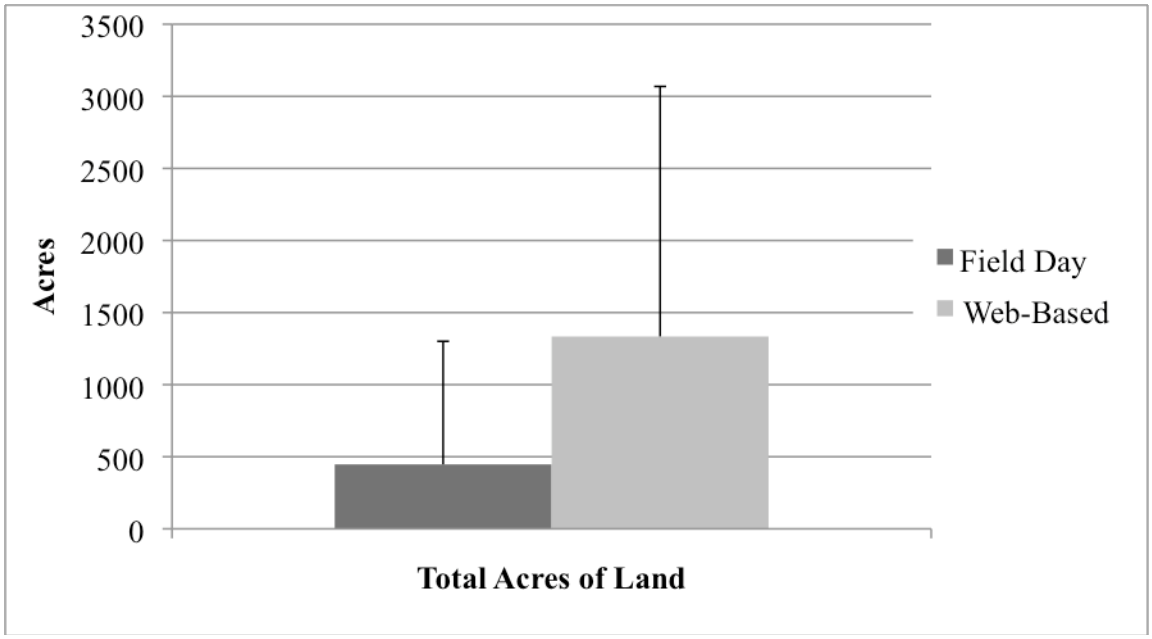

Figure 9. Differences in average total acres of land owned or managed by Healthy Hardwoods program participants by population sample. Error bars represent one standard error beyond the mean.

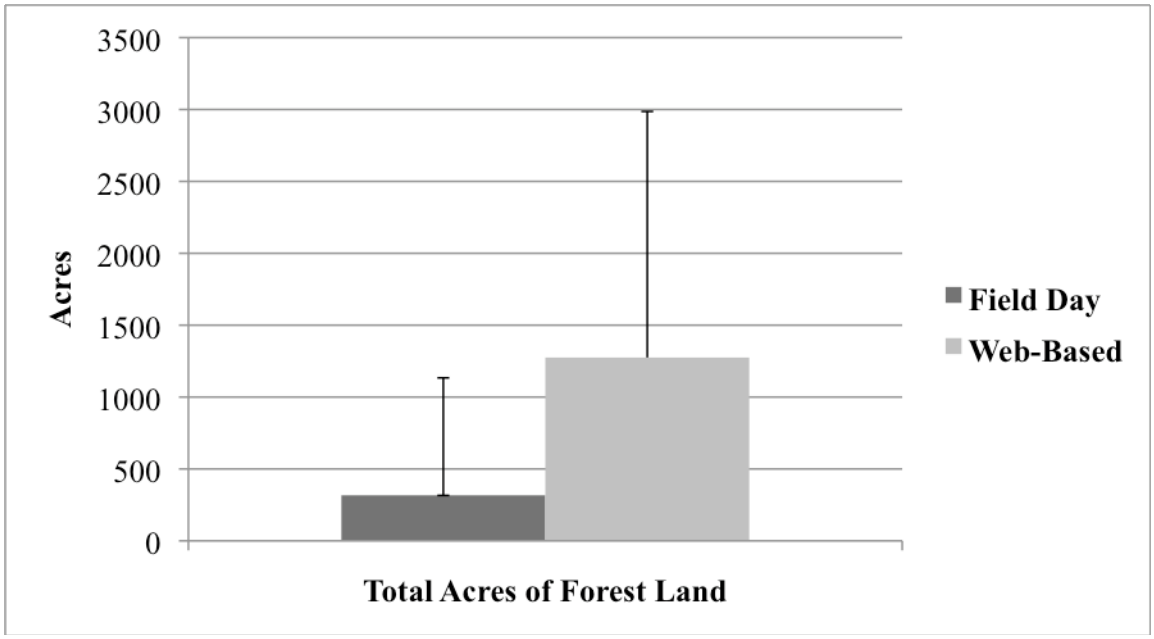

Figure 10. Differences in average total acres of forestland owned or managed by Healthy Hardwoods program participants by population sample. Error bars represent one standard error beyond the mean.

Table 13. Comparison of selected variable means between the two Healthy Hardwoods program population samples. Differences are significant at the 0.05 (95%) confidence level and are indicated by an asterisk.

Variable	Field Day	Web-Based	F Value	P-Value
Computer Ownership				
Mean	1.20	1.10	0.156	0.214
N	111	30		
Std. Dev.	0.400	0.305		
Frequency of Computer Use				
Mean	3.18	3.33	0.000	0.989
N	101	30		
Std. Dev.	1.033	0.959		
Ease at using the computer				
Mean	2.70	2.97	0.035	0.353
N	102	30		
Std. Dev.	1.088	1.033		
Internet access				
Mean	1.21	1.07	3.16	0.078
N	107	30		
Std. Dev.	0.406	0.254		
Type of Internet Access				
Mean	1.58	2	15.88	0.000*
N	78	28		
Std. Dev.	0.748	0.887		
Choice of Program				
Mean	1.03	1.70	93.43	0.0001*
N	92	30		
Std. Dev.	0.179	0.466		

Marginal significant differences were detected (F=3.16, P=0.078, Table 13) between the two groups in the percentage of participants having Internet access. Ninety three percent of the web-based sample had Internet access compared to 75% of the field day sample. The type of Internet access significantly differed between the two (F=15.88, P=0.000, Table 13). The web-based population sample had significantly more high-speed or broadband access (74%) than the field day sample (29%). Dial-up connections were also more prevalent in the field day sample (39%) than in the web-based sample (19%).

Participants' preference of program significantly differed if offered either a web-based or field day version of the same information. (F=93.43, P=0.0001, Table 13). Significantly more participants in the web-based sample would choose an web-based program (32%) than would a participant in the field day sample (3%). Still, a majority of each, 68 and 78% respectively, would choose a field day over a web-based program. Through the text analysis of the reasons for this choice, both samples gave similar reasons for choosing a field program. These reasons were: hands-on learning, technology issues, personal interaction, and field examples. A theme noted by the web-based population sample was the ability to ask questions of the presenters. The web-based sample was the only one to give reasons for choosing an web-based program. These reasons fell into the categories of convenience, information access, and understanding.

Methods of Learning

No significant differences were detected between the two samples when referring to preferred methods of learning (Table 14). Both samples ranked methods similarly. The top six preferred methods were identical, in slightly different orders.

Table 14. Average ranking of Healthy Hardwoods participants' preferred methods of learning about forest management by population sample. Methods were ranked 1-5, with 5 being the most preferred method.

Method of Learning	Field Day Ranking	Web-Based Ranking
Talk with a forester or other natural resource professional face-to face (F=0.003, P=0.960)	4.6	4.6
Field days/workshops (F=2.954, P=0.089)	4.5	4.3
Talk with other forest landowners face-to face (F=1.62, P=0.204)	4.4	4.1
Print publications (books, pamphlets, newsletters, magazines, or newspaper) (F=0.000, P=1.0)	4.3	4.5
Evening workshops/meetings (F=0.046, P=0.831)	3.8	3.8
Web-based information resources (websites, newsletters, publications, etc.) (F=0.000, P=0.988)	3.5	3.8
Talk with a forester or other natural resource professional online (email, chat, discussion, etc.) (F=0.613, P=0.436)	3.5	3.5
Video tapes for home viewing (F=0.897, P=0.346)	3.4	3.6
Television or radio programs (F=0.012, P=0.913)	3.3	3.4
CD-ROM or DVD program distributed by mail or at workshops (F=0.087, P=0.768)	3.3	3.6
Talk with other forest landowners online (email, chat, discussion, etc.) (F=1.060, P=0.306)	3.2	3.1
Web-based training (interactive lessons or courses) (F=0.656, P=0.420)	3.1	3.7
Video conferences (F=0.180, P=0.672)	2.9	3.0

Knowledge Levels

Knowledge levels of water protection and planting hardwood seedlings prior to the field day or web-based program significantly differed (Table 14). Both knowledge area levels were higher in the web-based sample.

Similarly, knowledge levels after the program's completion significantly differed (Table 15). Level of knowledge in water quality protection and planting hardwood seedlings were significantly higher in the web-based sample. Knowledge levels about the differences between natural and artificial regeneration were also significantly higher in the web-based population after the program.

Knowledge Gain

To compare knowledge gain between the two samples, the before and after knowledge levels were evaluated by using an ANOVA Repeated Measures analysis (Table 16). The data showed that knowledge gain related to water quality protection was higher in the field day sample (16.5% increase) than in the web-based sample (13.1%). The gain in knowledge about differences between natural and artificial regeneration was also significantly higher in the field day sample (25.9%) than in the web-based sample (19.8%). The field day sample's increased knowledge about planting hardwood seedlings was also significantly higher (30.1%) than in the web-based sample (12.2%). No significant differences in knowledge gain in the remaining areas were found.

Implementation

The participants of the field day were not more likely to implement practices they learned about through the event than those who participated in the web-based program ($F=0.079$, $P=0.779$; Table 17). Sixty-six percent of the web-based population planned to implement

Table 15. Average ranking of Healthy Hardwoods participants' knowledge level before and after the educational program by population sample. Participants rated their knowledge on a scale of 1-5, with 5 being the most knowledgeable. Differences are significant at the 0.05 (95%) confidence level. Significant differences are indicated by an asterisk.

Knowledge Area		Field Day	Web-Based	F-Value	P-Value
Water quality protection	Before	3.4	3.9	4.357	0.039*
	After	4	4.5	4.558	0.035*
Incentives and cost share programs	Before	3.1	3.4	1.05	0.307
	After	3.8	4.2	3.871	0.051
Regeneration systems in timber harvesting	Before	3.2	3.5	1.829	0.179
	After	4.1	4.4	1.711	0.193
Differences between natural and artificial regeneration	Before	3.2	3.7	3.113	0.08
	After	4	4.5	4.201	0.042*
Planting hardwood seedlings	Before	3.1	3.7	5.353	0.022*
	After	4.1	4.2	4.295	0.04*
Forest management practices on state forests	Before	2.7	3	1.385	0.241
	After	4	3.9	0.318	0.574

Table 16. Percent change in Healthy Hardwoods participants' knowledge levels before and after the educational program by population sample. Participants rated their knowledge on a scale of 1-5, with 5 being the most knowledgeable. Differences are significant at the 0.05 (95%) confidence level. Significant differences are indicated by an asterisk.

Subject Area	Field Day Percent Change	Web-Based Percent Change	F-Value	P-Value
Water quality protection	16.5	13.1	5.77	0.018*
Incentives and cost share programs	23.4	26.0	2.95	0.088
Regeneration systems in timber harvesting	29.7	24.8	2.77	0.099
Differences between natural and artificial regeneration	25.9	19.8	5.78	0.018*
Planting hardwood seedlings	30.1	12.2	7.15	0.008*
Forest management practices on state forests	46.1	28.7	0.528	0.469

Table 17. Percentage of Healthy Hardwoods participants who planned to implement practices in one or more of six categories following the educational program by population sample. Differences are significant at the 0.05 (95%) confidence level. Significant differences are indicated by an asterisk

Subject Area	Field Day Percentage	Web-based Percentage	F-Value	P-Value
Water quality protection	41	47	0.178	0.674
Incentives and cost share programs	49	37	1.318	0.253
Regeneration systems in timber harvesting	52	48	0.108	0.744
Differences between natural and artificial regeneration	29	17	2.613	0.108
Planting hardwood seedlings	36	37	0.073	0.787
Forest management practices on state forests	19	7	3.357	0.069

practices compared to 65% of the field day population. Implementation of practices within each individual subject area did not significantly differ between the populations.

Choice of Course Type by Demographic Characteristics

In the field-based population, only three individuals indicated they would choose a web-based course over a field course if given the choice. All three respondents were forestland owners, two males and one female. One respondent was between 35 and 44 years of age, while the other two were 65-74 years of age. All three were CFA members, owned forestland, and had incomes of between $25,000 and $99,000 annually. The respondents had received some type of college training. All three owned a computer, used it at least weekly, and were at least somewhat comfortable using the computer. Two had dial-up Internet access and one had broadband access.

In the web-based program, 21 people would choose an web-based course and 9 would not. Of those choosing a web-based course, 75% were males and 40% were females. Two-thirds of the respondents who chose the web-based course were between 45 and 64 years of age. Ninety percent of the respondents were CFA members and 75% owned forestland. Eighty six percent had at least a bachelor's degree. Sixty-eight percent had incomes of at least $50,000 annually. All of them owned a computer, 76% used it on a weekly basis, and 62% felt at least somewhat confident when using a computer. Ninety percent had Internet access with 76% of that being some type of high-speed connection and 24% had dial-up access.

V. DISCUSSION

Choosing Between Field-Based and Web-Based Programs

The focus of this study was the basic choice of the natural resource Extension clientele between the two offered program types: field-based and web-based. The two populations differed significantly in their choices. When given a choice between the two types of programs, the field day population would overwhelmingly choose the field-based program (97%). The web-based population had significantly more participants who would choose the web-based option (32%), but a majority (68%) would choose the field-based population.

However, when the field day population was asked if they would be interested in participating in a program like the one they attended if it were offered online, 56% said they would. This indicated that field day participants are not opposed to web-based Extension programs, they just preferred field-based programs. More surprisingly, when asked if they would be interested in participating in a similar program if it were offered as a field day, the web-based population indicated they would (97%). Even the participants that chose to participate in a web-based program would be interested in field programs.

Additional responses indicated that, of those completing the web-based module, 55% of them had never participated in an web-based program before, and upon completion, 77% of the population indicated they would participate in another one in the future. This population, coming from the similar CFA membership as the field day population, was not as experienced in web-based programs as expected.

The participants in the web-based population that chose a web-based program cited three categories of reasons: convenience, information access, and understanding.

Convenience reasons included no driving, less time commitment, easier to schedule, and health problems that make it difficult for a client to attend field days. These reasons related to convenience and quick access to information and were similar to those found in other studies (Abrami and Bures, 1996; Cassidy, 2001; Chyung, 2000; Frey, 2003; Giguere and Minotti, 2003). Other studies have noted these same ideas to be barriers to getting adults to participate in educational activities (Cantor, 1992; Fairchild, 2003; Scott et al. 1998). The responses of the "understanding" category indicated that the participants found web-based programs easier to follow and understand. As Kolb (1984) and Gardner (1993) have found, participants in educational activities have a variety of learning styles, making some programs more successful for individual learners than others. These participants were an example of those who preferred the learning method provided by the web-based program.

The participants in both the web-based and field-based programs gave similar categorical responses to why they would choose a field-based program. These categories included technology (barriers), field tours and examples, interaction, and hands-on learning. Chyung (2000) and Hara and Kling (2000) noted that technology barriers (no computer, lack of comfort with technology, Internet access type) were barriers to getting adults involved with web-based education. Though the module in the present study was constructed as an asynchronous activity, many participants noted that they preferred programs where they could interact with other landowners and presenters face-to-face. Most comments in this category focused on meeting other landowners. Studies have found similar results showing that even with asynchronous learning activities, some type of interaction for the participant must be included (Frey, 2003; Giguere and Minotti,

2003; King and Doerfert, 1996). The web-based population also provided responses related to a specific type of interaction, i.e., the ability to ask questions of presenters. Berge (1995) noted that an educational facilitator in an web-based program spurs student growth through questions and discussion. If web-based courses like the one in the present study are offered in the future, a more synchronous, facilitated activity may attract more users (Frey, 2003; Giguere and Minotti, 2003; King and Doerfert, 1996). A similar course offered in Virginia included web-based activities and also included a field portion. In the course, landowners in a similar geographic area met 2-3 times to discuss the materials (Jenkins, 2002). This program experienced good success and is still active today. Many of these landowner groups still meet regularly, long after the course has ended. This combination of web-based and field-based activities could serve as a model for future Extension education.

Basic Demographics

The populations were demographically similar. Both were primarily comprised of male forest landowners who were members of county forestry associations. This level of CFA membership and forestland ownership was to be expected as both types of programs, field and web-based, were both heavily marketed toward county forestry association (CFA) members. The field day was marketed through some newspaper advertising, but the web-based program was not due to budget constraints. This marketing occurred because the CFA information, such as member addresses, was known. Marketing programs to the general public is difficult and expensive.

The objectives of this study were to use demographic information about the populations of participants to better predict an individual's likelihood of participating in a

field- or web-based program. The demographic information collected in this study makes this type of prediction difficult. The only demographic factor where there were any significant differences between the populations was the level of education of each participant. Web-based program participants had significantly higher levels of education than the field-day participants. In the field day population, over half of the participants had at least a bachelor's degree (35%) or graduate degree (20%). In the web-based population, 74% had at least a bachelor's degree (45%) or graduate degree (29%). These findings are fairly consistent with the study by Butler et al. (2008) which found that 66% of private forestland in Tennessee was held by owners with at least some coursework, though the web-based population is considerably higher. This result was similar to what Bardon et al. (2007) found in that program participants with higher educational and income levels chose web-based resources more often.

Age categories of the participants were similar in both sample populations. Most surprising was the level of participation in the web-based course by people in the category of 55-64 years of age. Forty-five percent of the total participants were in this age category, a fact that does not support the postulate that younger people are more likely to participate in a web-based program. The field-based program had a slightly higher number of participants that were 54 years of age or younger. Both groups had approximately 60% of participants in the 55 years of age and above category. The age statistics found in the study were somewhat different than a previous study that found 74% of forestland was owned by those over 55 years of age (Butler et al. 2008).

Though incomes levels did not significantly differ, the web-based population exhibited higher levels of income, with 74% of participants earning more than $50,000

per year compared to 56% of field program participants. This seems to support the postulate that people of higher income brackets were more likely to participate in web-based programs. In relation to other studies, both percentages were higher than previous estimates (Butler et al. 2008).

When the participant was asked “did you attend this program as,” they were able to choose as many of the five given options or write in another descriptive term as needed. The five options were: 1) forest landowner, 2) interested citizen, 3) logger, 4) consulting forester, and 5) agency forester/Extension agent. In the field-based program, 75% percent identified themselves as forest landowners and 25% identified themselves as interested citizens, among others. When asked later in the survey if they owned forestland, 81% indicated they were forest landowners, a similar proportion. However, in the web-based population, 23% participants identified themselves as forest landowners and 39% chose interested citizens. When asked if they owned forestland, 81% of the same population indicated they did own forestland. The participants of the web-based population seemed to have a very different perception of their role as landowners than the field-day participants. This may indicate a difference of fundamental beliefs about forestland ownership.

Another indication of a fundamental difference in participant perceptions was in the reasons these landowners own their land. The field-based population ranked enjoying beauty or scenery; as part of their home, vacation home, or farm; and to protect nature and biological diversity as the top three reasons. The web-based population had similar rankings, with one exception. The top three reasons were enjoying beauty or scenery; as part of their home, vacation home, or farm; and to pass land on to their children or other

heirs. These rankings are somewhat consistent with Butler et al. (2008). Owning land for privacy was ranked higher in that study. A more interesting point, however, was where the two groups ranked the production of sawlogs, pulpwood, or other forest products as a reason for owning forestland. On average, the field-based population gave the reason a 4.1 out of 5 in terms or importance. The web-based group gave it an average rating of 2.5 (last among all reasons), placing much less importance on the production of forest products. Since the web-based population owned more acres of forestland, on average, than the field day population, the availability of these forestlands for products could be limited.

Landowners had significantly different reasons for owning forestland. Some of these reasons may be altered through education about sustainable natural resource management and some may not. This was another indication of the difference in basic perceptions of the two sample populations. This difference was also noted in the number of written management plans within each population. In the field-based population, 27% of the forestland owners had a written management plan, while only 16% of the web-based population's forestland owners had a written plan. Both of these percentages were significantly higher than previously conducted studies (Butler et al. 2008). The difference in self-perception between the populations may indicate a fundamental difference in the groups. The results suggested that programs delivering content preferred by those who see themselves less as forestland owners and more as interested citizens may be more suitable for web-based delivery.

Participants in the web-based program held larger tracts of forestland than the participants of the field day program. This indicated that in situations where attendance

was the same, the web-based program could have a larger impact on the landscape than the field-day program.

The relationship between the sex of the participant and choice of program could not be adequately studied due to the unequal numbers of males to females in the sample populations. Another demographic that should be measured in future studies is the ethnicity of the participant. Studies have shown that ethnicity can affect a person's likelihood of computer and Internet usage, with minority groups typically having more limited Internet access and thus use the Internet less frequently for gathering information (Korgen et al. 2001; Spooner and Rainie, 2001). Based on field observations, the ethnicity of the participants in this study was predominantly Caucasian, with extremely few (<5%) minorities. Ethnic differences may determine the type of program to be offered.

Computer and Web Experience

Computer ownership and usage was unexpectedly high in both groups. Nationally, 62% of households own a computer (United States Census Bureau, 2003). Rural populations, often descriptive of natural resource Extension clientele, tend to have lower rates of computer ownership than more urban populations. In 2007, 59% of farms owned or leased a computer (United States Department of Agriculture, 2007). Forty-eight percent of Tennessee farms owned or leased a computer. In this study, both sample populations had at least 78% of participants that owned their own computer. Though not statistically significant, the data seem to indicate that regular computer usage was higher in the web-based population. Eighteen percent of the field day population indicated they never used a computer while only two participants (6%) of the web-based population

indicated they never used a computer. These responses came via the Internet, so all indications are that 100% of the web-based population use a computer. Both populations had at least 65% of their members that use the computer weekly or daily, similar to statistics for the United States that say 71% of adults use the Internet regularly (Pew Internet and American Life Project, 2007). That same study indicated only 60% of rural adults use the Internet regularly, a figure lower than either of the study populations. Also unexpected was the high level of confidence participants felt about using a computer. Over half of each population was somewhat confident or confident when using a computer.

Internet access did not significantly differ between the two groups, but the type of access did. The web-based population had much more high-speed/broadband access. This type of access makes web-based programs and activities more accessible and easier to use. Nationally, 47% of adults have high-speed access. Only 31% of rural adults have high-speed access ((Pew Internet and American Life Project, 2007). In Tennessee, only 53% of households had Internet access and 78% of these homes had high-speed access (United States Department of Commerce, 2008). Both samples, with at least 75% of participants with Internet access, exceeded the national.

Computer ownership and Internet access rates in the study populations exceed both state and national averages. However, the large portion of the web-based population with high-speed Internet access indicates a better readiness for web-based Extension programming. The barriers historically related to technology in distance education have been significantly reduced and no longer pose significant issues for these populations.

Methods of Learning

Both populations ranked their preferred methods of learning very similarly. The top six were identical in each population. Four of the six reasons involved face-to-face discussions or field/workshop activities. The other two were related to print publications and web-based information sources. The similar nature of the rankings does continue to reinforce the concept that even though one population participated in a web-based program, both populations prefer face-to-face and field activities to web-based training. Butler et al. (2008) found a similar ranking, with videotapes being ranked higher than in this study. Other studies have found that Extension clientele prefer printed materials over web-based information (Howell and Habron, 2004; Rodewald, 2001). The field-based-population ranked web-based training near the bottom of the list of preferences. The web-based population ranked it in the middle of the list.

Knowledge Gain and Implementation

When comparing participants' ratings of their knowledge levels before and after the programs, the web-based program participants, without exception, ranked their pre-program knowledge higher than the field program participants. Similarly, the web-based population rated their post-program knowledge level higher than the field population. When comparing percent change in knowledge levels, both populations exhibited knowledge gains. However, in three of the six knowledge areas, the field-based population had significantly higher gains in knowledge than the web-based population. In all areas except incentives and cost share programs, the field population had higher gains in knowledge, indicating this population accumulated more knowledge through the

program. Both populations' preferences for face-to-face methods of learning correspond with the significantly higher levels of knowledge gain in the field-based program.

Regardless of the knowledge gain, both populations were equally as likely to actually implement the practices they learned about on their own land. In each population, feedback from Extension was critical to seeing practices changed and implemented on the ground. Clientele should be connected with county Extension staff or other professionals in their local area for on-the-ground assistance. In face-to-face situations, this feedback/connection is more easily made. In web-based situations, it is more difficult to make this connection. Two primary methods for connecting participants to professionals are used. The first is to provide the participant a database of contacts in their local area. This method is less preferred as the participant must make the effort to contact someone, making it less likely to occur. The second, more preferred method, requires users to register before completing an educational program. The information provided can then be used to contact the participant following the completion of the program. Requiring registration can reduce the number of participants due to reluctance to provide contact information. Careful consideration of impacts must be taken before deciding upon an appropriate path.

Correlation Analyses

The field-based population exhibited several expected correlations. Increase in age category was correlated to increasing likelihood of CFA membership and forestland ownership. This supports findings by Butler et al. (2008) that indicated a large percentage of forestland in Tennessee is owned by those age 55 and over. Age was correlated with decreasing levels of education, income, computer ownership, computer use, Internet

access, and level of comfort with computer use. Similar relationships between age, education, income, and Internet access when choosing a web-based learning program were found in Michigan forestland owners (Howell and Habron, 2004). Radhakrishna et al. (2003) also found age negatively-correlated with preference for Internet programs in a population of forestland owners.

Education was correlated with increasing levels of income, computer ownership, use and level of comfort, Internet access, and high-speed access. Income was also correlated with increasing levels of computer use and level of comfort as well as Internet access. These correlational results in this population indicated that clientele, who are younger and have higher levels of education and income, have the characteristics that make them more receptive to web-based programming (Bardon et al. 2007).

Correlation analysis in the web-based population provided additional insight into the choice of web-based programming. The participant's choice of web-based program was positively correlated with the type of Internet access the participant used. Those with high-speed connections chose the web-based program more often.

Again, education was positively correlated to increases in levels of income and computer use. No correlation between age or income levels with computer ownership or use appeared in this analysis.

These correlation analyses provided further credence to the postulate that participants who are younger and have higher levels of education and income are more likely to choose a web-based program if given a choice.

Learner Choice Characteristics

The number of people who would choose a web-based course if offered was very small in the field-based population. Few inferences can be made here. However, in the web-based population, general inferences can be made. The participants choosing the web-based course tended to be male CFA members who owned forestland. They were well-educated, with at least a bachelor's degree, and had incomes exceeding the average median household income for Tennessee ($40,696) by at least 8% (United States Department of Commerce, 2008). All owned a computer and used it frequently. The majority of them also had a high-speed Internet connection. These inferences support the postulate that people that are more educated and have higher incomes will choose web-based courses more readily than others. However, it is important to note that the only demographic characteristic that was significantly different between the two populations was educational level (Table 12). Age and income level distribution were nearly identical in each population.

Assessment of Program Development and Construction

In analyzing the development and construction of both the field-based and web-based programs, the discussion begins at the most fundamental of levels. By considering the characteristics of adult learners listed by Knowles et al. (2005), both programs were fundamentally based on the principles of andragogy. The programs provided information that participants needed to learn to better manage their resources. Both programs presented information that was not basic, but more advanced in forest management. Therefore, the learners were capable of understanding and applying pre-existing knowledge to the information. Participants learned information that will help them

address real-life issues and perform tasks encountered in daily life. Most of all, the programs were voluntary and free of charge, indicating that the learners who participated demonstrated the most fundamental characteristic of all: they were self-motivated to learn.

Though not entirely self-directed, the programs allowed for the learner to have a role in planning and evaluating the information. These are key components of self-directed learning (Hiemstra, 1994). The concept behind the topic was developed through comments and requests of private landowners. The information was presented in a way that gave the participants the best scientific findings, allowing them to evaluate the information and decide whether to use it in their forestland management. The web-based program allowed the participants to be more self-directed, presenting activities and links to additional information within each subject area that the user could choose to explore.

Neither program addressed all of the variety of learning styles that adult learners possess. Paulsen (1995) demonstrated four methods of programming to address a large number of learning styles: one-alone, one-to-one, one-to-many, and the many-to-many. The field program incorporated most of these, as the one-to-one, the one-to-many, and the many-to-many techniques were all used. The web-based program, though, only included the one-alone and the one-to-one. It would likely be impossible for any program to address all the preferred learning styles, making this study a good example of offering two versions of the same program to reach a wider audience.

The field-based program was designed in a synchronous manner, where the participants and instructors interacted during the program. The asynchronous nature of the web-based program does not make it any less effective (Moore and Kearsley, 1996).

The National Learning Center for Forest and Range Landowners has conducted successful asynchronous learning activities (Jackson et al. 2002). Giguere and Minotti's (2003) 10 guidelines for providing high-quality web-based learning for adults can be used to evaluate the quality of the web-based program. First, the curriculum was learner centered where a guided approach to the information was presented. The user could follow the guided path or simply enter the information at any stage they chose, allowing them to construct their own knowledge (Alley, 2001). Second, the information presented was pedagogically appropriate to the audience and had the potential to impact their daily life, a guideline reinforced by Moore (2003). Third, the web-based program clearly communicated the program's three objectives. They were: 1) identify various incentive and assistance programs available to you; 2) recognize the activities and practices related to artificial hardwood regeneration; and 3) describe the sources of hardwood natural regeneration. Fourth, the program presented a short, focused training session (typically 45 minutes) in comparison to the field program. This met the needs of learners who were constrained by barriers and needed convenience (Cantor, 1992; Abrami and Bures, 1996; Cassidy, 2001; Chyung, 2000; Frey, 2003; Giguere and Minotti, 2003).

Two more guidelines from Giguere and Minotti (2003) relate to the accessibility and availability of the content in multiple formats. The content in the module was typically delivered in two formats: video and text. The video embedded in a page served to reinforce the information presented in the text. Images, charts, and graphs were also used. This allowed users with different learning styles to ability to choose a method of learning more appropriate to them. Additional features, such as plain text or printable publication would have enhanced this ability. In regards to accessibility, the web-based

program met most of the requirements described by the Web Content Accessibility Guidelines of the Web Accessibility Initiative (World Wide Web consortium, www.w3.org). Proper web design standards (colors, consistency in navigation, etc.) were followed. In cases where images, graphics, or charts were used, adequate captions and alternate text coding was used. Two issues arose during the time the program was being actively used for the study. A participant who had been mailed an invitation letter to participate in the web-based program did not have a computer. However, he asked his daughter to print the information so he could read it. She submitted an email asking if a printable file containing the entire program was available. It was not and she had to print each page. This also brought to light that a detailed transcript of the videos available on the site was not available, although the text on the page described the same information. A revision of the web-based program should include a printable version and transcripts for all videos. In addition, consideration should be given to audio programs, such as Dragon (Nuance Inc.) that allow for sight-challenged individuals to utilize the web. These accessibility programs require specific programming in websites and modules to be effective at reaching audiences with limitations. Websites should also be offered in the major languages of the clientele group, so as not to exclude potential participants. Both special programming and translation will add expense to the construction of web-based learning tools.

The web-based program did not address two of the guidelines. It did not establish a sense of community among the participants, or provide online facilitation, and was designed to be completely asynchronous and thus did not include a tool or technique for these issues. The program also did not provide immediate online technical support

(related to video) and provided minimal offline technical support. Minimal feedback and assessment was provided, primarily through the use of an web-based quiz.

Other guidelines, as presented by King and Doerfert (1996) and Berge (1999) relate to interaction. Designing interaction into an asynchronous activity is difficult. In the present web-based program, interaction was sufficiently provided in three ways: pre-recorded videocasts, a printable in the field activity to allow a landowner to inventory their advanced regeneration, and quizzes to evaluate knowledge retention.

The web-based program as presented, though not perfect, appeared adequate for the learner. Those who completed the program and survey had satisfactory knowledge gain and the majority would participate in a similar web-based program. Improvements that could be made would be to increase accessibility (more transcripts, etc.), provide additional online and offline technical support (through an online listing of FAQs and a direct technical support email address), and increase assessment and feedback tools. Also, increased interactivity could be added through landowner groups as described by Jenkins (2002). These groups could add a sense of community and social interaction to the program, thereby helping to reinforce learning.

Survey Completion

During the field day program, participants were asked to complete the survey during lunch, immediately after the program. The participants had to turn in a complete survey before receiving a Healthy Hardwoods cap. This population had a survey completion rate of 93%. The face-to-face interaction, in addition to the incentive gift, helped maintain a high completion rate. In the web-based population, the survey completion rate was 28% of those who visited the site. Of the 116 visitors, 75 completed

the module to reach the survey but only 31 completed it. Even though an incentive was offered, it was cost prohibitive to provide an incentive to each participant. Also, there was no interaction between the program staff and the participant. This lack of contact likely led to the low rate of survey completion. Users could complete the web-based program without completing the survey. Once they reached the end of the program, little incentive existed for them to complete the survey.

As an incentive, a drawing for a prize pack was available for all of those who completed the survey at the end of the module. A more substantial incentive could possibly have been offered that would have increased participation. However, as noted by Knowles et al. (2005), successful adult learners were self-motivated and the offering of a prize to get participation was not the method to use to attract learners who will be successful in a program.

Study Implications on Forestry Extension Programming in Tennessee

Extension must continually assess the effectiveness, efficiency, and quality of its program in order to respond to constantly changing demographics (Summers et al. 2005). This study was one way to evaluate the effectiveness of a new type of programming. The results from this study, however, indicated that a small percentage of current forestry Extension clientele would choose to participate in a web-based program over a field-based program (78% of the field day population and 68% of the web-based population). In this period of reduced programming budgets, web-based programming offers a more affordable alternative that could prevent the loss of the program altogether. Drawn from a similar general population of county forestry association members, these two sample populations represented currently active forestry Extension clientele. Clearly, their

preference was for field-based programs. Howell and Habron (2004) found similar results in their study of Michigan forestland owners, where 57% of respondents favored personal, face-to-face communications and 18.7% favored web-based information sources. Similar studies have found field-type programs to be more preferred and more effective than other delivery methods (Richardson, 1994; Radhakrishna et al. 2003; Magill et al. 2004; Downing and Finley, 2005; Pocewicz, 2005).

However, this study also found that if a program similar to the field day was offered on the web, 56% of field day participants said they would be interested in the web-based program. When given a choice, the clientele will choose field programs. When choice is limited to an web-based program, interest in participating remains over 50%. In this study, web-based program participants owned significantly more forestland than those in the field day. For a similar number of participants in each type of program, engaging this clientele would impact a greater acreage on the ground through the web-based program.

Internet connections and types of connections have been cited as a barrier to web-based learning (Bates, 1995; Driscoll, 2002; Hall, 1997). The present study indicated that Internet access is not an issue for Tennessee Extension. Fifty-three percent of homes in the state have Internet access, 78% of which is high-speed access (United States Department of Commerce, 2008). When including access in places outside the home, 65% of the state's households had Internet access. This is a significant portion of the state's residents that have Internet access, specifically high-speed Internet access. This study found that 75% of the field-day population had Internet access (29% high speed) and 93% of the web-based population (74% high speed) had access. Similarly, daily use

of the computer and level of confidence with computers was not a limiting factor for these sample populations. Over 60% of each population used their computer on a daily or weekly basis and over half felt somewhat confident to confident using their computer. Providing technical assistance to participants can overcome any remaining technological barriers. Decamp et al. (2001) found in a study of pork producers that technological problems did not limit web-based program participation. The limiting factor was simply that producers had not been exposed to web-based learning. Simply allowing landowners to get experience with web-based programming may make it a more effective method of delivering educational programming in the future. This could be done through traditional programs where the technology is introduced with a face-to-face instructor. Participants could gain familiarity and ask questions of the program monitor.

An additional idea to consider when planning future forestry Extension programs is the age and educational demographics of forestland owners. Currently, 74% of private family forestland in Tennessee is held by owners age 55 or older (Butler et al. 2008). Almost half of family forestland has been held by the same person for more than 25 years. As the forestland ownership group's average age increases, it is reasonable to expect a transfer of ownership, either through inheritance or some other method disbursement to a generally younger age group. This younger age group is typically more educated and more likely to use the Internet as a source of information (Riesenberg and Gor, 1989; Hall et al. 2003; Henke, 2007). As this study has shown, the web-based population had significantly higher levels of education than the field-based group and also had higher percentage of choice of web-based programs. An increase in the number

of young, more educated landowners should lead to increased interest in web-based programs in the future (Sagor, 2005).

Future forestry Extension programming delivery method decisions should consider the age and educational levels of the target audience to better address their needs. Technology use and Internet access do not appear to be significant barriers to the delivery of information. However, current clientele do prefer field-based programs over web-based. Web-based programs, though, can help Extension further meet the needs of a diverse clientele base and reach a broader audience more effectively, more efficiently, and more affordably. As shown, these programs have the potential to impact large acreages of land.

Regardless of delivery method, topic and structure are still the most crucial part of any Extension program in that the content is the most important part of any education program. In any educational program, the topic must be well aligned with the needs of the target audience (Knowles et al. 1984; Chyung, 2000; Sagor, 2005). A topic that does not offer applicable information that a landowner can use to make decision about their property will not attract participation. Landowners want programs that address needs in their lives and can help them solve problems (Knowles et al. 1984). A needs assessment could be used prior to planning a major program to help identify the needs of the target audience. Knowles et al. (2005) noted in their list of adult learner characteristics that learners wanted to know why they need to learn something before undertaking learning. Motivating and getting the learner interested in a program is key to success Programs must address needs of the landowners. These needs can be identified through landowner surveys, requests from landowners, and through follow-up to timely issues, like wildfire,

that effect a large number of landowners across the state. As landowners deal with economic, disease and pest, natural disaster, and related issues, they will be more receptive to educational programming in those areas. Programs developed without some type of input from the clientele will not likely be as successful as those programs that do garner input.

Construction of web-based programs not only need to go through the rigors of content development and review, but must also be structured in a way that provides the most effective experience for the participant. The 10 guidelines developed by Giguere and Minotti (2003) can be used as the process by which these web-based programs should be developed. The content developed should be learner centered, accessible to all participants regardless of disability, short and focused, provide a sense of community, provide some type of interaction, provide feedback to the learner, and provide technical/expert support. Feedback is critical to the web-based learner, so interactivity, post-course follow up, and other methods of contact should be employed. Meeting all of these standards will provide the most effective program but can increase the cost of developing the program. Care must be taken when developing programs to maintain cost efficiency. However, in the present study, the participants in the web-based program held significantly larger tracts of forestland. Though higher in up-front cost, web-based programs may carry more impact on forestlands and hold a greater return on investment with lower maintenance costs over a longer period of time. Regardless of cost, these guidelines provide a goal or standard to meet in designing web-based programs. Sites should also be adequately maintained. Bardon et al. (2007) found that common problems forestland owners had with educational websites included the lack of frequent updates to

sites and lack of contact information for further follow-up questions on topics that landowners may desire.

VI. SUMMARY AND CONCLUSIONS

The primary objective of this study was to provide Extension educators with information needed to choose the best program delivery method based upon the desired audience. The hypotheses that the study tested were that absentee, younger, wealthier, and/or more educated landowners prefer web-based Extension programs instead of traditional programming. The data indicated that educational level was the only statistically significant difference between those who would choose web-based learning over a field-based program. The higher the educational level, the more likely a participant was to choose web-based programs. Income level, though not statistically significant, exhibited a pattern where higher income levels were more likely to choose web-based programs than lower incomes. Educational level and income level were positively correlated, indicating higher educational levels relate to higher income levels. Educational level was also correlated with computer ownership, use, and level of comfort as well as Internet access. Thus, the postulate that individuals with higher levels of education and income are more likely to choose web-based programs over field-based programs was accepted. Age, sex, and forestland ownership did not appear to be substantial factors in predicting the choice of program. The postulate that young individuals were more likely to choose web-based over field-based programs was rejected.

Another postulate that this study tested was that NIPF landowners who are regularly and actively seeking information on the management of their natural resources online will be more likely to choose web-based programs. This postulate was tested by comparing the choice of course type with the participants computer ownership, use of the

Internet, and level of ease when using a computer. Level of computer ownership was high in both populations as was the use of the computer on a regular basis. Though not significant, regular use of the computer was slightly higher in those choosing a web-based program. Internet access was high in both groups. The web-based population had significantly higher levels of high-speed access. Based upon the sample population, the postulate was rejected. Both groups use the computer/Internet regularly for information gathering. Further study may support the conclusion that speed of Internet access may drive the participant's course choice. Those with high -peed connections are more likely to choose web-based programs.

In addition to the hypotheses that were tested, the data collected in this study provided a better understanding of forestland owners in Tennessee who were interested in learning more about management of their forestland. First, over half of the web-based population had not participated in a web-based educational program prior to this study. As noted by Decamp et al. (2001), exposure to this type of program delivery may be the most limiting factor in garnering participation. Second, when provided a choice of program type, most of those who participated would choose a field-based program. This could be a function of the population type surveyed. CFA members have traditionally participated in face-to-face workshops and field days, possible making them prejudiced toward that type of program. Even though they may be more open to web-based programs, when given a choice, they will choose what is most familiar. This was illustrated when the web-based population was asked if only a web-based program was offered, would they still be interested. Over half would still be interested in the program. Third, the educational value of the programs was significantly different. The field-based

population sample gained more knowledge, indicating that the program type was more valuable in educating this particular group of clientele. Finally, the population samples also ranked their preferred methods of learning very similarly. Based on these rankings, it was apparent that forestland owners in Tennessee preferred learning in face-to-face or field-based ways. However, web-based information sources were a preferred method, though slightly lower in the ranking. This indicated a willingness to participate in this type of program if it were the only primary method of delivery available.

With the level of education found to be a significant factor in choosing between web and field-based programs, two primary inferences can be made about county forestry association members in Tennessee. First, CFA members who have higher levels of education are more likely to own and use a computer as well as choose web-based programs as a method of learning about the management of their forestlands. The second inference that can be made is that as land ownership changes between current landholders and their heirs/subsequent owners, the preference for web-based programs may become greater. Educational levels tend to rise within each new generation (Riesenberg and Gor, 1989; Hall et al. 2003). As this transfer between generations occurs, Extension must be prepared to meet this increased need for more flexible program options.

Extension in general, and University of Tennessee Extension specifically, has begun to develop web-based programs and should continue this trend. Yet providing quality field-based programming should also remain a priority. Current clientele in the CFA system prefer this program delivery method. As this study showed, older clientele with lower levels of education and income do prefer face-to-face methods and this client group should not be ignored. However, this study also showed that growing portion of the

clientele can learn very well from web-based programming and these types of programs should be offered to meet these learners' needs. The clientele group that is younger, more educated, and has a higher income level is growing and as the generational shift of land ownership occurs, this clientele group will expand. Extension needs to be have programs available on the web to meet the needs of this clientele group more effectively than other groups.

Butler et al. (2008) and Measells et al. (2006) noted that less than 31% of forestland owners in Tennessee had received forest management advice. With a pool of over 500,000 private forestland owners, there is ample opportunity to expand Extension's audience. Developing alternate forms of similar programming can help Extension reach beyond its traditional audiences and impact additional clients. Web-based programs on a more introductory level information should be created and posted online for new landowners to access at any time. Web-based programs can be developed and used in both a face-to-face environment or in a web-based environment. Technology offers considerable flexibility. Developing web-based programs with suitable content and following proven guidelines can educate landowners just as effectively as face-to-face programs. With proper planning, development of content and a diversity of educational program delivery options, Extension can increase its impact on private forestland owners.

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APPENDIX A

Tennessee Healthy Hardwoods Field Program Survey

Field Day Participant Survey

August 12 – Natchez Trace State Forest
August 19 – Standing Stone State Forest
August 26 – Stewart State Forest

By completing this survey, you will help us improve the future programs offered by the UT Extension and the Tennessee Division of Forestry. Your input is extremely valuable. Please respond to the following questions by marking the appropriate response(s). Please return the survey before you leave today to receive a free gift.

1. **Did you attend this field program as a (Check all that apply):**
   - ❑ Forest Landowner
   - ❑ Interested Citizen
   - ❑ Logger
   - ❑ Consulting Forester
   - ❑ Agency Forester/Extension Agent
   - ❑ Other:_____

2. **What is your sex?** ❑ Male ❑ Female

3. **What is your age category?**
   - ❑ Under 25 years
   - ❑ 25 - 34 years
   - ❑ 35 - 44 years
   - ❑ 45 - 54 years
   - ❑ 55 - 64 years
   - ❑ 65 – 74 years
   - ❑ 75 years or over

4. **Are you a member of a County Forestry Association?**
   - ❑ Yes ❑ No

5. **What category best describes your education?**
   - ❑ Less than 12th grade
   - ❑ High school graduate or GED
   - ❑ Vocational/technical training
   - ❑ Some college
   - ❑ Associate or technical degree
   - ❑ Bachelor's degree
   - ❑ Graduate degree

6. **What is your household's annual income before taxes?**
   - ❑ Less than $25,000
   - ❑ $25,000 to $49,999
   - ❑ $50,000 to $99,999
   - ❑ Over $100,000

7. **Are you a forest landowner?** ❑ Yes ❑ No

IF YOU ARE A FOREST LANDOWNER, PLEASE ANSWER 7a-7g.
IF YOU ARE NOT A FOREST LANDOWNER, GO TO QUESTION 8

7a. How many total acres of <u>land</u> do you own or manage? _____

7b. How many acres of <u>forest land</u> do you own or manage? _____

7c. How long have you owned your forest land (years)? _____

7d. How did you get your forest land? (Check all that apply)
- ❑ Purchased
- ❑ Inherited
- ❑ Gifted
- ❑ Other (specify): _____

7e. How important are the following reasons for why you own forest land?

	Not Important 1	2	3	4	Very Important 5	Don't Know
To enjoy beauty or scenery	☐	☐	☐	☐	☐	☐
To protect nature and biological diversity	☐	☐	☐	☐	☐	☐
For land investment	☐	☐	☐	☐	☐	☐
As part of my home, vacation home, or farm	☐	☐	☐	☐	☐	☐
For privacy	☐	☐	☐	☐	☐	☐
To pass land on to my children or other heirs	☐	☐	☐	☐	☐	☐
For cultivation or production of non-timber forest products	☐	☐	☐	☐	☐	☐
For production of firewood or other fuel woods	☐	☐	☐	☐	☐	☐
For production of sawlogs, pulpwood, or other forest products	☐	☐	☐	☐	☐	☐
For hunting or fishing	☐	☐	☐	☐	☐	☐
For recreation, other than hunting or fishing	☐	☐	☐	☐	☐	☐
Other (Specify): _____	☐	☐	☐	☐	☐	☐

7f. Do you have a written management plan for your forest land? ❑ Yes ❑ No

If yes, are you currently following your management plan? ❑ Yes ❑ No

---

8. **How did you hear about the Tennessee Healthy Hardwoods Field Day you attended today? (Check all that apply)**
   - ❑ Newsletter
   - ❑ Newspaper
   - ❑ Radio
   - ❑ Direct Mailing/Brochure
   - ❑ Div. of Forestry
   - ❑ UT Extension
   - ❑ Other _____

9. **Do you expect to attend future field day events like today's?**
   ❑ Yes ❑ No ❑ Not Sure

10. **How many field days have you attended in the past?**
    ❑ None ❑ 1 ❑ 2-5 ❑ 5-9 ❑ 10 or more

11. **Do you own a computer?** ❑ **Yes** ❑ **No**
    If not, do you use a computer somewhere other than your home? ❑ Yes ❑ No

12. **Which category best describes your computer use:**
    - ❑ Never
    - ❑ Occasionally, once or twice a month
    - ❑ Weekly
    - ❑ Daily

13. **How would you rate your level of ease in terms of using a computer?**
    - ❑ Not comfortable
    - ❑ Somewhat comfortable
    - ❑ Somewhat confident
    - ❑ Confident

14. Do you have Internet access? ❑ Yes ❑ No

If so, what type of access do you have?

- ❑ Dial-up
- ❑ Broadband
- ❑ Cable modem
- ❑ Other _____

15. Would you be interested in Extension programs like this one if they were offered online via the Internet? ❑ Yes ❑ No

16. If you had a choice of a program like today's or one online, which would you choose?

❑ One like today's ❑ Online

Why?

_____

_____

17. How useful would the following ways of learning about forest management be for you?

	Not Useful 1	2	3	4	Very Useful 5	Don't Know
Print publications (books, pamphlets, newsletters, magazines, or newspaper)	☐	☐	☐	☐	☐	☐
Web-based information resources (websites, newsletters, publications, etc.)	☐	☐	☐	☐	☐	☐
Web-based training (interactive lessons or courses)	☐	☐	☐	☐	☐	☐
Video conferences	☐	☐	☐	☐	☐	☐
CD-Rom or DVD program distributed by mail or at workshops	☐	☐	☐	☐	☐	☐
Field days/workshops	☐	☐	☐	☐	☐	☐
Evening workshops/meetings	☐	☐	☐	☐	☐	☐
Video Tapes for home viewing	☐	☐	☐	☐	☐	☐
Television or radio programs	☐	☐	☐	☐	☐	☐
Talk with a forester or other natural resource professional ➢ Online (email, chat, discussion, etc.) ➢ Face-to Face	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
Talk with other forest landowners ➢ Online (email, chat, discussion, etc.) ➢ Face-to Face	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
Other (specify): _____	☐	☐	☐	☐	☐	☐

18. Rate your level of knowledge concerning each of these topics PRIOR to this program:

	Low 1	2	Average 3	4	High 5
Water Quality Protection	☐	☐	☐	☐	☐
Incentives and cost share programs	☐	☐	☐	☐	☐
Regeneration systems in timber harvesting	☐	☐	☐	☐	☐
Differences between natural and artificial regeneration	☐	☐	☐	☐	☐
Planting hardwood seedlings	☐	☐	☐	☐	☐

Forest Management Practices on State Forests	☐	☐	☐	☐	☐

19. Rate your level of knowledge concerning each of these topics AFTER attending to this program:

	Low 1	2	Average 3	4	High 5
Water Quality Protection	☐	☐	☐	☐	☐
Incentives and cost share programs	☐	☐	☐	☐	☐
Regeneration systems in timber harvesting	☐	☐	☐	☐	☐
Differences between natural and artificial regeneration	☐	☐	☐	☐	☐
Planting hardwood seedlings	☐	☐	☐	☐	☐
Forest Management Practices on State Forests	☐	☐	☐	☐	☐

20. Do you plan to implement any of the practices related to the topics learned about today on the land you own or manage?

❑ Yes ❑ No ❑ Undecided

If so, in which area(s)? (Check all that apply)

- ❑ Water Quality Protection
- ❑ Incentives and cost share programs
- ❑ Regeneration systems in timber harvesting
- ❑ Differences between natural and artificial regeneration
- ❑ Planting hardwood seedlings
- ❑ Forest Management Practices on State Forests

21. What other plans do you have for your forest land over the next five (5) years? (Check all that apply)

- ❑ No activity – leave it as it is
- ❑ Minimal activity to maintain forest land
- ❑ Harvest firewood
- ❑ Harvest sawlogs or pulpwood
- ❑ Collect non-timber forest products
- ❑ Sell a hunting lease on my land or other type of fee hunting
- ❑ Sell some or all of my forest land
- ❑ Give some or all of my forest land to my children or heirs
- ❑ Divide all or part of my forest land and sell the subdivided parcels
- ❑ Purchase more forest land
- ❑ Convert some or all of my forest land to another use
- ❑ Convert another land use to forest land
- ❑ I don't know
- ❑ Other (specify): _____

Thank you for completing this survey. Please return it to the designated table for your gift.

APPENDIX B

Tennessee Healthy Hardwoods Web-Base Program Survey

Tennessee Healthy Hardwoods Evaluation

Please complete the questions as directed. The survey should take you approximately 10 minutes to complete. Thank you for your time in completing this survey. Your responses will help us to improve future Extension programs.

EMAIL

Please provide your email address (or name and phone number) to be entered in our prize pack contest.

_____

_____

_____

_____

ATTENDTYPE

Did you participate in this web-based program as a (Check all that apply):

- ☐ Forest Landowner
- ☐ Interested Citizen
- ☐ Logger
- ☐ Consulting Forester
- ☐ Agency Forester/Extension Agent
- ☐ Other : _____

SEX

What is your sex?

- ○ Male
- ○ Female

AGE

What is your age category?

- ○ Under 25 years
- ○ 25 - 34 years
- ○ 35 - 44 years
- ○ 45 - 54 years
- ○ 55 - 64 years
- ○ 65 - 74 years

- ❍ 75 years or over

CFA

Are you a member of a County Forestry Association?

- ❍ Yes
- ❍ No

EDUCATION

What category best describes your education?

- ❍ Less than 12th grade
- ❍ High school graduate or GED
- ❍ Vocational/technical training
- ❍ Some college
- ❍ Associate or technical degree
- ❍ Bachelor's degree
- ❍ Graduate degree

INCOME

What is your household's annual income before taxes?

- ❍ Less than $25,000
- ❍ $25,000 to $49,999
- ❍ $50,000 to $99,999
- ❍ Over $100,000
- ❍ No Answer

LANDOWNER

Are you a forest landowner?

- ❍ Yes
- ❍ No

LANDOWNED6

How many total acres of land do you own or manage?

(0 - 10000)

FORESTLANDOWNED

How many acres of forest land do you own or manage?

(0 - 10000)

OWNYEARS

How long have you owned your forest land (years)?

(0 - 255)

GETLAND

How did you get your forest land? (Check all that apply)

- ❑ Purchased
- ❑ Inherited
- ❑ Gifted
- ❑ Other (specify): : _____

REASONS

How important are the following reasons for why you own forest land?

	Not Important	2	3	4	Very Important	Don't Know
To enjoy beauty or scenery	❍	❍	❍	❍	❍	❍
To protect nature and biological diversity	❍	❍	❍	❍	❍	❍
For land investment	❍	❍	❍	❍	❍	❍
As part of my home, vacation home, or farm	❍	❍	❍	❍	❍	❍
For privacy	❍	❍	❍	❍	❍	❍
To pass land on to my children or other heirs	❍	❍	❍	❍	❍	❍
For cultivation or production of non-timber forest products	❍	❍	❍	❍	❍	❍
For production of firewood or other fuel woods	❍	❍	❍	❍	❍	❍
For production of sawlogs, pulpwood, or other forest products	❍	❍	❍	❍	❍	❍
For hunting or fishing	❍	❍	❍	❍	❍	❍
For recreation, other than hunting or fishing	❍	❍	❍	❍	❍	❍

PLAN

Do you have a written management plan for your forest land?

- ❍ Yes
- ❍ No

FOLLOWPLAN

Are you currently following your management plan?

- ○ Yes
- ○ No

NOTICE

How did you hear about the Tennessee Healthy Hardwoods Field Day you attended today (Check all that apply)?

- ☐ Newsletter
- ☐ Newspaper
- ☐ Radio
- ☐ Direct Mailing/Brochure
- ☐ Div. of Forestry
- ☐ UT Extension
- ☐ Other (Specify): : _____

FUTURE

Do you expect to participate in a program like this one in the future?

- ○ Yes
- ○ No
- ○ Not Sure

PAST

How many times have you participated in an online program like this one?

- ○ None
- ○ 1
- ○ 2 - 5
- ○ 5 - 9
- ○ 10 or more

COMPUTER

Do you own a computer?

- ○ Yes
- ○ No

IFNOWHERE

If not, do you use a computer somewhere other than your home?

- ○ Yes
- ○ No

COMPUSE

Which category best describes your computer use?

- ❍ Never
- ❍ Occasionally, once or twice a month
- ❍ Weekly
- ❍ Daily

COMPEASE

How would you rate your level of ease in terms of using a computer?

- ❍ Not comfortable
- ❍ Somewhat comfortable
- ❍ Somewhat confident
- ❍ Confident

INTERNET

Do you have Internet access?

- ❍ Yes
- ❍ No

INTERNETTYPE

What type of access do you have?

- ❍ Dial-up
- ❍ Broadband
- ❍ Cable Modem
- ❍ Other : _____

INTINFORMATION

Do you use the internet to get information on a regular basis?

- ❍ Yes
- ❍ No

FORINTINFO

Do you use the regularly use the internet to get information about forest management?

- ❍ Yes
- ❍ No

ONLINE

Would you be interested in Extension programs like this one if they were offered in a field setting on a particular day, like traditional Extension workshops?

- ❍ Yes
- ❍ No

CHOICE

If you had a choice of a program like this one (online) or one in the field, which would you choose?

- ❍ Online
- ❍ Field Day

WHYCHOICE

Why did you choose that type of program?

_____

_____

_____

_____

USEFULLEARN

How useful would the following ways of learning about forest management be for you?

	Not Useful	2	3	4	Very Useful	Don't Know
Print publications (books, pamphlets, newsletters, magazines, or newspaper)	❍	❍	❍	❍	❍	❍
Web-based information resources (websites, newsletters, publications, etc.)	❍	❍	❍	❍	❍	❍
Web-based training (interactive lessons or courses)	❍	❍	❍	❍	❍	❍
Video conferences	❍	❍	❍	❍	❍	❍
CD-Rom or DVD program distributed by mail or at workshops	❍	❍	❍	❍	❍	❍
Field days/workshops	❍	❍	❍	❍	❍	❍
Evening workshops/meetings	❍	❍	❍	❍	❍	❍
Video Tapes for home viewing	❍	❍	❍	❍	❍	❍
Television or radio						

programs	❍	❍	❍	❍	❍	❍
Talk with a forester or other natural resource professional online (email, chat, discussion, etc.)	❍	❍	❍	❍	❍	❍
Talk with a forester or other natural resource professional face-to-face	❍	❍	❍	❍	❍	❍
Talk with other forest landowners online (email, chat, discussion, etc.)	❍	❍	❍	❍	❍	❍
Talk with other forest landowners face-to-face	❍	❍	❍	❍	❍	❍

PRIORKNOWLEDGE

Rate your level of knowledge concerning each of these topics PRIOR to completing this module:

	Low	2	Average	4	High
Water Quality Protection	❍	❍	❍	❍	❍
Incentives and cost share programs	❍	❍	❍	❍	❍
Regeneration systems in timber harvesting	❍	❍	❍	❍	❍
Differences between natural and artificial regeneration	❍	❍	❍	❍	❍
Planting hardwood seedlings	❍	❍	❍	❍	❍
Forest Management Practices on State Forests	❍	❍	❍	❍	❍

AFTERKNOWLEDGE

Rate your level of knowledge concerning each of these topics AFTER completing this module:

	Low	2	Average	4	High
Water Quality Protection	❍	❍	❍	❍	❍
Incentives and cost share programs	❍	❍	❍	❍	❍
Regeneration systems in timber harvesting	❍	❍	❍	❍	❍
Differences between natural and artificial regeneration	❍	❍	❍	❍	❍
Planting hardwood seedlings	❍	❍	❍	❍	❍

Forest Management Practices on State Forests	❍	❍	❍	❍	❍

WILLIMPLEMENT

Do you plan to implement any of the practices related to the topics learned about today on the land you own or manage?

- ❍ Yes
- ❍ No
- ❍ Undecided

IMPLEMENTWHEN

Within what time frame to you plan to implement these practices?

- ❍ 1 year
- ❍ 5 years
- ❍ 10 years
- ❍ Don't Know

IMPLEMENTWHAT

In which area(s) do you plan to implement practices (Check all that apply)?

- ❑ Water Quality Protection
- ❑ Incentives and cost share programs
- ❑ Regeneration systems in timber harvesting
- ❑ Differences between natural and artificial regeneration
- ❑ Planting hardwood seedlings
- ❑ Forest Management Practices on State Forests

OTHERPLANS

What other plans do you have for your forest land over the next five (5) years (Check all that apply)?

- ❑ No activity – leave it as it is
- ❑ Minimal activity to maintain forest land
- ❑ Harvest firewood
- ❑ Harvest sawlogs or pulpwood
- ❑ Collect non-timber forest products
- ❑ Sell a hunting lease on my land or other type of fee hunting
- ❑ Sell some or all of my forest land
- ❑ Give some or all of my forest land to my children or heirs
- ❑ Divide all or part of my forest land and sell the subdivided parcels
- ❑ Purchase more forest land
- ❑ Convert some or all of my forest land to another use
- ❑ Convert another land use to forest land

- ❑ I don't know
- ❑ Other (specify): : _____

Thank you for completing this survey!

We hope your participation in this module provided you with some valuable knowledge. If you are drawn to win one of our prize packs, you will be contacted via email. You can now close this browser or go to http://www.healthyhardwoods.com to return to the front page of the module. Thanks again!

VITA

Samuel W. Jackson is a Research Scientist with the University of Tennessee Agricultural Experiment Station, Office of Bioenergy Programs. Sam received his Bachelor of Science degree in Wildlife and Fisheries Science and his Master of Science in Forestry from the University of Tennessee. He earned a Doctor of Philosophy in Natural Resources in 2008.

Sam works with a variety of programs, including the UT Biofuels Initiative (http://www.UTbioenergy.org) and the Southeastern Sun Grant Center (http://sungrant.tennessee.edu). The Biofuels Initiative is a project that seeks to promote the development of cellulosic ethanol in Tennessee and the nation. The Southeastern Sun Grant Center is a federally funded program designed at facilitating research in biomass and bioenergy at land-grant universities around the southeast. UT coordinates the program for the region. Sam is responsible for a variety of tasks in the Center, including coordinating the competitive grants programs.

Sam also serves as Vice President for Feedstock Development for Genera Energy, a company owned by the University of Tennessee Research Foundation (http://www.generaenergy.net). His duties relate to procurement of feedstocks for a demonstration scale biorefinery to produce cellulosic ethanol.

Previously, Sam was coordinator of the National Web-Based Learning Center for Private Forest and Range Landowners (http://www.forestandrange.org). The University of Tennessee coordinated this national effort and work with land-grant institutions around the country to develop this web-based Extension program.

Sam is a member of the Society of American Foresters, the Forest Products Society, and the Tennessee Forestry Association. Originally from West Virginia, Sam lives in Seymour, TN with his wife Daphne and son Noah.