Factors Related to Extension Professionals’ Use of Online Tools in Their Educational Programs

DISSERTATION

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By

Julie C. Robinson, M.S.
Graduate Program in Agricultural and Extension Education

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Dissertation Committee:

Dr. Robert J. Birkenholz, Advisor
Dr. Jeffrey King
Dr. Scott D. Scheer
Abstract

Access to information has dramatically changed since the creation of the Internet. People are able to access the internet from anywhere in the world using many different devices. OSU Extension is challenged to keep up with this trend to remain relevant to the target audience. Shifting toward online delivery methods by Extension professionals will require time, training, and possibly a change in the organizational culture.

The purpose of this study was to identify factors that Ohio State University Extension (OSUE) professionals considered in making decisions about using online tools in their educational programs. This study examined OSU Extension professionals’ experience with online education tools as learners and as educators, and identified factors considered in their decisions regarding the use of online tools in their educational programs.

Based on the literature, various faculty groups in higher education have been surveyed to identify factors that influenced their decisions to use online tools and delivery methods. However, prior to this study, Extension professionals have not been included in such studies. Although Extension programs afford many opportunities to use online tools; there is potential to expand the use of online tools in delivering Extension programs.

The target population for this study was OSU Extension professionals who plan and conduct educational programs. Survey methods were used to collect the data. A
review of the literature yielded information which provided the basis for developing the data collection instrument used in this study. Instrument validity and reliability were assessed prior to data collection. Data analysis involved statistical procedures needed to answer each research question. The data collection instrument was administered electronically to obtain responses from OSU Extension professionals regarding their use of online tools to deliver their educational programs. The instrument also solicited data from Extension professionals regarding their use of online tools, both as learners and as educators.

Results from this study indicated that Extension professionals used online tools more as learners than as educators. Communication tools were used most often as learners and educators, and Website design tools were used the least as learners and educators. Motivator and Inhibitor (intrinsic) factors explained the most variance associated with Extension professionals’ use of online tools. Age and years of work experience in Extension were inversely related to the use of online tools in their educational programs.

This study found that Extension professionals used online tools more as learners than they did as educators. The recommendation was made to incorporate professional development programs that afford Extension professionals the opportunity to experience online tools as learners. Results indicate that Extension professionals primarily considered intrinsic factors (Motivators and Inhibitors) when deciding about the use of online tools in their educational programs. Results also revealed that Extension professionals’ age and years working in Extension were inversely related to their decision.
to use online tools in their educational programs. Based on these results, hiring criteria should include experience and desire to use online tools in program delivery as preferred qualifications.

Implications of these findings support the assumption that understanding Extension professionals’ decision to use online tools in their educational programs is important and that a concerted effort to address these factors should continue to help meet the growing demand of Extension clientele for online programs. Suggestions for further study included an assessment of online educational program quality and identification of effective strategies to promote the use of online tools among older and experienced Extension professionals.
Vita

2005........................................B.S. Agricultural Business, Arkansas State University

2007........................................M.S. Agricultural Economics, University of Arkansas

2010 to present .........................Graduate Teaching Associate, Department of Agricultural Communication, Education, and Leadership, The Ohio State University

Field of Study

Major Field: Agricultural and Extension Education
Dedication

To my parents - my first and best teachers.
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With all my heart, I want to thank my biggest supporter and my rock throughout this journey, Lee. Without his love and support I would not have been able to achieve this goal. The amount of sacrifice that he has made through this process is humbling. Thank you for all of the words of encouragement, proof-reading, and gummy bears. He has been my biggest cheerleader, my shoulder to lean on, and my sounding board. I am forever grateful, I love you.

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Thank you to all of my family and friends for all of the love and support along the way. Thank you for the support and pep talks when I was discouraged, listening when I needed to vent my frustrations, and the words of encouragement when I needed them the most. All of your love and support is greatly appreciated. You all have contributed to my success and I am thankful to have each of you in my life.
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Chapter 1: Introduction

Introduction

Computers are basically instruments or tools used to measure, count, or calculate in a variety of fields (Thurber, 1995). Mechanical computers were developed to perform arithmetic operations automatically and repetitively. Later, more advanced mechanical computers counted, collated, and sorted information stored on punch cards (Thurber, 1995). The digital computing era began in 1947 when construction of the first all-electric computer was completed.

The 1950’s and 1960’s were the age of large computers (Daniels, 1996). Computers during this time were heavyweight and occupied whole floors or even buildings of universities and businesses (Thurber, 1995). Computers were initially used in corporations and academia, however the concept of a microcomputer began to take shape which coincided with the reduction in the size and cost of components (Daniels, 1996).

Development of microprocessors and integrated circuit systems reduced the cost of computer components (Thurber, 1995). Microcomputers soon became more readily available and quickly replaced mainframe computers as the predominant type of information processing equipment in office environments (Thurber, 1995). The term
personal computer (PC) replaced the term microcomputer as more functions and uses for
PC’s were developed (Thurber, 1995). Software programs for the first generation of
microcomputers performed five basic functions: spreadsheets, word processing,
databases, communications, and graphics (Daniels, 1996). However, use of PC’s for
computer assisted instruction (CAI) was another area that was being developed (Leiner,
Kahn, Postel, Cerf, Kleinrock, Roberts, Clark, Lynch, & Wolf, 2009).

During the Cold War, the United States Defense Department sought to develop a
system in which government officials would be able to maintain contact, route
information, and continue to communicate with no obvious central command in the event
of an attack (Leiner et al., 2009). The first demonstration of long distance data exchange
occurred in August 1969, and the first email message was sent in 1972 (Leiner et al.,
2009). In 1989, an information management system called the World Wide Web was
proposed, and in 1995 the internet was made fully available for commercial information
transfer (Leiner et al., 2009). The internet was used for world-wide broadcasting
capabilities, a mechanism for information dissemination, and a medium for collaboration
and integration between individuals and their computers without regard to geographic
location (Leiner et al., 2009).

Internet use in the early 1990’s changed the nature of business, transactions, and
education (Bach, Haynes & Smith, 2007). The internet influenced business and social
life in developed countries, and contributed to economic and social development in less
prosperous countries (Bach, Haynes & Smith, 2007). Developments in pedagogical and
technological innovations continued to evolve in education (Garrison, 2011). The
combination of pedagogical and technological developments, along with cost reduction pressures, contributed to a transformation in education (Garrison, 2011).

Adult internet use in the U.S. increased from 65% to 77% between 2000 to 2010 (U.S. Census Bureau, 2012). In 2010, 74% of households in the U.S. had internet access. (U.S. Census Bureau, 2012). In 2011, the percentage of people in the U.S. who viewed news online was 82%, and 54% got their news online on a daily basis (U.S. Census Bureau, 2012). Increased access to the internet has played an important part in economic and social development (Bach, Haynes, & Smith, 2007).

Use of computers for education and training purposes began in the 1950’s, however wide-spread interest in the use of computers as an instructional tool did not occur until the 1980’s (Leiner et al., 2009). Online learning began to be used in the mid 1990’s which coincided with the development of the World Wide Web (Garrison, 2011). Online learning technologies quickly expanded as the number of tools available to instructors and learners continued to increase (Garrison, 2011).

Distance education is a broad term that encompasses courses taught via mail, digital video disc, telephone, television, or any medium that does not involve a traditional classroom setting in which students and instructors were simultaneously co-located (Ko & Rossen, 2010). Online learning is a type of distance education that does not take place in a traditional classroom setting in which the learners and instructors are in the same location, and may not participate at the same time (Ko & Rossen, 2010; Garrison, 2008). Teaching and learning online is defined as conducting or participating in a course partially or entirely via the internet (Ko & Rossen, 2010).
In 2010, online enrollment in college courses experienced a ten percent growth rate, the second lowest increase since 2002. In fall, 2010 over 6.1 million students were enrolled in at least one online course, which was 31% of all higher education students. The increase in online enrollment in 2011 exceeded the overall growth of the higher education student population for the same year (Sloan Consortium, 2011).

Online education programs in Extension have grown rapidly (Dromgoole & Boleman, 2006). Reports of the economic benefits of distance education have varied, however Cecil & Feltes (2002) reported that cost savings can be realized when compared to face-to-face education programs. Due to budget constraints and cutbacks, Extension administrators have encouraged the use of online tools for Extension program delivery. Online education programs, technologies, and training were reported to be more cost effective when compared to face-to-face education programs (Dromgoole & Boleman, 2006).

Efforts should be made to adopt and implement online education programs if Extension is to continue to reach a broader audience and accomplish the goals and objectives of the organization (King & Boehlje, 2000). Campbell (1995) stated that, "... higher education [including Extension education] faces the challenge of expanding the reach, quality, and effectiveness of instruction within the context of shrinking resources as well as organizing itself to serve students [Extension clientele] regardless of where they reside . . ." (p. 73). Online education may enhance the effectiveness and accessibility of Extension programs in the face of challenges to become more efficient and relevant (Dromgoole & Boleman, 2006).
Online education programs in Extension have received mixed reviews regarding specific programs. Learner preferences for various distance and delivery method options have been studied. Whether or not certain program areas or content can be taught using online delivery methods has also been examined. Extension administrators have encouraged development of online education programs, and possibly the most challenging hurdle is facilitating a cultural change within the Extension system (Dromgoole & Boleman, 2006). Extension professionals may view the shift in program delivery strategy as a potential threat to program quality. Extension professionals may also perceive that without face-to-face contact, the learning experience will be less effective. Ultimately losing direct and personal contact with learners could be perceived to negatively impact the quality of educational programs conducted by Extension professionals. In addition, Extension professionals may envision reduced personal and professional satisfaction from delivering online educational programs compared to face-to-face programs (Dromgoole & Boleman, 2006).

Factors affecting higher education faculty acceptance or rejection of online education programs as a delivery method have been studied by many different researchers (Grant, 2004; Green, Alejandro, & Brown 2009; Bollinger & Wasilik, 2009; Rockwell, Schauer, Fritz, & Marx, 1999; Mahdizadeh, Biemans, & Mulder, 2007; Murphrey & Dooley, 2000; Murphy & Terry, 1998; Nelson & Thompson, 2005; Miller, 1997; Roberts & Dyer, 2005).
Incentives are extrinsic considerations that may potentially encourage the use of online tools. Incentives identified through previous research include:

- career development (Green, Alejandro, & Brown 2009; Roberts & Dyer, 2005)
- career advancement (Green, Alejandro, & Brown 2009)
- mentoring from veteran distance education instructors (Green, Alejandro, & Brown 2009)
- demand for distance education by learners (Roberts & Dyer, 2005; Murphrey & Dooley, 2000)
- providing flexible and convenient access to courses (Grant, 2004; Bollinger & Wasilik, 2009; Murphrey & Dooley, 2000; Rockwell, Schauer, Fritz, & Marx, 1999; Green, Alejandro, & Brown 2009)
- learners actively communicating with the instructor (Bollinger & Wasilik, 2009)
- providing innovative instruction (Rockwell, Schauer, Fritz, & Marx, 1999; Roberts & Dyer, 2005)
- applying new teaching techniques (Rockwell, Schauer, Fritz, & Marx, 1999; Green, Alejandro, & Brown 2009)
- recognition of work (Roberts & Dyer, 2005; Rockwell, Schauer, Fritz, & Marx, 1999)
- reduction of student travel time (Rockwell, Schauer, Fritz, & Marx, 1999)
- continuous improvement of technologies (Murphrey & Dooley, 2000)
- ability to reach new audiences (Grant, 2004; Murphrey & Dooley, 2000; Roberts & Dyer, 2005)
- comfort with technology (Grant, 2004; Murphrey & Dooley, 2000)
- reputation for quality content (Murphrey & Dooley, 2000)
- extensive infrastructure and network (Murphrey & Dooley, 2000)
- use of technology to enhance teaching and learning (Green, Alejandro, & Brown 2009; Murphrey & Dooley, 2000)
- support from administration (Murphrey & Dooley, 2000)
- opportunities for collaboration (Grant, 2004; Murphrey & Dooley, 2000)
- opportunity to create an individualized learning experience (Murphrey & Dooley, 2000; Green, Alejandro, & Brown 2009)
- opportunity to provide specialized courses/programs (Murphrey & Dooley, 2000; Green, Alejandro, & Brown 2009)
- individual and department financial compensation (Roberts & Dyer, 2005)
- distance education considered normal or routine activity (Roberts & Dyer, 2005)
- awards and recognition (Roberts & Dyer, 2005)

Motivators are intrinsic or personal drives that prompt the use of online tools. Motivators identified through previous research include:

- opportunity to share knowledge with others (Green, Alejandro, & Brown 2009)
- intellectual challenge (Green, Alejandro, & Brown 2009)
- self-gratification (Fritz, & Marx, 1999)
- fulfilling a personal desire to teach (Fritz, & Marx, 1999)
- recognition (Roberts & Dyer, 2005)
Barriers are extrinsic considerations that potentially discourage the use of online tools. Barriers identified through previous research include:

- unreliable technology (Bollinger & Wasilik, 2009; Mahdizadeh, Biemans, & Mulder, 2007; Murphrey & Dooley, 2000; Roberts & Dyer, 2005)
- limited incentives (Murphrey & Dooley, 2000; Murphy & Terry, 1998; Bollinger & Wasilik, 2009; Green, Alejandro, & Brown 2009; Roberts & Dyer, 2005)
- potential for copyright and intellectual property infringement (Murphrey & Dooley, 2000; Nelson & Thompson, 2005)
- career and job insecurity (Murphrey & Dooley, 2000; Bollinger & Wasilik, 2009)
- institutional culture (Nelson & Thompson, 2005)
- inability to have lab sessions (Miller, 1997)
- costs and lack of funding (Roberts & Dyer, 2005; Miller, 1997; Nelson & Thompson, 2005; Murphy & Terry, 1998)
- lack of technical support (Roberts & Dyer, 2005; Miller, 1997; Murphy & Terry, 1998; Nelson & Thompson, 2005; Murphrey & Dooley, 2000; Rockwell, Schauer, Fritz, & Marx, 1999)
- administrative issues (Roberts & Dyer, 2005; Murphrey & Dooley, 2000; Grant, 2004; Green, Alejandro, & Brown 2009)

Inhibitors are intrinsic or personal considerations that discourage the use of online tools. Inhibitors identified through previous research include:

- preference for face-to-face teaching (Mahdizadeh, Biemans, & Mulder, 2007)
- concerns about increased workload (Green, Alejandro, & Brown 2009; Bollinger & Wasilik, 2009)

- use of online tools would require them to be more creative (Bollinger & Wasilik, 2009)

- lack of technical knowledge (Murphrey & Dooley, 2000; Mahdizadeh, Biemans, & Mulder, 2007; Rockwell, Schauer, Fritz, & Marx, 1999; Roberts & Dyer, 2005; Miller, 1997)

- loss of interaction between instructors and students (Murphrey & Dooley, 2000; Mahdizadeh, Biemans, & Mulder, 2007; Roberts & Dyer, 2005)

- time constraints (Roberts & Dyer, 2005; Miller, 1997; Murphy & Terry, 1998; Mahdizadeh, Biemans, & Mulder, 2007; Rockwell, Schauer, Fritz, & Marx, 1999; Green, Alejandro, & Brown 2009)

- faculty attitudes and resistance (Nelson & Thompson, 2005)

- lack of personal contact with learners (Nelson & Thompson, 2005)

- lack of faculty time and support (Nelson & Thompson, 2005)

Several studies have been conducted (Dromgoole & Boleman, 2006; Dooley, Van Laanen, & Fletcher, 1999; DeCamp, Richert, Singleton, Vines, and Slipher, 2001; Cecil and Feltes, 2002; Twidwell and Venuto, 2004) on distance education and online learning in Extension. Most of the studies examined participant attitudes, perceptions, knowledge gain, and willingness to participate in distance or online educational programs. Even so, a literature review identified relatively few studies that focused on factors affecting the
decision to use online learning tools by Extension professionals’ as a delivery method for
their educational programs.

One study reported by Dromgoole & Boleman (2006) was conducted to determine
what Extension educators viewed as obstacles, advantages or disadvantages when
developing and implementing distance education programs. Another study reported by
Cecil and Feltes (2002) at the University of Illinois assessed audience acceptance of an
alternative method of instruction during an Extension delivered series of continuing
education short courses using the internet and teleconferencing.

Dooley, Van Laanen, and Fletcher (1999) evaluated the distance delivery of a
Food Protection Management (FPM) program, in an effort to evaluate knowledge gained.
A study of pork producers’ acceptance of distance education media by DeCamp, Richert,
Singleton, Vines, and Slipher (2001) sought to expose producers to various types of
educational media. In yet another study, Twidwell and Venuto (2004) discussed the
experience of Extension agents and instructors in a course taught via distance education
and their evaluation of the distance education method of teaching.

Extension programs will need to accommodate changing learner preferences in
order to remain relevant, as educational technology evolves and the demand for
information and programs online converges. Meeting the interests and demands of the
clientele and future audiences will require that Extension professionals consider using
online technology in delivering educational programs. Understanding the barriers,
inhibitors, motivators, and incentives that Extension professionals consider when making
decisions about the use of online tools will enable Extension administrators to increase
the use of online tools for programs delivery. Therefore, the research problem for this study was to identify factors (i.e. collectively barriers, inhibitors, motivators, and incentives) that relate to Extension professionals’ use of online tools for program delivery.

Purpose of Study

The purpose of this study was to identify factors that Ohio State University Extension Service (OSUE) professionals considered in making decisions about using online tools in their educational programs. Furthermore, this study examined OSU Extension professionals’ experience as learners and as educators with online education tools, and identified factors considered in their decisions related to the use of online tools in their educational programs. Online tools may be utilized to better serve the needs and interests of Extension audiences through improved efficiency and accessibility. Therefore, Extension administrators seeking to increase the use of online tools need to better understand the factors considered by Extension professionals as they make decisions about the use of those tools in their educational programs. To guide the study, the following research questions were formulated.
**Research Questions**

1. To what extent do Extension professionals use online tools in conducting educational programs?
2. To what extent do Extension professionals have experience using online tools as a learner?
3. Is there a relationship between the Extension professionals’ use of online tools as a learner and as an educator?
4. What factors do Extension professionals consider in their decisions about the use of online tools in their Extension program?
5. Which factors explain the variability associated with Extension professionals’ use of online tools in their Extension program?
6. Is there a relationship between the demographic characteristics of OSU Extension professionals and their use of online tools?

**Definition of Terms**

The terms below were defined as follows when used in the context of this study.

- **Adoption**: the decision of a person to make full use of an innovation as the best option to complete a task (Rogers, 1962; Rogers & Shoemaker, 1971; Rogers, 1983).

- **Barriers**: extrinsic considerations that may discourage Extension professionals from using online tools (for the purpose of this study).

- **Diffusion**: wide spread use of an innovation among the members of a community over time (Rogers, 1962; Rogers & Shoemaker, 1971; Rogers, 1983).
**Distance Education:** a form of learning and instruction that does not involve the traditional classroom setting, and in which the learner and instructor are not in the same location at the same time (Ko & Rossen, 2010; Garrison, 2008).

**Distance Delivery Method:** the means by which distance education programs are delivered. Examples include correspondence, videoconferencing, online courses, and webinars (Ko & Rossen, 2010; Garrison, 2008).

**Extension Educational Program:** planned learning activity designed to share research and information from land grant institutions with the public (Seevers, Graham, & Conklin, 2007).

**Extension Professional:** employee of a university Extension service who complete various educational tasks in which they disseminate research from the land grant institution with the purpose of sharing the information with people in their assigned county, state, or country (Seevers, Graham, & Conklin, 2007).

**Factors:** for the purpose of this study, four factors were defined as the composite of items that Extension professionals may consider in their decision about using online tools in their educational programs. The four factors examined in this study included: Barriers, Incentives, Inhibitors, and Motivators.

**Incentives:** extrinsic considerations that encourage Extension professionals to use online tools (for the purpose of this study).

**Inhibitors:** intrinsic considerations that discourage Extension professionals from using online tools (for the purpose of this study).
Innovation: an idea, practice, or object that is perceived to be new by an individual or community (Rogers, 1962; Rogers & Shoemaker, 1971; Rogers, 1983).

Motivators: intrinsic considerations that encourage Extension professionals to use online tools (for the purpose of this study).

Online: connected by computer to one or more other computers or networks, as through a commercial electronic information service or the Internet (Ko & Rossen, 2010; Garrison, 2008).

Online Tool: hardware, software, and/or electronic applications that may be used as a means of teaching or learning in an online environment (Ko & Rossen, 2010; Garrison, 2008). For the purpose of this study nine categories of online tools were examined including: Conferencing Tools, Social Media Tools, Communication Tools, Video, Images, Audio, Website Design, Course Management System, Survey/Polling/Testing/Assessment/Evaluation.

Perception: organization, identification, and interpretation of sensory information in order to fabricate a mental representation of a person or thing (Rogers, 1962; Rogers & Shoemaker, 1971; Rogers, 1983).

Theoretical Foundation

Rogers’ innovation diffusion theory provided the theoretical foundation for this study. Numerous studies have been conducted using Rogers’ (1995) theory about the diffusion of innovations (Anderson & Harris, 1997; Dooley & Murphy, 2000; Jacobsen, 1998; Knutel, 1998; and Ndahi, 1998) as the theoretical basis in studying the adoption of
distance education technologies. Rogers defined innovation as “. . . an idea, practice, or object that is perceived as new by an individual or other unit of adoption . . .” (1995, p. 11). For the purpose of this study, the innovation was adoption of the use of online tools to deliver Extension education programs.

Rogers (1962) suggested that potential adopters could be categorized into five groups: (a) innovators; (b) early adopters; (c) early majority; (d) late majority; and (e) laggards. However, some previous studies have simply contrasted adopters and non-adopters (Evans & Lepman, 1968; Rogers, 1983). Furthermore, diffusion of information concerning an innovation has been described as a five step process: knowledge and awareness of the innovation, positive attitudes or interest in the innovation, commitment to try or evaluate the innovation, trial run of the innovation, and the acceptance or rejection of the innovation (Rogers, 1983). Regardless of the adopter category or step in the adoption process that Extension professionals find themselves, understanding the factors that educators consider when choosing an instructional technique may help to facilitate adoption of online tools by Extension professionals.

**Conceptual Model**

The conceptual model for this study is framed in the context of four categories of factors that may be considered by instructors in choosing appropriate instructional techniques when planning educational programs. A literature review revealed ten major factors that instructors considered when planning an educational program, with four being the most important (Tracey, 1992, Milano & Ullius, 1998; Smith & Ragan, 1999;
Vella, 2000; Dick, Carey, & Carey, 2001). The four key factors considered in educational program planning included: the learning objectives, capability of the instructor, learner characteristics, and learning context (Caffarella, 2002).

Capability of the instructor focuses on the person who plans and implements the educational program (Caffarella, 2002). Program planners are those who devote their time and energy toward developing, implementing, and evaluating educational programs, sometimes with support from others (Caffarella, 2002). Educators draw upon their knowledge base as well as their experience with planning and implementing programs (Fenstermacher, 1994). For those that plan, develop, and coordinate education and training programs, the process involves decision making, political maneuvering, details, and deadlines (Caffarella, 2002). The instructor’s knowledge, skill, comfort, and confidence to handle a particular technique are also considerations in the decision-making process (Caffarella, 2002).
Learning objectives help to clarify relevant ideas, needs, and program content, in the process of planning educational programs (Witkin & Alschuld, 1995; Houle, 1996; Gupta, 1999). Educators must determine the context, purpose, and objectives of the program, as they plan educational programs (Caffarella, 2002). There are many instructional strategies that educators can employ in order to achieve learning objectives (Mezirow & Associates, 1990; Apps, 1996; Silberman, 1996; Driscoll, 1998; Galbraith, 1998; Smith & Ragan, 1999; Burge, 2000; Taylor, Marienau, & Fiddler, 2000; Alessi &

<table>
<thead>
<tr>
<th>Capability of the Instructor</th>
<th>Learning Objectives</th>
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<tbody>
<tr>
<td>- Experience with online methods</td>
<td>- Content</td>
</tr>
<tr>
<td>- Factors</td>
<td>- Extension program area:</td>
</tr>
<tr>
<td>- Barriers</td>
<td>Agriculture and Natural Resources</td>
</tr>
<tr>
<td>- Motivators</td>
<td>Community Development</td>
</tr>
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<td></td>
<td>Family and Consumer Sciences</td>
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<td>4-H Youth Development</td>
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<td></td>
<td>- Learning outcomes</td>
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<tr>
<th>Learning Context</th>
<th>Learner Characteristics</th>
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<tbody>
<tr>
<td>- Location</td>
<td>- Demographic characteristics of target audience</td>
</tr>
<tr>
<td>- Geographic profile</td>
<td>- Previous experiences</td>
</tr>
<tr>
<td>- Facilities and technology</td>
<td>- Desired outcome of educational program</td>
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Trollip, 2001). Although learning techniques are categorized based on the learning outcomes desired, one technique may be appropriate for more than one learning outcome (Caffarella, 2002).

The learning context also influences the choice of learning techniques, particularly the setting where the learning will take place (Smith & Ragan, 1999; Vella, 2000). Learning can take place in a variety of settings from formal classroom or training rooms, to homes, workplaces, and various other environments (Cafferella, 2002). Some learning environments are more conducive to certain teaching techniques than others (Cafferella, 2002). Some learning contexts may support the use of some learning techniques, but inhibit the use of other techniques (Cafferella, 2002).

Instructors recognize that learners bring different experiences and preferences with them to their learning activities, including different life roles, and varying ways of learning (Knowles, 1980; Merriam & Caffarella, 1999; Dick, Carey, & Carey, 2001). One particular challenge that instructors face involves selecting an instructional technique that takes into consideration the different experiences and preferences of all learners (Cafferella, 2002). Changing population demographics in the United States and the world including race, gender, class, and culture affect the learning process (Cafferella, 2002). Educators must be willing to change their views about learners, the way they teach, and the content they include in order to create a more inclusive environment for all learners (Hayes, 1994; Guy, 1999).
Limitations

The scope of this study was limited to Ohio State University Extension professionals identified by OSUE Human Resources staff during the 2012 fiscal year. Therefore, the results of this study may not be generalized to Extension professionals in other states or countries. The sample for the survey was delimited to persons in OSUE holding a relevant job classification in the fall of 2012, when the survey was administered.

Basic Assumptions

This study was conducted based upon the assumption that potential Extension audiences were interested in accessing information and programs via online. Researchers assume that current as well as potential future Extension audiences demand and prefer the availability of online programs. With the increased availability of computers and online access, more people utilize the internet as a source of information. The researchers assumed that Extension audience demand for online programs will continue to increase as a matter of personal convenience.

Extension professionals were also assumed to have had some level of familiarity with the potential for using online methods in educational program delivery. Researchers assumed that Extension professionals may have had some experience using online tools either as a learner, an educator, or both. Extension professionals were also assumed to have some degree of familiarity with the availability and capability of online tools for use in their educational programs.
Other assumptions for this study include Extension professionals’ willingness to complete the survey, and Extension administration’s interest in knowing what factors influence Extension professionals’ use of online learning tools in educational programs. Researchers assumed that participants in the study were willing to complete the instrument. Researchers also assumed that Extension administration is interested in gaining knowledge about the factors that influence Extension professionals’ use of online tools in order to encourage and increase the use of online tools. Extension administrators were also assumed to be interested in increasing and developing the use of online tools in educational programs within Extension and that understanding the factors perceived by Extension professionals would be viewed as beneficial.
Chapter 2: Literature Review

Introduction

The purpose of this literature review is to present and describe previous research on factors related to the use of online learning tools. In addition, this chapter will present information about the use of online learning by Extension employee’s in their educational programs. Information from research literature is also presented in this chapter to describe the factors considered in Extension educators’ decisions related to the use of online learning tools.

Theoretical Foundation

Diffusion of innovation theory provides a plausible explanation of how, why, and at what rate new ideas and technology are adopted within a group or organization (Rogers, 1962). Diffusion of innovation theory also provides the groundwork for behavioral change models in the field of social sciences which are applicable to a broad range of topics (Valente & Rogers, 1995). Multiple studies have been conducted that utilize Rogers’ (1994) theory of diffusion of innovations (Anderson & Harris, 1997; Dooley & Murphy, 2000; Jacobsen, 1998; Knutel, 1998; & Ndahi, 1998) as the framework to study the adoption of distance education technologies. Rogers’ (1962)
model of the innovation-decision process was used as the theoretical foundation for this study.

Research leading to the development of the theory began with a study of the adoption of hybrid seed corn by farmers in a study reported by Ryan and Gross (Valente & Rogers, 1995). Ryan and Gross (1950), rural sociologists at Iowa State University, conducted the study to investigate the rate at which the new hybrid seed corn technology spread among farmers in the state of Iowa.

The study established that the hybrid seed corn innovation, while profitable, took several years to spread through the Iowa agricultural community (Valente & Rogers, 1995). Slowly, diffusion of innovation spread when farmers who were reluctant to adopt hybrid seed corn talked with farmers who had already adopted the new technology with successful results (Ryan & Gross, 1943).

The study conducted by Ryan and Gross (1950) investigated four aspects of the diffusion of innovation process. The four aspects established by Ryan and Gross (1950) were the innovation-decision process for an individual farmer, the sources of information about the innovation, the rate of adoption, and the personal, economic, and social characteristics of the adopters. Farmers were classified into four adopter categories by Ryan and Gross based on the year that they started planting hybrid seed corn (Valente & Rogers, 1995). The adopter groups were correlated with other variables such as age, formal education, size of farm, organizational participation, trips to Des Moines, Iowa, and reading material choices (Ryan & Gross, 1943). The adopter groups were precursors
to innovator groups that were subsequently described by Rogers (Valente & Rogers, 1995).

Ryan and Gross established the groundwork for diffusion theory based upon their study (Valente & Rogers, 1995). After Ryan and Gross published results from their hybrid seed corn study, diffusion of innovations was widely studied in the field of rural sociology for several years (Valente & Rogers, 1995). A private foundation supported by the International Harvester Company, a major manufacturer of farm machinery, funded the North Central Subcommittee for the Study of Diffusion of Farm Practices in 1955. The North Central Rural Sociology Committee was comprised of a group of rural sociologists from sixteen Midwestern states (Valente & Rogers, 1995). Beal and Bohlen (1957) helped develop and facilitate the North Central Region Subcommittee, and also published the first and most influential report which was a synthesis of diffusion studies to date. Beal and Bohlen (1957) classified adopters as innovators, early adopters, early majority, majority, and non-adopters.

Much of the research conducted on diffusion of innovation was in the field of rural sociology, until the 1960’s, when it spread to other areas such as medicine, economics, geography, marketing, political science, and communication (Valente & Rogers, 1995). The primary reason for expanded interest in the topic was the publication of Rogers’ (1962) text titled Diffusion of Innovations. This book made research results more accessible and argued that diffusion of innovations was a general process that could be applied in other situations and contexts in which individuals were adopting a new technology (Valente & Rogers, 1995).
Rogers defined innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (1995, p. 11). “Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 1995, p. 5). The innovation-decision process is the “process through which an individual (or other decision-making unit) passes from awareness of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision” (Rogers, 1995, p. 20). The process can be influenced by prior conditions, characteristics of the decision making unit, the perceived characteristics of the innovation, and communication channels. For the purpose of this study, the innovation is the use of online learning tools to deliver Extension education programs and the diffusion is the extent to which OSU Extension professionals had adopted this technology.

Theoretically, potential adopters can be viewed in five categories: (a) innovators; (b) early adopters; (c) early majority; (d) late majority; and (e) laggards (Rogers, 1962). Some previous studies have contrasted adopters and non-adopters (Evans & Lepman, 1968; Rogers, 1983).

The process of diffusion of information concerning an innovation can be divided into five steps: (a) knowledge and awareness of the innovation, (b) positive attitudes or interest in the innovation, (c) commitment to try or evaluate the innovation, (d) trial run of the innovation, and (e) acceptance or rejection of the innovation (Rogers, 1983).
Rogers (1995) discussed five factors that influence the rate of adoption: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability.

“Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes” (Rogers, 1995, p. 212). Many change agencies use incentives to increase the rate of adoption. The main function of an incentive is to increase the perceived degree of relative advantage. The greater the perceived advantage of an innovation, the more rapid the rate of adoption is (Rogers, 1995).

The second attribute, compatibility, “. . . is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters . . .” (Rogers, 1995, p. 224). Ideas that are incompatible with the values and norms of a group of adopters will not be adopted as quickly as an innovation that is compatible. In order for an innovation that is incompatible with established social norms to be accepted, adoption of a new values system would have to take place first. Adoption of a new values system is a much slower process (Rogers, 1995).

The third attribute, complexity, “. . . is the degree to which an innovation is perceived as relatively difficult to understand and use . . .” (Rogers, 1995, p. 242). New innovations that are simple to understand are adopted rapidly, as opposed to innovations that require development of new skills, understanding, and knowledge. The rate of adoption is slower with more complex innovations (Rogers, 1995).

The fourth, trialability, (sometimes called divisibility) “. . . is the degree to which an innovation may be experimented with on a limited basis. New ideas that can be tried
on the installment plan are generally adopted more rapidly than innovations that are not divisible . . .” (Rogers, 1995, p. 243). An innovation that can be tried first produces less uncertainty to the individual contemplating adoption (Rogers, 1995).

The last attribute, observability, “. . . is the degree to which the results of an innovation are visible to others . . .” (Rogers, 1995, p. 244). The more visible the results of a new innovation, the more likely it will be adopted. Visibility prompts peer discussion as adopters are questioned by friends and neighbors to evaluate the innovation. The less visible a new innovation, the more slowly it diffuses through a community (Rogers, 1995).

**Conceptual Framework**

The conceptual framework for this study was developed based on factors considered in the decision making process when instructors choose to use online tools as an instructional technique. Theory suggested that adoption of an innovation was influenced by attributes of the adoption process, attributes of the innovation, characteristics of the audience, and the nature of the social system in which the innovation was taking place (Evans, 1982; Cafferella, 2002). Instructor selection of instructional techniques to achieve program learning objectives usually include capability of the instructor, learner characteristics, and learning context are all taken into consideration (Cafferella, 2002).

In addition, Rogers identified five characteristics of an innovation that impact the rate of adoption including: the relative advantage of adopting the innovation,
compatibility of the innovation with adopters’ values, experiences, needs, complexity of use and understanding of the innovation by adopters, whether or not an innovation can be separated into steps and used on a trial basis, and the degree to which the results of the innovation can be observed and communicated to other potential innovators (Rogers, 1962; Rogers & Shoemaker, 1971; Rogers, 1983).

Computers

The impact of computers on social, political and economic life is widely recognized. Ensmenger (2012) suggested that no technological development during the past century has had such a profound influence as the invention of the electronic digital computer (Ensmenger, 2012). The history of computers encompasses many descriptions of computer and data analysis mechanisms, however the biggest gains toward development of the personal computer did not occur until World War II (Ensmenger, 2012). World War II was described as a scientific and technology war in which countries invested money and manpower into scientific discoveries and developing new technologies, to help win the war (Kelly & Aspray, 2004). Early computers were large, bulky machines consisting of several thousand vacuum tubes, required large amounts of space, were slow and unreliable, and had a fraction of the computational power of today’s computing systems (Ensmenger, 2012).

The earliest computer developed in the United States was the Atanasoff-Berry computer (ABC) developed by John Atanasoff and Clifford Berry. The concept of the ABC was developed in the late 1930s, and was built from 1939 to 1942 (Ensmenger,
The ABC was approximately the size of a large desk and had 270 vacuum tubes. Two hundred and ten tubes controlled the arithmetic unit, 30 tubes controlled the card reader and card punch and the remaining tubes helped maintain charges in the condensers (O’Reagan, 2012). The ABC weighed over 660 pounds and used 5,250 feet of wiring.

In 1946, Mauchly and Eckert developed the Electronic Numerical Integrator and Calculator (ENIAC) at the Moore School of Engineering at the University of Pennsylvania (O’Reagan, 2012). The ENIAC was a large bulky vacuum tube computer that was the size of a box car, weighed 30 tons, contained 18,000 vacuum tubes, and used 150,000 watts of power (Daniels, 1996). This all-electric, full scale, general purpose, and digital computer was the prototype for the computer (Thurber, 1995). In 1949, Mauchly and Eckert, joined by von Neumann designed the Electronic Discrete Variable Automatic Computer (EDVAC), which was the successor to the ENIAC (O’Reagan, 2012).

After World War II ended in 1945, computer research and development continued to receive support from government and the business world (Ensmenger, 2012). Computers developed during the 1950s–1970s were mainly large, proprietary mainframes and minicomputers, and were developed for business, scientific, and government use (O’Reagan, 2012). Computers developed during this time were expensive, and only after cost reduction of components were vendors able to introduce personal computers in the 1980s where a consumer could purchase a smaller more inexpensive machine and upgrade to a larger computer as their needs expanded (Ensmenger, 2012).

In the mid-1970s the concept of a personal computer was born. Early personal computers included the Altair-8800 (O’Reagan, 2012). The MITS Altair 8800 was the
first commercially available microcomputer which sold for $400 dollars and was sold as
a kit that had to be assembled (Daniels, 1996). Introduction of personal computers led to
major changes in the industry and eventually replaced many mainframe computers with
networks of personal computers and servers (Kelly & Aspray, 2004).

Development of microprocessors and integrated circuit systems reduced the cost
of computer components (Thurber, 1995). Invention of the integrated circuit also
allowed multiple transistors to be placed on a single piece of silicon (O’Reagan, 2012).
The invention of the microprocessor provided computer functionality on a single chip,
and led to the development of personal computers beginning in the mid-1970’s (Kelly &
Aspray, 2004).

The computing field shifted its focus from mainframe computers to networks of
personal computers during the 1980’s and 1990’s (O’Reagan, 2012). Personal computers
became more affordable for consumers and the market for personal computers and
application software needed to run on the computers grew (Kelly & Aspray, 2004). For
businesses it was feasible to have a personal computer on every employee’s desk
(Molnar, 1975). This fact also led to an increase in employee productivity as well as a
demand for business applications for personal computers (Kelly & Aspray, 2004).

Early business applications included editors such as the Brief programming
editor, Wordstar word processor, and the Norton Utilities (O’Reagan, 2012). These
programs allowed users to edit text documents and analyze hard disks on a machine
allowing recovery of files that had accidentally been deleted (Ensmenger, 2012).
Spreadsheet applications were developed in the mid-1980’s that included data charting
and graphing capabilities. These programs later developed into Microsoft Excel® (O’Reagan, 2012).

During the 1980’s and 1990’s the speed of microprocessors improved dramatically as well as increases in memory and data storage in personal computers (Ensmenger, 2012). Increasing processing power also transformed computers from machines dedicated to business or scientific use to machines that played music, videos, or engaged in multimedia communication (Kelly & Aspray, 2004). The creation of the World Wide Web in the early 1990’s was a major milestone in computing that dramatically altered business and consumer behavior. The World Wide Web allowed businesses to operate in a globalized world and was an essential part of modern business (Ensmenger, 2012).

Development of the World Wide Web revolutionized computers by expanding the Internet from predominantly academic use to an integral part of peoples’ lives (Ensmenger, 2012). Users surf the web through hyperlinks that can be accessed by millions of computers throughout the world and provide nearly instant access to information (Kelly & Aspray, 2004). Each web page has a standard address called the universal resource locator (URL). Each web page is accessible via a common hypertext transfer protocol (HTTP). Web page content is formatted using hypertext markup language (HTML), and accessed through various web browsers (Ensmenger, 2012).

Early web browsers included Gopher, developed at the University of Minnesota, and Mosaic, developed at the University of Illinois (Kelly & Aspray, 2004). These web browsers were replaced by Netscape which dominated the browser market until
Microsoft introduced Internet Explorer®. Microsoft allowed user access to its browser without charge and bundled with the Windows® operating system, which led to the dominance of Internet Explorer in the personal computer market (Ensmenger, 2012). Development of other graphical browsers led to the commercialization of the World Wide Web (Kelly & Aspray, 2004).

Early use of computers in education was predominately in mathematics, science and engineering. Educational computing initially was as a mathematical problem-solving tool, replacing the slide rule and electronic calculator; thus permitting students to deal more directly with problems of the type and size most likely to be encountered in the real world (Levien, 1972).

The first computer-aided instruction (CAI) programs used in public schools were developed by researchers in the 1950’s (Leiner et al., 2009). Researchers developed CAI at both the public school and university levels in the 1960’s (Levien, 1972).

The National Science Foundation (NSF) supported the development of 30 regional computing networks, which included 300 institutions of higher education and some secondary schools, in order to make access to computers more widely available during the 1960s (Molnar, 1997). Stanford University developed programs of research and development on computer-assisted instruction in mathematics and reading in 1963 (Taylor, 1980). The program sought to free students from the process of group-paced instruction and developed individualized instruction that allowed learners to receive rapid feedback on responses (Molnar, 1997). These self-paced programs allowed students to take a more active role in the learning process (Taylor, 1980).
Only 1% of the nation's secondary schools used computers for instructional purposes in 1963 (Taylor, 1980). However, over two million students used computers in their classes by 1974. An estimated 55% of schools had access to computers and 23% were using computers primarily for instruction by 1975 (Molnar, 1997). By the late 1970s, personal computers were at the office, the school room, the home, in laboratories, and libraries. The computer was viewed as a necessity for many schools and universities, requiring incoming freshmen to own a computer (Taylor, 1980). Education institutions viewed computers as educational tools as important as books and libraries (Molnar, 1997).

Computers were being used in more than 40% of all elementary schools and more than 75% of all secondary schools in the United States by January 1983 (Center for Social Organization of Schools, 1983). Many educators were interested in microcomputers because they were relatively inexpensive, compact enough for desktop use, and could perform many of the functions performed by large computers that preceded them, including access to networks and information from other computers (Leiner et al., 2009).

**Online Education**

Online education is a form of distance education (Ko & Rossen, 2008). Online education refers to conducting an educational program partially or fully over the internet (Garrison, 2011; Ko & Rossen, 2008). Distance education encompasses forms of teaching that use mail, telephone, DVD, CD, satellite classrooms, or any classroom.
situation in which the instructor and learners are not located in the same physical space at
the same time (Ko & Rossen, 2008). Students have little to no face-to-face interaction
with the instructor and/or other students in learning environments that are completely
virtual or online (Bach, Haynes, & Smith, 2007).

Instructors use course management systems or software programs, virtual learning
environments, and other online meeting programs during an online course. Course
management systems allow instructors to post lectures, PowerPoint® presentations,
images, videos, and many other teaching aides and tools (Ko & Rossen, 2008). Online
courses and distance education programs have grown in popularity prompted by learner
expectations for convenience (Garrison, 2011). Completely online courses utilize either
or both synchronous and asynchronous communications (Ko & Rossen, 2008). Online
learning technologies are constantly undergoing improvements and the number of tools
available to instructors and learners is increasing (Garrison, 2011).

Instructors have many options to consider when selecting a delivery technique for
use in an online learning program. One important consideration is the use of
synchronous or asynchronous delivery. Synchronous communication may involve the
use of text, video, or audio. Synchronous delivery uses real-time (instant) messaging or
communication between two or more people. Synchronous programs are preferable
when group work is required. Synchronous programming prompts more natural
discussion, and requires learners and instructors to be prepared to discuss the topic. One
drawback of synchronous delivery is the requirement that participants must be connected
at the same time. Thus, scheduling and coordination is an issue for many learners, especially if learners reside in different time zones (Ko & Rossen, 2008).

Asynchronous programming allows participants to engage in an educational program at different times, but does not require simultaneous participation. Asynchronous discussion questions can be integrated into a recorded presentation, reading assignment, or other information sharing techniques. Learner participation using these methods require more preparation for posting responses and tend to be longer in length. Instructors generally give learners time limits to post initial responses, and then ask for threaded responses to the postings made by other learners and/or the instructor. Asynchronous discussion offers a good collaboration technique, and can be used to encourage learners to share knowledge and perspectives among peers based upon their prior learning and/or experiences (Ko & Rossen, 2008).

Traditionally online courses have been designed based upon the same theoretical foundations and frameworks as face-to-face learning environments (Garrison, 2011). However, many aspects of online learning indicate that teaching and learning online differs from a physical classroom environment. Instructors in a physical classroom have the potential to use voice, body language, ability to listen to students and observe interactions, facial expressions, and gestures. Participants in online teaching and learning environments have to substitute those qualities of a physical presence with emoticons, videos, emphasize written instruction and documents, and encourage student to collaborate and interact (Ko & Rossen, 2008).
Educational program design can utilize many different delivery formats; however two of the most prevalent are entirely online and blended designs. Program design depends upon the subject matter, students, and instructor. Design should consider program goals and objectives, class schedule, content, and exams or assessments (Ko & Rossen, 2008). Instructors need to know specific details about the learning audience when developing an online or blended educational program including number of learners, internet and equipment accessibility, materials available, and knowledge of how to use equipment and materials (Ko & Rossen, 2008).

Blended learning is defined as the integration of face-to-face and online learning activities (Garrison, 2011). Another term that is somewhat synonymous with blended learning is hybrid learning (Rudestram & Read, 2010). A blended learning experience will allow learners to attend face-to-face learning activities in some combination with online learning activities (Bach, Haynes, & Smith, 2007). Blended learning offers a balance between a face-to-face learning environment where the instructor manages the physical learning environment (specifically time) and online learning where there may be less structure and organization because the student is expected to be more self-directed (Rudestram & Read, 2010).

Blended learning utilizes various methods of web based technology, pedagogical methods, different instructional and delivery methods, and a mixture of technology-based instruction and hands-on tasks (Driscoll, 2002). Blended learning may also require institutional and/or cultural changes and additional resources prior to implementation. Choosing to use blended learning is dependent upon the goals and objectives that the
instructor and institution are seeking to accomplish (Niemiec & Otte, 2009). Blended learning may involve both synchronous and asynchronous programming, each with its inherent advantages and disadvantages (Garrison, 2011). Blended learning may also provide a reasonable segue into a completely online learning environment for organizations (Driscoll, 2002). Blended learning allows institutions and instructors to teach adult learners who are often more comfortable and familiar with face-to-face interaction while also introducing them to online learning (Garrison, 2011).

Teaching completely online refers to conducting an educational program entirely through internet connections for information transfer (Garrison, 2011). Students have little to no face-to-face interaction in a learning environment that is completely virtual or online (Bach, Haynes, & Smith, 2007). Instructors use course management systems or software, virtual learning environments, and other online meeting programs to communicate and transmit information in an online program. The course management system allows the instructor to post lectures, PowerPoint® presentations, images, videos, and many other teaching/learning resources and tools (Ko & Rossen, 2008).

According to Garrison (2011), completely online learning is often times “the most dreaded and intimidating” form of education, due to many unknowns including instructor insecurity in how to develop a social presence and a community of learners within a virtual learning environment. Teaching and learning methods require modification as instructors and learners adapt to online learning. The time commitment for instructors planning a completely online educational program is much greater than for most face-to-face programs. Course structure, clarification of instructions, and expectations of the
learners are similar to any other course no matter the delivery method, with some modifications. However, greater attention and consideration is necessary in areas such as faculty/staff preparation, teaching methods, student management, evaluation, and other aspects of course development (Bach, Haynes, & Smith, 2007). Many development tools and guides are available for instructors to use, either through their institution or available commercially through various vendors, businesses, and organizations (Garrison, 2011).

Factors

Literature on factors that influence the use of online learning included data collected from faculty members and administrators. The literature included data collected from faculty engaged in using a wide variety of online learning tools and methods. Emerging from this literature was a list of factors regarding the use of online education methods and tools. Factors cluster naturally into two primary categories: factors perceived as deterrents to faculty use of online learning tools; and factors perceived to positively influence faculty decisions about the use of online educational tools.

Barriers, Motivators, Incentives, and Inhibitors

During the fall of 2002 a study conducted in a teacher education department at a large urban university in the southeast U.S. asked faculty members to describe factors that influenced their participation in online professional development. Personal interviews were used to collect data from participants in the study. The study identified four intrinsic items and one extrinsic item that influenced teacher education faulty to
participate in online professional development. The four main influences faculty indicated that motivated them to participate in online professional development were convenience, comfort, common interests, and future purposes. Extrinsic factors identified by participants included pressure from administration, curriculum, and other institutions (Grant, 2004).

Members of the Distance Education Online Symposium comprised the sample for another study conducted in 2009. This study sought to determine factors that had the greatest impact on faculty with regard to their approach to teaching online. The authors developed and administered a survey to faculty at 23 different universities and received 135 completed surveys. Results revealed that faculty members were motivated to teach online education courses for the following reasons: flexible working conditions, opportunity to use technology, opportunity to share knowledge with others, intellectual challenge, career development, career advancement, continuous training provided by the university, opportunity to assist with course and program development, mentoring from veteran distance education instructors, and an opportunity to gain teaching experience. Barriers or deterrents identified by faculty respondents were time commitment, lack of sufficient financial compensation in comparison to workload, concerns about workload, and lack of institutional support (Green, Alejandro, & Brown 2009).

A survey of faculty who teach online courses was conducted to identify factors affecting the satisfaction of online faculty that taught during fall 2007 and 2008 at a public research university. The survey was categorized into student related issues, instructor related issues, and institutional related issues. Factors identified by the results
of this study were providing flexible and convenient access to courses, active involvement in learning, learners actively communicating with the instructor, reliable technology, the need to be more creative, workload, compensation, preparation, and course evaluations (Bollinger & Wasilik, 2009).

Two colleges at the University of Nebraska were surveyed in yet another study to determine incentives that encourage faculty to teach via distance education and obstacles that prevented them from doing so. Interviews were conducted as the first step in the research and produced items that were later developed into a data collection instrument. Motivators or incentives identified through the study that contributed to faculty use of distance teaching methods were providing innovative instruction, applying new teaching techniques, self gratification, fulfilling personal desire to teach, recognition of work, access to place-bound students, reduction of student travel time, release time, and peer recognition. Obstacles or barriers identified in the study were: time requirement, assistance or support needs, time taken from research, training requirements, and developing effective technology skills (Rockwell, Schauer, Fritz, & Marx, 1999).

A study of university faculty at Wageningen University in the Netherlands surveyed 178 teachers from a variety of departments. The study was designed to identify factors that explained teachers’ use of online learning environments in higher education. The instrument used in the study was developed by the researcher based on a review of the literature. Factors reported in the study that might impede faculty use of online learning environments were the quality of student learning, being unable to find useful, relevant computer software, lack of useful and relevant websites, preference for face-to-
face teaching, lack of technical infrastructure, difficulty working with online learning environments, and a lack of time. Researchers identified five constructs based on factors identified in an exploratory factor analysis. The five constructs identified were: knowledge construction, teaching and learning approach, teachers’ opinion about computer assisted learning, teachers’ opinion about web-based activities, and ease or difficulty of use (Mahdizadeh, Biemans, & Mulder, 2007).

A study of the strengths, weaknesses, opportunities, and threats (SWOT analysis) associated with distance education at Texas A&M University in the College of Agriculture and Life Sciences was conducted by interviewing 42 participants who were familiar with distance education technologies. Strengths were identified as continuous improvement of technologies, ability to reach new audiences, audiences access and comfort with technology, reputation for quality content, extensive infrastructure and network, use of technology to enhance teaching and learning, and support from administration. Opportunities were identified as expansion of audience base, opportunities for collaboration, opportunity to create an individualized learning experience, opportunity to provide specialized courses/programs, and advances in available technology. Weaknesses were identified as limited incentives, development, and support, limited knowledge regarding copyright and intellectual property, weak communication channels, slow action on critical issues, current technology limitations, lack of skills, expertise, and desire to develop interactive courses, and loss of interaction. Threats were identified as career and job security, competition from private and public institutions, dependency on outside developers and programmers, quality measurement
issues, using old models to develop policies, and misinformation on the internet (Murphrey & Dooley, 2000).

A delphi study surveyed 61 experts in distance education in agricultural education departments across the country. The purpose of the study was to identify opportunities and obstacles for electronic technologies in agricultural education. Results from this study reported a consensus among respondents concerning obstacles to be overcome in the adoption of educational technologies. Obstacles were identified as lack of time, lack of formalized reward system for faculty, lack of technical support, cost of equipment, and lack of properly designed facilities (Murphy & Terry, 1998).

Program leaders and teaching faculty from agricultural education teacher preparation programs across the country were surveyed using an instrument developed by researchers at Oregon State University. The objective of this study was to determine what faculty and program leaders perceived as barriers inhibiting the start and or expansion of distance education. The results of the study found that the majority of respondents indicated that faculty attitudes and resistance, lack of personal contact, lack of faculty time and support, technology issues, lack of student services, institutional culture, legal concerns, regulatory restrictions, and expense as barriers to starting or expanding distance education (Nelson & Thompson, 2005).

Identification of obstacles that might inhibit the use of distance education by secondary agricultural education teachers was the objective of a research study conducted at Iowa State University. Secondary agricultural education teachers in Iowa were the target audience for the study. Researchers developed a three part questionnaire that
investigated the target population’s attitudes toward distance education, obstacles that might inhibit use of distance education, and demographic questions. Results from this study found that secondary agriculture teachers considered the lack of local support, staff, and inability to have lab sessions, and materials distribution, costs, training, and preparation time were identified as significant to moderately significant barriers (Miller, 1997).

Department chairs and program leaders were surveyed to provide a summary of distance education programming in agricultural education departments across the United States. The population for this study was all university agricultural education departments and programs as listed in the AAAE Directory of university faculty in Agricultural Education. Data were collected using a researcher developed instrument. Two of the objectives of the study were to describe administrative perspectives of motivational factors for faculty to teach distance courses in agricultural education departments, and describe administrative perspectives of the barriers to using distance education in agricultural education departments. Results from the study found that department chairs and program leaders viewed the following as motivating factors for faculty: better service provided, individual and department financial compensation, involvement in a future and innovative educational experience, intrinsic motivations, recognition, distance education is a normal or routine activity, increase enrollment, favorable faculty evaluations, and extra support for faculty. Department chairs and program leaders listed the following as barriers for faculty using and considering distance education: time constraints, costs and lack of funding, equipment limitations, technical
knowledge and technical support, demand for distance education, lack of recognition for faculty, pedagogical concerns, and administrative issues (Roberts & Dyer, 2005).

*Extension*

Cooperative Extension Service (CES) was established in 1914 with the passage of the Smith-Lever Act. The act was designed to create a partnership between the United States Department of Agriculture (USDA) and land grant institutions which were established through the Morrill Act of 1862. Cooperative Extension was conceived as a non-formal education system that disseminates research conducted at land grant universities through educational programs to help people improve their lives and communities. Utilizing the knowledge and research of the USDA, land grant institutions, and county Extension offices; CES delivers educational programs to people on a national, state, and county/parish level (Seever et al., 2007).

Cooperative Extension is believed to be the largest adult, out-of-school education program in the world (Fiske, 1989). The CES is made up of professionals at land grant institutions and county units. Most CES professional staff are located in counties or parishes, with the remainder located at land grant university campuses and research stations. On the national level, Extension administration teams with The National Institute of Food and Agriculture (NIFA) to partner with the USDA to oversee, provide leadership, and allocate federal funds. Collaborative efforts between these partners seek to perform, diffuse, and disseminate research and create educational programs that can
enable people to make practical, educated decisions, and improve their lives (Seevers et al., 2007).

The philosophy of Extension, is based upon four basic principles underlying the activities, practices, and programs as follows: (a) the individual is supreme in democracy; (b) the home is the fundamental unit in a civilization; (c) the family is the first training group of the human race; (d) the foundation of any permanent civilization must rest on the partnership of the people and land (Bliss, 1952). These philosophical principles are based on the beliefs that education and learning put to practical use can help people lead better lives by improving their individual self, family, and communities (Seevers et al., 2007).

Four program areas addressed through the Cooperative Extension System are agriculture and natural resources (ANR), family and consumer sciences (FCS), 4-H youth development (4-H), and community and economic development (CD). Agriculture and natural resources focuses on an adequate food and fiber supply, improving water quality, natural resource conservation, environmental risks, biotechnology, and educational programs emphasizing all of the above. Family and consumer sciences focuses on improving family and economic wellbeing; including nutrition, financial, and family relationships. 4-H youth development focuses on assisting youth gain knowledge, develop life skills, and form attitudes that will help them become productive and contributing members of society. Community and economic development focuses on improving physical, economic, social, and cultural environments in which people live and work. Extension programs also include leadership development programs and public
policy education for people living and working in communities across the country, both rural and urban (Seevers et al., 2007).

Every organization has a set of goals that are communicated and guided by the beliefs and values of the organization (Hitt, 1988). The goals, values, and beliefs of Extension are the empowerment of people, the importance of rural life, faith in the future, faith in the individual, the home, and the family (Sanderson, 1988; Boone, 1989). Every state CES defines its individual mission, vision, values, and beliefs through organizational planning processes, however each are grounded on basic principles and historical values and beliefs (Seevers et al., 2007).

Technology changes, budget shortages, and programmatic shifts have created changes within the organization. These shifts have caused the organization to update and reaffirm its mission, values, and beliefs (Seevers et al., 2007). This reexamination has caused Extension to update its organization and structure to reflect current economic and social realities (Smith & Oliver, 1991).

Extension personnel who have not fully embraced the ‘digital age’ may attempt to embrace new technology and delivery systems for educational programs, however they often revert back to older ways after using methods that are unfamiliar and/or uncomfortable. Extension’s need to remain relevant and available to audiences in a more technologically advanced society is a driving force for expanding online educational programs (Seevers et al., 2007). Hoag (2005) suggested that Extension needs to make a greater effort in developing and testing alternative modes of information delivery. Advances in electronic delivery is not only useful in distributing information across the
country, it also makes information more accessible. Cost efficiency benefits in the form of digital books, online materials, reduced travel costs, lower equipment costs, and time savings are all driving forces prompting Extension to move toward a more technology based system (Seevers et al., 2007).

Use of the internet to conduct business is nearly essential for success in the 21st century (Harder & Lindner, 2008). In 2010, the amount of people in the U.S. who had ever viewed news online was 82%, and 54% of the population reported getting their news online every day (U.S. Census Bureau, 2012). Extension should consider the use of online educational tools to increase the functionality, accessibility, and relevance of the Cooperative Extension Service (Tennessen, PonTell, Romine & Motheral, 1997).

The Association of Public and Land-Grant Universities (APLU) Extension Committee on Organization and Policy (ECOP, which is the governing committee for the Cooperative Extension Service) released a report titled The Extension System: A Vision for the 21st Century, in 2002. This report strongly suggested that Extension personnel begin to aggressively use information technology (Harder & Lindner, 2008). Since that report was released, CES has made strides to incorporate the use of information technology and the internet. One of those efforts has been the development of eXtension. eXtension is an interactive learning environment designed to deliver research-based knowledge from land-grant universities across the United States. Content is provided by teams of experts from around the country, and posted online for Extension personnel and others to access. The eXtension program was created to increase the efficiency and effectiveness of the current Extension system, reduce costs for Cooperative Extension,
raise client awareness of Cooperative Extension, and provide an instantly accessible information resource to increase client satisfaction (Accenture, 2003).

The mission of Extension is accomplished through three basic conceptual models: technology transfer, problem solving, and imparting knowledge (Seevers et al., 2007). The technology transfer model provides answers to the client questions/problems through information from the land grant institution. The Extension agent or educator serves as the information resource link between researchers and clients. Transfer of information is in response to client needs, but the force behind the research may not be client driven, it may be the researcher’s search for new knowledge (Boyle, 1981).

The problem-solving model provides alternative solutions to problems (Seevers et al., 2007). Problems identified by learners are examined and alternative solutions are identified, evaluated and appropriate action is taken (Boyle, 1981). Extension educators fulfill the role of facilitator in this process (Seevers et al., 2007). Educators facilitate the problem solving process and evaluate the value of the solution reached (Boyle, 1981).

The imparting-knowledge model fulfills Extension’s mission to improve learner skills (Seevers et al., 2007). This model focuses on teaching learners that are unable to attend a formal on-campus class (Boyle, 1981). Content is generally focused in a specific discipline with a particular emphasis on practical application (Seevers et al., 2007).

Extension Educators

Extension personnel have been educating the public since the implementation of the Smith-Lever Act in 1914. Before the act was passed Extension Educators were not referred to as county agents but employees of land grant universities or research stations.
charged with delivering the research-based and information to the people across the country. After the Smith-Lever Act was passed, the position of county agent was created with more people employed to conduct local demonstrations and educational programs.

Extension county agents or educators across the country were not just located in rural areas, but in urban areas as well (Ode, 1991). The need for agents in the four program areas still exists, however they are continuously modifying their content and delivery methods to accommodate an ever-evolving audience (Seevers et al., 2007). County agents that once primarily performed special topic adult programs may still perform demonstrations, but they also utilize different methods and delivery tools to reach a broader audience (Seevers et al., 2007). Due to downsizing, not every county has a county agent in many states. Therefore, some Extension agents are not county based, but serve a regional audience (Ode, 1991).

*Extension Program Delivery*

After the American Revolution, the founding and development of agriculture societies spread across the country. These societies were devoted solely to agriculture and encouraged experimentation within the field of agriculture, and educating farmers. There were over 900 societies at the height of agricultural societies. Agricultural societies published literature, held educational programs, and hosted guest speakers (Seevers et al., 2007).

Development of the nation and westward expansion continued with the passage of several congressional acts such as the Land Act of 1800, the Public Railway Act of 1862, and the Homestead Act of 1862 (Seevers et al., 2007). These acts granted land to settlers
for use in farming and food production, which presented new challenges for farmers and increased the need for farmer education. The first American colleges were based on the British university system, and focused on classic areas of study such as ministry, medicine, law, and the arts. As American colleges expanded their scope of education to include science and education, the first schools devoted exclusively to agriculture were founded (Seevers et al., 2007).

Colleges and universities in America were originally only available to wealthy and specific groups of people (Seevers et al., 2007). To offer quality education, support from the federal government to colleges that focused on agriculture would be imperative (Sanders, 1966). Requesting aid from the federal government led to passage of the Morrill Act in 1862. Growth of land grant colleges struggled for many years, due to the fact that many farmers did not recognize immediate benefits from the colleges and did not value the non-agriculture related courses offered by the colleges (Seevers et al., 2007).

The Hatch Act of 1887 contributed to the growth and development of agricultural experiment stations, which soon became a source of information that farmers sought for knowledge. Experiment stations were required to publish periodic bulletins and reports that were made available to the public (Seevers et al., 2007).

Along with experiments stations, land grant colleges and universities sought to spread research-based knowledge through Farmer’s Institutes (Fiske, 1989). Experiment station staff conducted the institutes and traveling schools to provide information to anyone who wanted or could use it. Institutes were initially directed toward farmers, but
women and youth topics of interest were included as well. Experiment station staff taught classes, traveled throughout the state, conducted demonstrations, and wrote bulletins, reports, and newspaper and journal articles (Seevers et al., 2007).

Cooperative demonstration work was so successful that Extension agents were hired in southern states. Along with the establishment of the first Extension agents, boy’s and girl’s clubs (which are now known as 4-H clubs) were developed. Boy’s and girl’s clubs stemmed from the public school education system and sought to teach the latest agricultural practices to youth. Women’s clubs (in which demonstration work was the major method of instruction) taught farm wives domestic skills such as home sanitation, cooking, sewing, canning, beautification, and encouraging thrift. Successful field demonstrations and institutes in rural America garnered support for a national system of cooperative extension, and the Smith-Lever Act was passed in 1914 (Seevers et al., 2007).

The makeup of the American people evolved and Extension changed its delivery methods to accommodate the needs of the people it served (Vines & Anderson, 1976). When World War I began, Extension led the nation’s food production efforts by conducting educational programs promoting advancements in crop and livestock production, food preservation, and soil conservation. During the 1920’s, Extension helped organize farm cooperatives to facilitate group purchases and sales of products. During the depression era, Extension facilitated educational program discussions on economic topics resulting in rural farm families becoming more involved in public affairs at the local, state, and national level (Seevers et al., 2007).
Home economics programs were started in the 1930’s to educate people about self-sufficiency, canning, food production, and conservation. During World War II, Extension assisted with several programs such as price control and rationing, managing emergency farm labor programs, promoting increased food and fiber production, and conservation education. After World War II, Extension was challenged with expanding educational programs to include urban areas, as well as farm management, public affairs, and marketing. Major advances in agriculture and increased production capabilities that began in the 1940’s prompted the development of new programs about hybrid grain varieties, chemical pest control, new soil tillage, and conservation practices. Extension also broadened its programs to include community development and family life (Seevers et al., 2007).

Modern living and social issues resulted in new problems and challenges in the 1960’s and 1970’s. Extension expanded existing programs or developed new ones for low-income groups, minority groups, migrant workers, and urban populations. In the 1980’s economic struggles among farmers prompted a shift in Extension program delivery to focus on stress management and farm business management. Extension programs focused on environmental, social, and economic issues for personal, family, and community development in the 1990’s. Extension tried to broaden its programs to non-traditional audiences and develop programs that addressed current issues during the early 2000’s. During this time, Extension was also faced with changing its delivery methods once again due to the increased use of computers, software, and the Internet (Seevers et al., 2007).
Extension is still charged with being a source of unbiased, research based information. Efforts have been made by Extension to develop online programs and software. Extension maintains that while its delivery methods have changed to accommodate the needs and demands of the current clientele, that the basic philosophy is the same (Seevers et al., 2007).

*Online Educational Programs in Extension*

The increasing demand for distance education is driven by many factors within the CES system and has resulted in the creation of online and distance programs. A literature search revealed research regarding the attitudes and perceptions of Extension personnel and participants concerning distance education programs. Much of the literature focused on the growing demand for distance Extension education programs, the efficacy of the programs, program development, and participant attitudes toward distance delivered programs.

The fastest growing form of domestic and international education at the turn of the century was distance education (McIssac & Gunawardena, 2001). In 2009, 20 percent of all U.S. citizens, or nearly 40 million adults, obtained most of their science news from the internet (Horrigan, 2006). Electronic delivery of information has been on an upward trend for all audiences and that trend is expected to continue (Richardson, Clement, & Mustian, 1997). Therefore, it appears that Extension personnel can either accept and adopt distance education or risk becoming obsolete (Dromgoole & Boleman, 2006; Williamson & Smoak, 2005).
One challenge Extension faces, is altering the culture of the organization as it attempts to develop and deliver distance education programs. Extension educators may view this delivery method as a competitor with the traditional delivery methods fearing that lack of social and instructor presence may diminish the learning experience and therefore the quality to the program (Dromgoole & Boleman, 2006). "Higher education [including Extension education] faces the challenge of expanding the reach, quality, and effectiveness of instruction within the context of shrinking resources as well as organizing itself to serve students [Extension clientele] regardless of where they reside" (Campbell, 1995, p.73). Distance education is quickly becoming necessary for Extension to continue to deliver effective and accessible educational programs (Dromgoole & Boleman, 2006).

A Delphi study by Dromgoole and Boleman (2006) was conducted to determine what Extension educators viewed as obstacles, advantages or disadvantages when developing and implementing distance education programs. Fifty-one county and district educators, in the state of Texas, were surveyed and 43 county and district educators responded. Respondents were classified by program specialty area which included Agriculture and Natural Resources county Extension agents, Family and Consumer Sciences county Extension agents, Marine county Extension agents, Natural Resources county Extension agents, Family Consumer Science 1890 program Extension agents, district-based subject matter specialists, Extension associates, Extension program managers, and 4-H and Youth Development county Extension agents.
Round one of the study contained open ended questions that were emailed to educators in a specified Extension district. The questions addressed perceived obstacles to utilizing distance technology and delivery, perceived advantages, preferred web based models respondents wanted to have developed, and perceived disadvantages when using distance technology. Round two and subsequent rounds contained more closed-end questions that involved the use of Likert-type response scales. The Delphi method used in the study involved three rounds, so steps 3-5 were repeated once (Dromgoole & Boleman, 2006).

Round one results were used to develop a survey to assess perceptions of county- and district-based educators' related to distance education program delivery. Results of the study indicated that Extension educators in one Texas district perceived distance education to be an obstacle in being connected to clientele, difficult due to lack of required technology, difficult due to clientele’s lack of knowledge in using required technologies, difficult due to overall resistance by clientele to accept and utilize distance learning methods, and less cost efficient (Dromgoole & Boleman, 2006).

Results from this study revealed that Extension professionals perceive clientele connectivity, clientele not possessing the required technology, clientele having a lack of competency needed to access the programs, clientele being reluctant to accept distance education methods, and the costs required to develop high quality programs concerns and obstacles. Extension professionals also identified lawn, ornamental, and household gardening, general horticulture, pesticide continuing education training, beginning rancher/new landowner, and water education as topics that clientele would be most
receptive to in a distance education format. Overall the study revealed that Extension professionals feel capable and comfortable utilizing distance education methods if it matches the appropriate target audience and subject matter (Dromgoole & Boleman, 2006).

In March of 2001, Cecil and Feltes (2002) at the University of Illinois Extension delivered a series of continuing education short courses via internet and teleconferencing. The topic of the short course was insect identification in urban and agricultural environments. The educational series was an attempt by researchers to assess the audience’s acceptance of an alternative method of instruction.

The study involved a sample size of 171 clients, covering an Insect Identification series. The program encompassed a three session series delivered using distance education methods. Participants were required to take part in the first session of the series and attend a second session of their choice. Synchronous audio interaction between the instructor and participants took place and computer slides and printed materials were available for visual aids (Cecil & Feltes 2002).

Results of this study indicated a cost savings associated with using the distance delivery method. The internet connection received the lowest rating in the evaluation of the course. Participants indicated that they would be able to apply knowledge gained from the program. Researchers reported that internet connections did not hinder the participants’ ability to gain knowledge during the program. Participants in the study rated the quality of the delivery method high, indicating that the instructional format used was appropriate for the specific situation. A high rating was reported by participants
when asked about the usefulness of information presented. Conclusions drawn from this study indicate that knowledge can be gained by using distance education methods (Cecil & Feltes 2002).

Dooley, Van Laanen, and Fletcher (1999) evaluated the distance delivery of a Food Protection Management (FPM) program. Three remote sites were used in Dallas, Houston and San Antonio, Texas with the program originating from College Station, Texas. The content was delivered by three specialists. Participants were new to distance delivery so instructors began the session with an introduction and tutorial on videoconferencing. Following each presentation an activity as well as small and large group work was used to improve retention and evaluate knowledge gained.

After the program concluded, 89 participants were interviewed via telephone survey that was designed to elicit respondent views of the videoconference technology, as well as the subject matter delivered. Researchers asked questions of participants concerning the specific type of technology used in the program (Dooley, Van Laanen, & Fletcher 1999).

One conclusion from the survey was that nearly three-fourths of the respondents indicated that the distance education technology was as effective as face-to-face programs. Other favorable comments included saving money, reducing travel time, interactivity, and the ability to ask questions. Participants who did not prefer the technology indicated that delays in transmission, a feeling of an impersonal atmosphere, and discomfort and unfamiliarity with the technology as the reasons for dissatisfaction with the delivery method. Eighty-six respondents indicated that the technology should be
utilized in the future for similar training sessions. Reasons supporting the use of the delivery method were: it was economical, educational, interactive, and beneficial to a large group of people. Negative comments included the lack of comfort and impersonal nature. Another major conclusion from the evaluation was the increase in knowledge reported by participants. Respondents were asked to rate their knowledge on a scale of 1 to 5, with 1 being ‘not very knowledgeable’ and 5 ‘very knowledgeable’. Participant responses indicated an increase in knowledge due to the training (Dooley, Van Laanen, & Fletcher 1999).

A study of pork producers’ acceptance of distance education media by DeCamp, Richert, Singleton, Vines, and Slipher (2001) sought to expose producers to eight different educational media. Information was presented to pork producers at a tradeshow booth at the 1999 Indiana Pork Conference. Producers were exposed to eight types of distance education media: CD- ROM (CD), self-study manuals (SSM), video (V), multimedia kits (MMK), video conferencing (VC), e-chat rooms (CHAT), e-mail (EM), and World Wide Web (WWW). The various media were available for hands-on interaction for producers attending the tradeshow, producers were allowed to proceed through the booth and allowed all producers to see each type of media, and engage with the types they chose to use. A handout created for producers contained additional information about distance education. The handout was distributed to producers to read at their leisure. The handout provided general information about distance education, media use in distance education, and contacts for more information about distance education.
An instrument used was developed to determine the producers’ previous knowledge and use of distance education programs and whether or not they would be willing to use distance education. The survey asked about media the producers would be willing to use based on the educational media they used in the tradeshow booth. The survey asked producers to rank the media types by preference, and what if any, previous experience they had with distance education. The survey consisted of 11 questions, and was completed by 31 producers (DeCamp et al, 2001).

The media with the most previous exposure for the producers was video, which was also their highest overall preference. Producers rated the media in descending order of preference included: email, World Wide Web, and CD-ROM. Producers were willing to try most of the media in the booth, with the exception of e-chat rooms and multi-media kits (DeCamp et al, 2001).

Producers were also asked to rank face-to-face educational programs and distance education media for delivery. Resulting data showed that producers preferred live face-to-face training over distance education. Producers indicated that while they preferred face-to-face education, they realize that future modes of information sharing will be via distance education, and producers acknowledged that their questions could be adequately answered using distance education (DeCamp et al, 2001).

Producers were also asked what factors might limit them from using distance education. Four major items formed the basis of this question: technical knowledge, technical equipment, technology expense, and technology accessibility. Producers overall, did not identify any of the four components as limitations to using technology
and distance education in their personal situations. Some producers indicated that one limitation was the lack of technical equipment. Finally, producers were asked how much they would be willing to pay for distance education and most producers indicated that they prefer to have distance education delivered at no cost; however some did indicate that they would be willing to pay for distance education, but none of them would pay more than $50 (DeCamp et al, 2001).

In 2000, a specialization program for Extension agricultural field agents in Louisiana was created, that allowed agents to take five graduate-level courses in a given field of study, such as agronomy, animal science, horticulture, etc. Many of the agents would have needed to drive 3-4 hours to attend a class on the land grant university campus, so faculty made the courses available at seven different satellite locations throughout the state. Twidwell and Venuto (2004) discussed the experience of agents and instructors in a Forage Ecology and Management course taught via distance education to 30 Extension agents and their evaluation of distance education teaching and learning.

The course evaluated consisted of ten lecture sessions, two problem sets, a field trip, a group project, a mid-term, and a final exam. A course evaluation was conducted, and 90% were returned. Prior to the beginning of the course, instructors attended a technical training session, and a technician was present during the class session to assist instructors and address technical problems.

Most agents reported that the course was well organized and that the topics were well taught. Respondents suggested that it was helpful to have class notes before each
lecture. The agents agreed that the content learned in the course could and would be used on the job. The enrollees were somewhat evenly divided when asked about the effectiveness of the distance education method, although a majority indicated that they preferred traditional face-to-face classroom to the distance delivery format. Even so, most of the agents also indicated that they would take more courses offered through distance delivery.

Georgia Extension personnel encouraged all Junior and Senior 4-H members to participate in digital classroom sessions in 2012. Nineteen 4-H youth actively participated in a program delivered through digital classroom technology in order to improve their Project Achievement scores and other 4-H programs through digital club meetings. A preliminary meeting was held with participants and their parents to introduce them to the technology, provide instructions for digital classroom application use, and distribute a program schedule of meeting times. Club meetings lasted approximately one and a half hours, and included a PowerPoint® presentation, discussion, and a question-and-answer session. The titles of the workshops were Portfolio Writing, Demonstration Brainstorming, Winner's Workshop for State Congress, Wildlife Judging Team Training, and Executive Board Meetings (West, Fuhrman, Morgan, & Duncan 2012).

Participants were asked to complete a questionnaire to evaluate the effectiveness of the digital club meetings and learn ways to improve them. Feedback received from participants and their parents revealed that eighteen of the 19 digital classroom participants increased their average Project Achievement scores from the previous year.
by 11%. Seven participants produced scores that were high enough for them to advance to the State 4-H Congress competition. Extension staff that participated estimated that seven hours of travel time and 26 hours of instructional time were saved by utilizing digital classroom technology during the three month period (West et al, 2012).

A team of Extension educators teamed up with Web designers at Oregon State University (OSU) to develop an online training module for the Master Gardener program in 2002. Modules were created based on annual training program requirements, which equated to 48-66 hours of training. Developers assumed that having the training program available completely online would increase learner access, decrease classroom limitations, and reduce travel budgets for faculty (VanDerZanden, Rost, & Eckel, 2002).

Modules were made available on the Oregon State University Extension website. Module components included a glossary with a pronunciation guide, on-line quizzes for each section, an on-line discussion group, links to additional educational resources on the Web, three multimedia components, including a welcome video from the instructor, two animations, and numerous photographs and line drawings. Development of a single module required approximately 14 weeks (VanDerZanden et al., 2002).

Thirty-two new Master Gardener trainees self-selected to complete their botany training using the on-line module. Participants were given two weeks to complete the module online at their own pace. Participants received a 27 item survey at the end of the two week period. Overall, participants in the test group reported the on-line botany module was a useful training tool for the OSU Master Gardener program and that it would be a useful addition to the annual training (VanDerZanden et al., 2002).
Written comments were also requested on the survey. Respondents acknowledged that the option to complete the module at their own pace and from their home was very beneficial. Most participants did not perceive the on-line discussion group, email, and posted questions as helpful or connect them with the other learners or the course instructor. Given the successful launch of this online training module, developers planned to continue developing more modules (VanDerZanden et al., 2002).

Summary

In this chapter the research literature was summarized to describe the diffusion and adoption of innovations theory. The literature review also covered the mission and values of the Cooperative Extension Service and explained the goals and vision of the organization. Research findings and conclusions were compiled from previous studies in an attempt to describe the study. Literature was compiled, reviewed, and disseminated in an attempt to explain the factors that influence the use of online learning methods and tools by Extension personnel.

Innovation theory provides a foundation for understanding the factors that Extension educators consider in decisions about the use of online education tools. Specifically, this theory can be applied to the context of Extension personnel’s use of online learning tools and methods when delivering educational programs. Theories of adoption and diffusion of innovations were also reviewed with applications to the context of this study.
The Cooperative Extension System is a national education system that links research based information from land grant institutions, extended to serve the needs and interests of the clientele that they serve. The USDA is the federal participant, land grant colleges are the state level partners, and field staff and county offices provide services at a local level. The mission of the CES is to translate the research into applicable knowledge. Field staff and county offices transfer technology from basic and applied research to the local level. Transfer of knowledge has historically utilized face-to-face interaction, however along with technology transfer, educators are using technology to deliver education programs. Evolving demands by the Extension audience has resulted in changes in delivery methods throughout the history of the organization. While the basic values and beliefs have remained the same, program delivery methods have evolved in order for Extension to remain current and relevant.

A review of literature revealed very few studies that examined factors related to Extension educator use of online methods and tools when conducting educational programs. However, the literature review revealed several studies of factors related to higher education faculty decisions about the use of online learning methods and tools. Previous studies have been conducted about the use of distance education programs in Extension, evaluating the efficacy of such programs, participant knowledge gains, participant satisfaction, participant preference for face-to-face vs. distance education, and learner comfort and satisfaction with distance education technologies. A majority of the studies concerning Extension’s use of online programs have been from the perspective of the users, and not from an Extension administrator or educator perspective.
Studies about factors affecting the use of online learning methods and tools by faculty in higher education indicated that they perceive various barriers and motivating factors. Faculty appear to exhibit diverse attitudes and perceptions toward online learning, which influences their opinions of barriers and motivating factors, however most are receptive to the idea of increasing and continuing online learning.
Chapter 3: Methods

Introduction

Research methods and procedures used in this study are the primary focus of chapter three. This chapter presents the research questions used to guide the study and describes the research design, population and subject selection, instrumentation, data collection, and data analysis procedures. Prior to data collection; but after development of the instrument; the researcher submitted a plan outlining details of the study and all related materials to The Ohio State University Institutional Review Board (IRB). Initiation of the data collection commenced after receiving IRB approval for this study on October 9, 2012.

Purpose of the Study

The purpose of this quantitative, descriptive study was to identify factors that Ohio State University Extension (OSUE) professionals consider as they make decisions about using online tools in their educational programs. Furthermore, this study examined OSUE professionals’ experience with online tools and identified factors related to the use of online tools in their educational programs. Factors considered by Extension professionals as they make decisions about the use of online tools was neither well
known nor documented prior to this study. Online education programs are increasing in frequency and demand, and encouraged by administrators for their cost saving benefits. As OSU Extension strives to meet the growing demand for online education programs, knowing the factors related to Extension professionals’ use of online tools may influence the frequency, methods used, and reach or scope of the audience. Knowledge of the factors considered in the decision making process was prerequisite to the development of strategies to promote adoption of online tools. This study was conducted to identify factors considered by OSU Extension professionals as they made decisions about using online tools in their educational programs. The primary purpose of this study was to identify and describe factors related to Ohio Extension professionals’ use of online tools.

Research Design and Methodology

This research was a quantitative, descriptive study. The primary purpose of descriptive research is to explore and describe the status of a phenomenon. Descriptive research is commonly referred to as status studies or normative studies.

Survey research methodology was employed for data collection in this study. Survey methods have historically been used for scientific inquiry to study social and social-psychological relationships (Borg & Gall, 1979; Herriott, 1969). Survey methods may be used to collect data to develop hypotheses or to identify research problems that go beyond descriptive data.
Research Validity

Shavelson (1996) described research validity as “... the extent to which the interpretation of the results of the study follows from the study itself and the extent to which the results may be generalized to other situations with other people ...” (p. 19). Potential contaminating variables can affect internal and external validity of the research. Validity of the research can be protected by designing the research project to guard against threats to validity.

Threats to internal validity include maturation, instrumentation, experimental mortality, and implementation. Maturation error is the affect that passage of time has on respondents. This was controlled by collecting data from adults and limiting the length of the period of data collection in the study. Instrumentation error is the change in scores due to change in measurement. Instrumentation error was controlled through the use of a fixed instrument that was judged to be valid and reliable. Experimental mortality is the loss of subjects over the course of a study. Experimental mortality error was controlled in this study using approved procedures for missing data. Implementation error occurs when different individuals use different methods to implement the study. Implementation error was controlled in this study by holding the implementation process constant.
Research Questions

The following research questions were developed to guide this study:

1. To what extent do Extension professionals use online tools in conducting educational programs?
2. To what extent do Extension professionals have experience using online tools as a learner?
3. Is there a relationship between the Extension professionals’ use of online tools as a learner and as an educator?
4. What factors do Extension professionals consider in their decisions about the use of online tools in their Extension program?
5. Which factors explain the variability associated with Extension professionals’ use of online tools in their Extension program?
6. Is there a relationship between the demographic characteristics of OSU Extension professionals and their use of online tools?

Population and Sample

Extension professionals are located throughout the state of Ohio and conduct a variety of non-formal educational programs. Extension professionals who plan and conduct educational programs hold job titles of Extension Educator, Extension Specialist, Field Specialist, and Program Coordinator. The target population in this study encompassed all OSU Extension professionals who were involved in planning and conducting educational programs. There were 326 persons (see Table 1) who were
employed by OSU Extension on July 1, 2012 with job titles and duties that included planning and conducting educational programs. Names and email addresses of the 326 OSU Extension employees were obtained from OSUE Human Resources staff.

Extension Educators in Ohio are located in 88 county offices throughout the state, specializing in one of four Extension program areas labeled: Family and Consumer Sciences (FCS), 4-H Youth Development (4-H), Community Development (CD), and Agriculture and Natural Resources (ANR). Extension Specialists and Field Specialists are experts in their subject area and provide service to a region (i.e. multiple counties) or the entire state. Specialists provide technical expertise in their subject area of specialization and are located throughout the state at research stations, the OSU Columbus campus, OSU regional campuses, or county offices. Program Coordinators develop, coordinate, and conduct educational programs. Extension professionals fulfilling Program Coordinator roles are located at county offices throughout the state, often assisting county Extension educators with program delivery.
<table>
<thead>
<tr>
<th>Job Title</th>
<th>Number of Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension Educator</td>
<td>196</td>
</tr>
<tr>
<td>Extension Specialists</td>
<td>82</td>
</tr>
<tr>
<td>Field Specialists</td>
<td>13</td>
</tr>
<tr>
<td>Program Coordinator</td>
<td>35</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>326</strong></td>
</tr>
</tbody>
</table>

Figure 3.1  OSU Extension Job Titles and Number of Employees

*Instrumentation*

The data collection instrument used in this study was developed by the researcher based on a review of literature to address the research questions developed to guide the study. Items included in the instrument were developed as a result of the literature review process. The researcher secured input from a panel of experts including professionals familiar with online education and Extension professionals in refining the instrument.

*Instrument*

The data collection instrument (see Appendix A) was designed to obtain data to answer each of the research questions. Participants were asked to provide responses to instrument items involving the use of Likert-type response scales.
Items addressing the first research question were included to collect data about the extent to which OSU Extension professionals used online tools in conducting their educational programs. This section was comprised of nine items pertaining to the respondents’ prior use of online tools in delivering educational programs. Items were included to assess respondents’ experience as an educator using online tools. Online tools were organized into nine categories, with examples of tools (and/or program names) listed under each respective category. Respondents used a Likert-type response scale to report the extent of their experience using each online tool category as an educator (in which 1= Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Very Often).

Items to address the second research question asked OSU Extension professionals to report on their prior experience using online tools as a learner. Items were included to measure respondents’ experience as a learner using the same nine categories of online tools included in the previous section. Again, the online tools were organized and listed in categories, with example tools (and/or program names) listed under each respective category. Respondents were asked to use the same Likert-type response scale to report the extent of their experience using each online tool category as a learner.

Research question three was included to determine if there was a relationship between OSU Extension professionals’ use of online learning tools as a learner and as an educator. Results of this analysis was determined by computing a correlation coefficient between participant responses to items on the instrument that assessed respondents’ experience using online learning tools as a learner with their experience using online tools as an educator.
Another section of the instrument included items that Extension educators may have considered in their decisions about the use of online tools in conducting educational programs. Items included in this section were identified through the literature review. Using a Likert-type response scale, subjects were asked to provide data regarding possible barriers, inhibitors, motivators, and incentives that may have been considerations in their decisions about the use of online tools for program delivery.

Conceptually the four factors and the questions designated under each barrier were grouped based on a on a four square quadrant classification. The quadrants were labeled: (1) intrinsic, (2) extrinsic, (3) positive, and (4) negative. The Barrier factor was the extrinsic negative quadrant, the Inhibitor factor was the intrinsic negative quadrant. The Incentive factor was the extrinsic positive quadrant, and the Motivator factor was the intrinsic positive quadrant.

The survey instrument concluded with demographic items requesting data about personal and professional characteristics of respondents. Specific items included: Extension program area, years working in Extension, age, gender, geographic service area, and education level.

*Instrument Validity*

The survey instrument was presented to a panel of four experts for their review to judge content and face validity. The panel was made up of specialists with expertise in distance education, research design, Extension, and adult learning to assess the content and structure of the instrument, in order to determine if the instrument was appropriate for use with the target population. The panel of experts reviewed each item on the
instrument for face and content validity, and determined that items comprising the instrument adequately addressed the research questions guiding the study. Suggestions and recommendations received from the panel were taken into consideration in editing and refining the instrument.

Instrument validity is described as whether or not an instrument measures what it purports to measure (Ary, Jacobs, & Razavieh, 2002). Face validity is the most basic type of instrument validity, and refers to the appeal and appearance of the instrument. Face validity determines whether or not the questions appear to measure what they are supposed to be measuring. Content validity refers to the extent to which items in an instrument measures all research objectives and questions. Content validity cannot be represented numerically but is determined subjectively by a panel of experts.

Instrument Reliability

Instrument reliability refers to the consistency with which an instrument measures the phenomenon, object, or variable that the researcher intends to measure (Ary, Jacobs, & Razavieh, 2002). Reliability is referred to as “. . . the consistency or dependability of a behavioral measurement . . .” (Shavelson, 1996, p. 19). Reliability addresses the extent to which the data collected using an instrument are accurate and replicable.

Instrument reliability was assessed through a pilot test of Extension professionals, similar to those who comprised the population for this study. Extension educators employed in the University of Arkansas Cooperative Extension Service served as pilot test subjects using the data collection instrument developed for this study.
A pilot test was conducted in cooperation with the University of Arkansas Cooperative Extension Service (UAEX). Arkansas Extension professionals that fulfill job functions of planning and conducting Extension education programs (similar to the target population of Ohio Extension Professionals) were asked to complete the survey instrument for the pilot test. The data collection instrument was distributed to 155 UAEX professionals, with a response rate of 46% or 72 responses.

Instrument reliability was assessed by computing a Cronbach’s Alpha coefficient for items included in section one of the data collection instrument in which participants were asked to rate their experience using online tools, both as learners and as educators using a Likert-type scale (in which 1= Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Very Often). Cronbach’s Alpha was also used to estimate reliability for section two of the instrument which asked subjects to rate their level of agreement with each of 45 items using a Likert-type scale (in which 0 = Not Applicable, 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree).

Section one of the data collection instrument asked participants to rate their experience using online tools as a learner and consisted of nine items. Cronbach's Alpha for the nine items produced a reliability coefficient alpha of .713.

Section two of the data collection instrument which asked participants to rate their experience using online tools as an educator also consisted of nine items. Cronbach's Alpha for the nine items produced a reliability coefficient alpha of .781.

Reliability for section three of the instrument was based on participant ratings of their level of agreement with 45 items using a Likert-type response scale (coded as 0 =
Not Applicable, 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree). Items comprising section three of the data collection instrument were organized in four factor categories titled: Motivator, Incentive, Inhibitor, and Barrier. Cronbach's Alpha for the seven items comprising the Motivator category produced a reliability coefficient alpha of .766. The 24 items comprising the Incentive category produced a reliability coefficient alpha of .871. Eight items comprising the Inhibitors category produced a reliability coefficient alpha of .674. And the five items comprising the Barriers category produced a reliability coefficient alpha of .623.

A reliability coefficient of 1.0 indicates a perfect correlation. Scores below 1.0 are less reliable. An ideal coefficient is .80, but .50 to .60 may be sufficient in early stages of research (Nunnally, 1972). According to the Cronbach’s Alpha guidelines suggested by Nunnally, the survey items were judged to be in an acceptable range to support the use of the instrument in this study.

Data Collection

Approval for conducting the study was obtained from The Ohio State University Institutional Review Board (IRB) prior to initiating data collection. The data collection instrument was created by the researcher, validated by a panel of experts, and pilot tested for reliability. The instrument was administered using the SurveyMonkey® online survey administration program. SurveyMonkey® is a commercial web survey administration service enabling customers to create and administer online surveys and questionnaires, view results graphically, and download data for analysis. Email messages
were sent to the selected sample for the study asking them to indicate their preference of survey form, either online or mailed survey. This option was extended to all participants to reduce the potential for non-response bias due to a respondent's potential preference for one particular instrument format. None of the respondents requested a mailed questionnaire.

Participation in the study was completely voluntary and participants completing the survey were informed that doing so would be interpreted as implied consent to use their responses and data for research purposes. Following a protocol similar to those for a mailed survey, the researcher anticipated an equivalent response rate. Recommended steps in conducting a mailed survey for data collection starts by sending a notice to participants informing them of the forthcoming questionnaire. A pre-survey email message was sent to each subject one week prior to sending a cover letter either a paper copy or email message informing them of the purpose of the study, requesting their participation, and containing the URL link to the questionnaire. Participants receiving the email message were asked to indicate if they would prefer to complete a paper survey rather than in an electronic format online.

One week after sending the first message, a second email message with the URL link to the questionnaire was sent to the participants. The third step in the protocol was a email message reminder that reinforced the rationale for the research. A follow-up email was sent one week after the initial contact to non-respondents with an imbedded survey URL link and announcing the response deadline.
A second reminder was sent one week after the first reminder email was sent, and a final email message was sent to non-respondents as a final invitation to participate in the research project. The final reminder message was sent to announce the deadline for returning completed questionnaires.

Participants who completed the survey were assured complete confidentiality regarding the data they provided. Responses collected through the online survey were stored on a secure OSU computer server. Data collected from the online survey using SurveyMonkey® were downloaded into Statistical Package for Social Sciences (SPSS, 2012).

Variables

The dependent variable for this study was the extent to which Extension professionals used online tools in their educational programs. The Educator Use Score was computed by summing responses that each subject provided regarding their use of the nine online tool categories as educators. Educator Use Scores ranged from 9-45 and reflected the extent to which OSU Extension professionals used online tools in their educational program delivery. The lowest possible score of nine (9) indicated that the Extension professional did not use any of the nine online tool categories in their educational program delivery. The highest possible score of 45 indicated that the respondent used all nine categories of online tools very often.

Independent variables for research question three were the Extension professionals' experience using online tools as a learner. The independent variable for
research question five were the four factor categories (i.e. Motivators, Incentives, Inhibitors, and Barriers) that Extension professionals may have considered in their decisions about the use of online tools in their Extension program. Independent variables for research question six were the demographic characteristics of OSU Extension professional respondents.

Data Analysis

Research data were stored in an electronic data set for analysis using the Statistical Package for Social Sciences (SPSS, 2012). Data analysis was conducted to answer each of the six research questions developed for the study.

The first research question in this study focused on the extent to which OSU Extension professionals had conducted educational programs using online tools. Nine items on the data collection instrument requested data about the extent to which OSU Extension professionals used online tools in their Extension educational programs. Respondents were provided a list of nine online tool categories. Each online tool category was accompanied by a list of specific tool names (e.g. common names, commercial packages, programs, etc) for each respective category. Respondents were asked to report the extent to which they had experience using each online tool category as an “EDUCATOR.” A Likert-type response scale was provided for subjects to use in reporting their responses (1= never, 2= rarely, 3= sometimes, 4= often, 5= very often). The ordinal level data collected to answer this research question were summarized and
reported using frequencies and percentages; although means and standard deviations were also computed.

Campbell and Stanley (1963) suggested that it is appropriate to sum ordinal level data and then report the summated scores as interval level data. Therefore, the summated Educator Use Scores computed in this research were reported using means and standard deviations.

The second research question in this study focused on how much experience OSU Extension professionals had using online tools as learners. Respondents were again provided with a list of nine online tool categories and each category was accompanied by a list of specific tool names (e.g. common names, commercial packages, programs, etc) for each respective category. Respondents were asked to indicate the extent to which they had used each online tool category as a "LEARNER." A Likert-type response scale was used to measure the responses (1= never, 2= rarely, 3= sometimes, 4= often, 5= very often). The ordinal level data collected for the second research question were summarized and reported using frequencies and percentages; although means and standard deviations were also reported.

The third research question in this study examined the relationship between OSU Extension professionals’ use of online learning tools as learners and as educators. Relationships between the ordinal level data were determined by computing a Spearman rank order correlation coefficient. A correlation coefficient of .70 or higher, indicated a very strong association, a coefficient of .50 to .69 indicated a substantial association, a
coefficient of .30 to .49 was considered a moderate association, and a coefficient of .10 to .29 was considered a weak association (Davis, 1971).

The fourth research question sought to identify factors (i.e. motivators, incentives, barriers, and inhibitors) that OSU Extension professionals’ considered in their decisions about the use of online tools in their Extension programs. Items included in this section of the questionnaire asked subjects to respond to items (see Appendix G) classified as: motivators, incentives, barriers, and inhibitors, respectively, that may have been considered by OSU Extension professionals’ in their decision making about the use of online tools. Potential items comprising motivator, incentive, barrier, and inhibitor categories were identified from the review of the literature. Respondents were asked to indicate the extent to which they considered each item (i.e. motivators, incentives, barriers, and inhibitors) in their decision to use online tools in their Extension education program. The Likert-type response scale provided for respondents was coded as follows: 1= strongly disagree, 2= disagree, 3= indifferent, 4= agree, 5= strongly agree. The resulting ordinal level data were summarized and reported using means and standard deviations.

The fifth research question focused on identifying which, if any, of the factors (e.g. motivators, incentives, inhibitors, and barriers) explained variability associated with OSU Extension professionals use of online tools in their Extension programs. The four factors were included as a pool of potential predictor variables in a step-wise regression analysis with a priori alpha level established at the .05 level. Step-wise regression drew from the pool of independent (predictor) variables by identifying the variable that made
the largest contribution to explained variance associated with the dependent variable. Additional iterations were completed to identify additional predictor variables that would contribute to the prediction equation, on the condition that each additional independent variable explained a statistically significant portion of the variance associated with the dependent variable. The stepwise regression process was terminated when remaining predictor variables were unable to account for a statistically significant portion of the unexplained variance associated with the dependent variable.

The sixth research question focused on demographic characteristics of the respondents to determine if there was a relationship between the use of online tools and the respondents’ age, years working in Extension, gender, Extension program area, geographic service area, and level of education. Demographic characteristics were summarized and reported using frequencies and percentages for nominal and ordinal data. Means and standard deviations were reported for interval level data. Relationships between interval level demographic characteristic data and the Educator Use Score were calculated using a Spearman rank order correlation coefficient. Relationships between interval level data were calculated using a Pearson product moment correlation coefficient. Relationships between nominal and interval level data were calculated using point-biserial correlation coefficients.

Summary

This chapter presented the methods and procedures used to collect and analyze the data for the study. Survey methods were used to collect the data. A review of the
literature provided information for the researcher to develop the data collection instrument used in this study. Instrument development, validity, and reliability were discussed and explained. Data analysis methods employed to answer each research question were described and discussed in this chapter. The data collection instrument was designed to obtain responses from Extension professionals regarding their use of online tools to deliver their Extension educational programs. The instrument also solicited data from Extension professionals regarding their use of online tools, both as educators and as learners. Subject responses were analyzed to examine factors that may have been considered by Extension professionals in their decisions about the use of online tools in their educational programs. Demographic data were also collected and analyzed to determine if there was a relationship between respondent characteristics and their use of online tools.
Chapter 4: Findings

Results

This chapter presents results of the data collected and analyzed in this research. The purpose of this study was to identify factors that Ohio State University Extension (OSUE) professionals considered in their decisions regarding the use of online tools in their educational programs. Furthermore, this study examined OSUE professionals’ experience using online tools and identified factors related to the use of online tools in their educational programs. Online education programs have increased in terms of frequency and demand, and were encouraged by administrators. Knowing the factors related to Extension professionals’ use of online educational tools may promote the frequency, online methods used, and reach of the audience OSU Extension strives to meet and the growing demand for online education programs.

Knowing the factors considered in the decision making process was viewed as a necessary prerequisite to developing new strategies to promote adoption of online education tools in Extension. This study identified factors considered by OSU Extension professionals as they made decisions about using online tools in their educational programs. The primary purpose of this study was to identify and describe factors related to Ohio Extension professionals’ use of online tools.
Research questions developed to guide this study were:

1. To what extent do Extension professionals use online tools in conducting educational programs?

2. To what extent do Extension professionals have experience using online tools as a learner?

3. Is there a relationship between the Extension professionals’ use of online tools as a learner and as an educator?

4. What factors do Extension professionals consider in their decisions about the use of online tools in their Extension program?

5. Which factors explain the variability associated with Extension professionals’ use of online tools in their Extension program?

6. Is there a relationship between the demographic characteristics of OSU Extension professionals and their use of online tools?

Data Collection

Ohio State University Extension professionals who were responsible for planning and conducting educational programs comprised the target population for this research. The population included Extension professionals with job titles of Extension Educator, Extension Specialist, Field Specialist, and Program Coordinator. The Department of Human Resources for Ohio State University Extension provided a list of all employees that held the job titles specified above. Upon receipt of the list from OSUE Human Resources
Resources, the list was checked for duplicates, appropriate job titles, and a census survey was conducted using the population frame (N = 326).

On November 2, 2012, 326 Extension professionals were sent a pre-notification email message informing them that they would receive an invitation message with a URL link to access a secure online survey. Subjects were offered the option of receiving a paper version of the instrument by mail. None of the subjects requested a paper copy of the instrument. Researchers utilized the secure internet survey provider SurveyMonkey® to collect responses from subjects. On November 5, 2012, Extension professionals were sent an email invitation to participate in the study, which consisted of a cover letter and the URL link to the instrument. A total of 115 responses (35%) were received by November 12, 2012.

On November 12, 2012 subjects who had not responded were sent a reminder email notification via SurveyMonkey®. A total of 163 (50%) responses were received by November 20, 2012. On November 20, 2012, subjects who had not responded were sent the second reminder email notification via SurveyMonkey®. A total of 185 (57%) responses were received by November 28, 2012. On November 28, 2012, subjects who had not responded were sent a third reminder notification via SurveyMonkey®. A total of 198 (61%) responses were received by November 30, 2012. On November 30, 2012, the subjects who had not responded were sent a final email reminder notification via SurveyMonkey®. A total of 212 responses were received from 326 Extension professionals by December 5, 2012 for a final response rate of 65%. The data collection process was closed on December 5, 2012.
A description of the respondents was based on the data they provided (n = 212) on five demographic items. Extension professionals were asked to indicate their age within range increments of: 20-29, 30-39, 40-49, 50-59, and 60 and over. Seventy-four (34.9%) of the Extension professional respondents indicated their age was in the 50-59 range. Fifty (23.6%) of the respondents were in the 40-49 age bracket, 35 (16.5%) in the 30-39 age bracket, 30 (14.2%) in the 60 and over age bracket, and 20 (9.4%) in the 20-29 age bracket.

Fifty-seven percent (n = 121) of the Extension professional respondents were female, and 40.6% (n = 86) were male. Education level was measured by the highest level of degree held by Extension professionals included 153 (72.5%) with a masters degree, 45 (21.3%) with a Ph.D. degree, 11 (5.2%) with a bachelors degree, and 2 (0.9%) with a high school diploma.

Eighty-one (38.2%) of the Extension professionals indicated that their primary Extension program area was Agriculture and Natural Resources (ANR), 79 (37.3%) were in 4-H Youth Development (4-H), 34 (16.4%) were in Family and Consumer Sciences (FCS), and 13 (6.1%) listed Community Development (CD) as their primary Extension program area.

Extension professionals indicated that their geographic service area location averaged 61% in a rural area (SD = 33.0), 21.5% in a suburban area (SD = 22.4), and 15.6% in an urban area (SD = 23.2). The average number of years that participants had worked in Extension was 15.5 years (SD = 9.7).
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>20</td>
<td>9.4</td>
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<tr>
<td>30-39</td>
<td>35</td>
<td>16.5</td>
</tr>
<tr>
<td>40-49</td>
<td>50</td>
<td>23.6</td>
</tr>
<tr>
<td>50-59</td>
<td>74</td>
<td>34.9</td>
</tr>
<tr>
<td>60 and over</td>
<td>30</td>
<td>14.2</td>
</tr>
<tr>
<td>Gender</td>
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<tr>
<td>Male</td>
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<td>40.6</td>
</tr>
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<tr>
<td>Bachelors</td>
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<tr>
<td>Masters</td>
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<tr>
<td>PhD</td>
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<td>21.3</td>
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<td></td>
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<td>Agriculture and Natural Resources (ANR)</td>
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<td>38.2</td>
</tr>
<tr>
<td>4-H Youth Development</td>
<td>79</td>
<td>37.3</td>
</tr>
<tr>
<td>Family and Consumer Sciences</td>
<td>34</td>
<td>16.4</td>
</tr>
<tr>
<td>Community Development</td>
<td>13</td>
<td>6.1</td>
</tr>
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<table>
<thead>
<tr>
<th>Geographic service area</th>
<th>x</th>
<th>SD</th>
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<tr>
<td>Rural</td>
<td>61.00</td>
<td>33.0</td>
</tr>
<tr>
<td>Suburban</td>
<td>21.5</td>
<td>22.4</td>
</tr>
<tr>
<td>Urban</td>
<td>15.6</td>
<td>23.2</td>
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</tbody>
</table>

<table>
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<tr>
<th>Years working in Extension</th>
<th>( \bar{x} )</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15.5</td>
<td>9.7</td>
</tr>
</tbody>
</table>

Table 4.1 Demographic Characteristics of OSU Extension Professional Respondents

**Results for Research Question One**

The first research question asked participants to identify the extent to which they (as Extension professionals) used online tools as an educator in conducting their educational programs. Online tools were organized into nine categories on the
instrument, with examples of tools (and sample program names) listed under each respective category. A Likert-type response scale was provided for subjects to use in reporting their responses (1= never, 2= rarely, 3= sometimes, 4= often, 5= very often). The ordinal level data collected for this research question were reported using frequencies, percentages, although means and standard deviations were also reported.

The Educator Use Score was computed for this research by summing the responses provided by each subject regarding their use of each of the nine online tool categories as educators. Educator Use Scores could potentially have ranged from 9-45 and were used as a measure of the extent to which OSU Extension professionals' used online tools in their educational program delivery. The lowest possible Educator Use Score of nine (9) indicated that the Extension professional did not use any of the nine online tool categories in their educational program delivery. The highest possible Educator Use Score of 45 indicated that the respondent used all nine categories of online tools very often in their educational program. Educator Use Scores were summarized and reported using means and standard deviations.

The top three online tools used by Extension professionals in conducting their educational programs were communication tools ($\bar{x} = 4.25$, $SD = 1.09$), Conferencing tools ($\bar{x} = 3.40$, $SD = 1.03$), and Social Media tools ($\bar{x} = 3.11$, $SD = 1.03$). Online tools used the least by OSU Extension professionals in their educational program delivery were Audio tools ($\bar{x} = 2.20$, $SD = 1.19$), Course Management Systems ($\bar{x} = 2.11$, $SD = 1.33$), and Website Design tools ($\bar{x} = 1.77$, $SD = 1.08$) (see Table 4.2).
<table>
<thead>
<tr>
<th>Online Tool Category</th>
<th>Never (n/%)</th>
<th>Rarely (n/%)</th>
<th>Sometimes (n/%)</th>
<th>Often (n/%)</th>
<th>Very Often (n/%)</th>
<th>$\bar{x}^a$</th>
<th>SD</th>
</tr>
</thead>
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<tr>
<td>Communication Tools</td>
<td>6/2.8</td>
<td>16/7.5</td>
<td>19/9.0</td>
<td>44/20.8</td>
<td>121/57.1</td>
<td>4.25</td>
<td>1.09</td>
</tr>
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<td>Conferencing Tools</td>
<td>19/9.0</td>
<td>34/16.0</td>
<td>51/24.1</td>
<td>61/28.8</td>
<td>43/20.3</td>
<td>3.40</td>
<td>1.03</td>
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<td>Social Media</td>
<td>34/16.0</td>
<td>36/17.0</td>
<td>53/25.0</td>
<td>40/18.9</td>
<td>43/20.3</td>
<td>3.11</td>
<td>1.36</td>
</tr>
<tr>
<td>Survey/Polling/Testing/Assessment/Evaluation</td>
<td>35/16.5</td>
<td>41/19.3</td>
<td>62/29.2</td>
<td>38/17.9</td>
<td>32/15.1</td>
<td>2.96</td>
<td>1.29</td>
</tr>
<tr>
<td>Images (still photos &amp; digital)</td>
<td>61/28.8</td>
<td>40/18.9</td>
<td>52/24.5</td>
<td>33/15.6</td>
<td>22/10.4</td>
<td>2.59</td>
<td>1.34</td>
</tr>
<tr>
<td>Video (creating and sharing)</td>
<td>53/25.0</td>
<td>72/34.0</td>
<td>58/27.4</td>
<td>15/7.1</td>
<td>9/4.2</td>
<td>2.30</td>
<td>1.65</td>
</tr>
<tr>
<td>Audio</td>
<td>71/33.5</td>
<td>66/31.1</td>
<td>42/19.8</td>
<td>13/6.1</td>
<td>15/7.1</td>
<td>2.20</td>
<td>1.19</td>
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<tr>
<td>Course Management System</td>
<td>95/44.8</td>
<td>51/24.1</td>
<td>25/11.8</td>
<td>16/7.5</td>
<td>20/9.4</td>
<td>2.11</td>
<td>1.33</td>
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<tr>
<td>Website Design</td>
<td>115/54.2</td>
<td>52/24.5</td>
<td>18/8.5</td>
<td>14/6.6</td>
<td>7/3.3</td>
<td>1.77</td>
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<tr>
<td>Educator Use Score $^b$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24.52</td>
<td>6.60</td>
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</table>

$^a$ Note: Scale: 1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = very often

$^b$ Educator Use Score was the sum of each respondent’s data for the nine categories of online tools ranging from 9-45.

Table 4.2 Means and Standard Deviations for OSU Extension Professionals’ Use of Online Tool Categories as an Educator. (n = 212)
Educator Use Score was computed as a composite measure of the use of the nine online tool categories by Extension professionals in conducting their educational programs. The lowest possible Educator Use Score of 9 indicated no use of online tools, and the highest possible Educator Use Score of 45 indicated that all nine of the online tool categories were used very often. The average Educator Use Score (EUS) was 24.5 (SD = 6.60). One respondent produced an EUS score of nine reflecting no use of online tools in their Extension program, and one respondent produced a score of 45, indicating that they used all nine categories of online tools very often in their educational program.

Based on the range of possible Educator Use Scores from 9-45, the mean score of all respondents was 24.5, which was slightly below the midpoint (i.e. 27) of the scale range of 9 to 45. Approximately two-thirds (i.e. 67%) of the subjects were encompassed within ± one standard deviation of the mean, resulting in a range of Educator Use Scores from 17.9 – 31.1. Furthermore, ± 2 standard deviations from the mean ranged from 11.3 – 37.7 on the scale and encompassed approximately 95% of all respondents.
Results for Research Question Two

Research question two asked participants to report on their use of online tools as a learner. Subjects were asked to identify their use of the same nine categories of online tools assessed in research question one. Again, the online tools were organized and listed in categories, with specific tools (and sample program names) listed for each respective category. For each respondent, a response of *Never* was coded with a score of one, *Rarely* was coded with a score of two, *Sometimes* was coded with a score of three, *Often* was coded with a score of four, and *Very Often* was coded with a score of five.

The most frequently used online tools by OSU Extension professionals as a learner were Communication Tools ($\bar{x} = 4.44$, $SD = 0.92$), Conferencing Tools ($\bar{x}$ of 3.72, $SD = 0.96$), and Survey/Polling/Testing/Assessment/Evaluation tools ($\bar{x} = 3.40$, $SD =$
1.03), and Social Media ($\bar{x} = 3.16$, $SD = 1.24$). The least frequently used online tools by OSU Extension professionals as a learner were Images ($\bar{x} = 2.71$, $SD = 1.28$), Audio ($\bar{x} = 2.51$, $SD = 1.08$), Video tools ($\bar{x} = 2.49$, $SD = 1.07$), Course Management System tools ($\bar{x} = 2.43$, $SD = 1.25$), and Website Design tools ($\bar{x} = 1.70$, $SD = 0.99$).
<table>
<thead>
<tr>
<th>Online Tool Category</th>
<th>Never (n/%)</th>
<th>Rarely (n/%)</th>
<th>Sometimes (n/%)</th>
<th>Often (n/%)</th>
<th>Very Often (n/%)</th>
<th>$\bar{x}^a$</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Tools</td>
<td>3/1.4</td>
<td>9/4.2</td>
<td>18/8.5</td>
<td>43/20.3</td>
<td>136/64.2</td>
<td>4.44</td>
<td>0.92</td>
</tr>
<tr>
<td>Conferencing Tools</td>
<td>5/2.4</td>
<td>16/7.5</td>
<td>56/26.4</td>
<td>91/42.9</td>
<td>44/20.8</td>
<td>3.72</td>
<td>0.96</td>
</tr>
<tr>
<td>Survey/Polling/Testing/Assessment/Evaluation</td>
<td>8/3.8</td>
<td>30/14.2</td>
<td>75/35.4</td>
<td>65/30.7</td>
<td>32/15.1</td>
<td>3.40</td>
<td>1.03</td>
</tr>
<tr>
<td>Social Media</td>
<td>22/10.4</td>
<td>44/20.8</td>
<td>61/28.8</td>
<td>47/22.2</td>
<td>38/17.9</td>
<td>3.16</td>
<td>1.24</td>
</tr>
<tr>
<td>Images (still photos &amp; digital)</td>
<td>45/21.2</td>
<td>52/24.5</td>
<td>57/26.9</td>
<td>33/15.6</td>
<td>24/11.3</td>
<td>2.71</td>
<td>1.28</td>
</tr>
<tr>
<td>Audio</td>
<td>34/16.0</td>
<td>83/39.2</td>
<td>57/26.9</td>
<td>25/11.8</td>
<td>12/5.7</td>
<td>2.51</td>
<td>1.08</td>
</tr>
<tr>
<td>Video (creating and sharing)</td>
<td>41/19.3</td>
<td>70/33.0</td>
<td>69/32.5</td>
<td>21/9.9</td>
<td>11/5.2</td>
<td>2.49</td>
<td>1.07</td>
</tr>
<tr>
<td>Course Management System</td>
<td>61/28.8</td>
<td>58/27.4</td>
<td>50/23.6</td>
<td>25/11.8</td>
<td>17/8.0</td>
<td>2.43</td>
<td>1.25</td>
</tr>
<tr>
<td>Website Design</td>
<td>117/55.2</td>
<td>57/26.9</td>
<td>23/10.8</td>
<td>7/3.3</td>
<td>6/2.8</td>
<td>1.70</td>
<td>0.99</td>
</tr>
</tbody>
</table>

$^a$Note. Scale: 1=never, 2=rarely, 3=sometimes, 4=often, and 5=very often.

Table 4.3 Means and Standard Deviations for OSU Extension Professionals’ Use of Online Tool Categories as a Learner. (n = 212)
Results for Research Question Three

The third research question in this study examined the relationship between OSU Extension professionals’ use on online learning tools as learners and as educators. Relationships between respondents’ use of online tools, as learners and as educators, were measured by computing Spearman rank order correlation coefficients between each of the nine online tool categories addressed in research questions one and two. Using the Davis (1971) convention, a correlation coefficient of .70 or higher, indicated a very strong association; a coefficient of .50 to .69 indicated a substantial association; a coefficient of .30 to .49 was considered a moderate association, and a coefficient of .10 to .29 was considered a weak association.

Each pair-wise relationship was highly significant (p. < .01). Very strong correlation coefficients were calculated between educators and learners for the online tools Images (r = .790) and Website Design (r = .709). Substantial correlation coefficients in descending order between educators and learners were Social Media (r = .695), Audio (r = .617), Survey/Polling/Testing/Assessment/Evaluation (r = .589), Video (r = .570), Course Management System (r = .547), and Conferencing Tools (r = .508). Communication Tools (r = .421) was the only correlation coefficient that exhibited a moderate association between OSU Extension professionals use of online tools as learners and educators.

Significant non-pair-wise relationships were also found between many of the tools used as educators and learners some of the stronger relationships were between Course Management System as an Educator and Website Design as a Learner (r = .411); Images
as an educator and Website Design as a learner (r = .382); Social Media as an educator and Survey/Polling/Testing/Assessment/Evaluation as a learner (r = .379); Audio as an educator and Video as a learner (r = .347); Social Media as an educator and Conferencing Tools as a learner (r = .341); Website Design as an educator and Video as a learner (r = .338); Images as an educator and Audio as a learner (r = .323); Website Design as an Educator and Course Management as a learner (r = .319); Audio as an educator and Images as a learner (r = .316); Video as an educator and Website Design as a learner (r = .311); Images as an Educator and Survey/Polling/Testing/Assessment/Evaluation as a learner (r = .302); and Images as an educator and Social Media as a learner (r = .300).

<table>
<thead>
<tr>
<th>LEARNER</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.508**</td>
<td>.341**</td>
<td>.241**</td>
<td>.138</td>
<td>.148*</td>
<td>.190**</td>
<td>.189**</td>
<td>.070</td>
<td>.321**</td>
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<tr>
<td>2</td>
<td>.182**</td>
<td>.695**</td>
<td>.282**</td>
<td>.275**</td>
<td>.300**</td>
<td>.198**</td>
<td>.214**</td>
<td>.038</td>
<td>.197**</td>
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<tr>
<td>3</td>
<td>.122</td>
<td>.163**</td>
<td>.421**</td>
<td>.062</td>
<td>.110*</td>
<td>.170*</td>
<td>.054</td>
<td>-.019</td>
<td>.104</td>
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<tr>
<td>4</td>
<td>.168*</td>
<td>.329**</td>
<td>.061</td>
<td>.570**</td>
<td>.286**</td>
<td>.347**</td>
<td>.338**</td>
<td>.292**</td>
<td>.241**</td>
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<tr>
<td>5</td>
<td>.156*</td>
<td>.237**</td>
<td>.124</td>
<td>.295**</td>
<td>.790**</td>
<td>.316</td>
<td>.297**</td>
<td>.229**</td>
<td>.202**</td>
</tr>
<tr>
<td>6</td>
<td>.163*</td>
<td>.187**</td>
<td>.178*</td>
<td>.277**</td>
<td>.323**</td>
<td>.617**</td>
<td>.209**</td>
<td>.177*</td>
<td>.146*</td>
</tr>
<tr>
<td>7</td>
<td>.060</td>
<td>.185**</td>
<td>.030</td>
<td>.311**</td>
<td>.382**</td>
<td>.232**</td>
<td>.709**</td>
<td>.411**</td>
<td>.224**</td>
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<tr>
<td>8</td>
<td>.089</td>
<td>.199**</td>
<td>.136</td>
<td>.292**</td>
<td>.249**</td>
<td>.114</td>
<td>.319**</td>
<td>.547**</td>
<td>.291**</td>
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<tr>
<td>9</td>
<td>.270**</td>
<td>.379**</td>
<td>.284**</td>
<td>.262**</td>
<td>.302**</td>
<td>.257**</td>
<td>.246**</td>
<td>.252**</td>
<td>.589**</td>
</tr>
</tbody>
</table>

a Note: 1 = Conferencing Tools, 2 = Social Media, 3 = Communication Tools, 4 = Video, 5 = Images, 6 = Audio, 7 = Website Design, 8 = Course Management System, 9 = Survey/Polling/Testing/Assessment/Evaluation.
* significant at p < .05
** significant at p < .01

Table 4.4 Relationship Between OSU Extension Professionals’ Use of Online Tools as a Learner and as an Educator.
Results for Research Question Four

The fourth research question asked OSU Extension professionals to identify factors that they considered in their decisions about the use of online tools in their Extension programs. Participants were asked to indicate their responses using a Likert-type response scale. Responses to the items comprising for each of the four factors were coded: Not Applicable as a zero, Strongly Disagree as a one, Disagree as a two, Indifferent as a three, Agree as a four, and Strongly Agree as a five. Not Applicable responses were treated as missing values. Missing values were replaced with the mean scores computed for the remaining items in the factor. Factors means were calculated by averaging the responses for the items comprising each factor.

Collectively, respondents indicated that when choosing to use online tools in their Extension educational programs that they were Indifferent with regard to each of the four factors. Means and standard deviations for the four factors in rank order were: Incentive ($\bar{x} = 3.14$, SD = 0.52), Motivator ($\bar{x} = 3.11$, SD = 0.74), Barrier ($\bar{x} = 3.03$, SD = 0.78), and Inhibitor ($\bar{x} = 2.70$, SD = 0.75).

<table>
<thead>
<tr>
<th>Factor</th>
<th>$\bar{x}$</th>
<th>SD</th>
<th>N of items</th>
<th>N of respondents</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incentive</td>
<td>3.14</td>
<td>0.52</td>
<td>24</td>
<td>187</td>
<td>.854</td>
</tr>
<tr>
<td>Motivator</td>
<td>3.11</td>
<td>0.74</td>
<td>7</td>
<td>199</td>
<td>.750</td>
</tr>
<tr>
<td>Barrier</td>
<td>3.03</td>
<td>0.78</td>
<td>4</td>
<td>203</td>
<td>.650</td>
</tr>
<tr>
<td>Inhibitor</td>
<td>2.78</td>
<td>0.75</td>
<td>7</td>
<td>200</td>
<td>.724</td>
</tr>
</tbody>
</table>

Table 4.5 Means, Standard Deviations, and Reliability of Factors OSU Extension Professionals Considered in Their Decision to Use Online Tools.
Based upon the literature review, the data collection instrument was organized in four factor categories: Motivators, Incentives, Barriers, and Inhibitors (defined in chapter 1). Cronbach's alpha for the seven items comprising the Motivator factor category produced a reliability coefficient of .750. The 24 items comprising the Incentive factor category produced a reliability coefficient of .854. Seven items comprising the Inhibitors factor category produced a reliability coefficient of .724. And the four items comprising the Barriers factor category produced a reliability coefficient of .650. Two items were eliminated and not considered in determining reliability. One item was removed from the Inhibitors category and one item was removed from the Barriers category.

Results for Research Question Five

The fifth research question focused on identifying which, if any, of the factors (i.e. Motivators, Incentives, Inhibitors, and Barriers) explained a significant portion of the variance associated with OSU Extension professionals’ use of online tools in their educational programs.

Stepwise regression was performed to explain variability associated with OSU Extension professionals’ use of online tools in their educational programs that was accounted for by each factor. Stepwise regression produced a constant value of 15.45. The first iteration (i.e. step one) introduced the Motivator factor with a beta value of 2.03. The beta value is a weighted measure of the strength of the factor in explaining variance in the Educator Use Score. The Motivator factor had an R value of .351 and an R² value of .123 which is the proportion of variance associated with the Educator Use score that
was explained by the Motivator factor. Motivator factor in step one produced a significant F value of 29.50 with a p value of .001.

Step two added the Inhibitor factor to explain the variance associated with OSU Extension professionals use of online tools in their educational programs. Step two revealed a beta value of -1.91. The Inhibitor factor had an R value of .399 and an R² value of .159 explaining 15.9% of the variance associated with the Educator Use Score using the combination of Motivator and Inhibitor factors. The additional explained variance due to the introduction of the Inhibitor factor was 3.6%. Inhibitor factor in step two produced a significant F value of 8.99 with a p value of .003.

Step three added the Incentive factor to the Motivator factor and Inhibitor factor. Step three revealed a beta value of 2.56 for the Incentive factor to explain the variability in the Educator Use Score. Step three had an R value of .425 and an R² of .180. The additional explained variance due to the introduction of the Incentive factor was 2.1%. Incentive factor in step three produced a significant F value of 5.33 with a p value of .022. The Barrier factor was not significant and therefore was not included in the analysis as it did not contribute significantly to the prediction model.
Variables | B  | R    | $R^2$ | F   | p   
---|---|---|---|---|---
Constant | 15.45 |  
Motivators | 2.03 | .351 | .123 | 29.50 | .001 
+ Inhibitors | -1.91 | .399 | .159 | 8.99 | .003 
+ Incentives | 2.56 | .425 | .180 | 5.33 | .022 

Note: Standard error = 5.95  Adjusted $R^2 = .169$

Table 4.6 Stepwise Regression Analysis of Factors Considered by OSU Extension Professionals Concerning Their Decision to Use Online Tools.

Results for Research Question Six

The sixth research question focused on demographic characteristics of the respondents to determine if there was a relationship between the use of online tools and the respondents’ age, years working in Extension, gender, Extension program area, geographic service area, and level of education.

Spearman rank correlation coefficients were used to determine if there was a relationship between the use of online tools and the respondents’ demographic characteristics of age, and level of education. Pearson product moment correlation coefficients were used to determine if there was a relationship between the use of online tools and respondents demographic characteristics of geographic location and years of working in Extension. Point biserial correlation coefficients were used to determine if there was a relationship between the use of online tools and the respondents’ demographic characteristics of gender and Extension program area.

Using the Davis (1971) convention a correlation coefficient of .70 or higher, indicated a very strong association, a coefficient of .50 to .69 indicated a substantial
association, a coefficient of .30 to .49 was considered a moderate association, and a coefficient of .10 to .29 was considered a weak association. The relationship between age and Educator Use Score was a negative and significant. The negative correlation indicated that the lower the age or younger the Extension professional the more they tend to use online tools in their educational programs. Inversely the higher the age or older the Extension professional the less likely they were to use online tools in their educational programs.

The relationship between the respondents’ age and number of years worked in Extension and their Educator Use Score were both negative, and the only two statistically significant correlations. The negative correlation indicated that as the respondents’ age and number of years worked in Extension increased the Educator Use Score decreased. Similarly, the negative correlation indicates that younger and less experienced Extension professionals reported more extensive use of online tools in their educational program delivery.
<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>Educator Use Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Age</td>
<td>205</td>
</tr>
<tr>
<td>Sex</td>
<td>203</td>
</tr>
<tr>
<td>Education level</td>
<td>207</td>
</tr>
<tr>
<td>Predominant Extension program area:</td>
<td></td>
</tr>
<tr>
<td>Agriculture and Natural Resources</td>
<td>203</td>
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<tr>
<td>4-H Youth Development</td>
<td>203</td>
</tr>
<tr>
<td>Family and Consumer Sciences</td>
<td>203</td>
</tr>
<tr>
<td>Community Development</td>
<td>203</td>
</tr>
<tr>
<td>Geographic service area:</td>
<td></td>
</tr>
<tr>
<td>Rural Area</td>
<td>208</td>
</tr>
<tr>
<td>Suburban Area</td>
<td>207</td>
</tr>
<tr>
<td>Urban Area</td>
<td>208</td>
</tr>
<tr>
<td>Years working in Extension</td>
<td>202</td>
</tr>
</tbody>
</table>

<sup>a</sup>Correlation coefficient between Educator Use Score and demographic characteristic.

Table 4.7 Demographic Information Correlated With the Use of Online Tools Among OSU Extension Professionals.

**Key Findings**

Based on the results of this study the following key findings were revealed:

- Communication tools were the most often used online tool by Extension professionals in their educational programs.
- Website design tools were the least often used online tool by Extension professionals in their educational programs.
- The average Educator Use Score indicated that Extension professionals’ use online tools in their education programs Rarely to Sometimes.
- OSU Extension professionals’ composite use of online tools as educators ranged from none to very often in their educational program.
• Communication tools were the most often used online tool by Extension professionals as learners.

• Website Design tools were the least often used online tools by Extension professionals as learners.

• OSU Extension professionals’ use scores were higher as learners than as educators for most online tool categories.

• Imaging tools produced the strongest relationship between Extension professional’s use of online tools as educators and as learners.

• Communication tools produced the weakest relationship between Extension professional’s use of online tools as educators and as learners.

• Incentives were the highest rated factor considered by Extension professionals in their decisions about the use of online tools in their educational programs.

• Barriers were the lowest rated factor considered by Extension professionals in their decisions about the use of online tools in their educational programs.

• The Motivator factor explained the most variance associated with the use of online tools by OSU Extension professionals in their educational programs. Inhibitor and Incentive factors also explained a significant proportion of the variance.

• The Barrier factor did not explain a significant proportion of the variance associated with the use of online tools by OSU Extension professionals in their educational programs.
• Age and years of working in Extension were negatively correlated with the OSU Extension Educator Use Score.
• Demographic characteristics of sex, education level, Extension program area, and geographic service area were not correlated with OSU Extension professionals use of online tools in their education programs.

Summary

Findings based upon the data collected and analyzed in this study were presented and summarized in this chapter. Six research objectives provided the framework for this research. The findings were presented in the order of the six research questions. Findings related to the use of online tools by Extension professionals in their educational programs, the use of online tools by Extension professionals as learners, factors related to Extension professionals’ use of online tools in their educational programs, and the demographic characteristics of Extension professionals were examined and reported in this chapter. Educator Use Scores were calculated to measure the use of online tools by Extension professionals in conducting their educational programs. Correlation coefficients were calculated to measure relationships between Extension professionals’ use of online tools in their educational programs and their use of online tools as learners. Factors considered by Extension professionals in their decision about the use of online tools in their educational programs were also examined. The predictor value of the four factor categories in explaining the variance associated with Extension professionals’ use of online tools in their educational programs was determined using regression analysis.
Demographic characteristics were examined, a profile of the respondents developed, and the relationship between demographic characteristics and Extension professionals’ use of online tools in their educational programs was determined.
Chapter 5: Discussion

Introduction

This chapter provides an overview of the results of this research. Key findings are presented and discussed in the context of the existing knowledge base. Conclusions, implications, and recommendations are also presented. This chapter concludes with suggestions for further research and a summary.

Overview

The development of computers and the Internet have been two of the most significant cultural impacts of the 20th century (Ensmenger, 2012). People use computers and access the internet for news and information on a daily basis. People access the internet as well seeking information for their school, work, and personal knowledge. Demand for online education programs has also grown, along with the number of learning opportunities and courses offered in an online environment (Sloan Consortium, 2011). Meeting the growing demand for online information requires that Extension adopt and implement online education programs in order to reach a broad audience and accomplish the goals and objectives of the organization (King & Boehlje, 2000). Extension administrators have encouraged the use of online tools for Extension program delivery for many reasons, some related to budget constraints and cutbacks. Support for
online education programs, technologies, and training are justified based upon reports of more cost effective delivery compared to face-to-face programs (Cecil & Feltes, 2002).

Online delivery may also enhance the effectiveness and accessibility of Extension programs in the face of challenges to become more efficient and relevant (Campbell, 1995). Potentially, one of the most challenging aspects of developing online education programs for Extension administrators may be resistance to cultural change within the Extension system. Extension professionals may view the shift toward online program delivery as a potential threat to program quality. Extension professionals may also perceive that without face-to-face contact, the learning experience will be less effective. Furthermore, losing direct and personal contact might contribute to reduced satisfaction among the target audience, which in turn could negatively impact the perceived quality of educational programs delivered by Extension professionals.

The purpose of this study was to identify factors (i.e. collectively barriers, inhibitors, motivators, and incentives) that were related to Extension professionals’ use of online tools for program delivery. OSU Extension professionals who plan and conduct educational programs and held job titles of Extension Educator, Extension Specialist, Program Specialist, Field Specialist, Program Manager, and Program Coordinator, comprised the population frame. A data collection instrument was developed by the researcher for this study. Data collection was completed using the SurveyMonkey® online survey administration service. The data collection process generated 212 usable responses for an overall response rate of 65% (n = 212). The SPSS statistical program was used to analyze the data. Results of the study were presented in Chapter 4 to address
six research questions developed to guide this research. Based on those results, fifteen key findings were revealed as follows:

- Communication tools were the most often used online tool by Extension professionals in their educational programs.
- Website design tools were the least often used online tool by Extension professionals in their educational programs.
- The average Educator Use Score indicated that Extension professionals use online tools in their education programs rarely to sometimes.
- OSU Extension professionals’ composite use of online tools as educators ranged from none to very often in their educational program.
- Communication tools were the most often used online tool by Extension professionals as learners.
- Website Design tools were the least often used online tools by Extension professionals as learners.
- OSU Extension professionals’ use scores were higher as learners than as educators for most online tool categories.
- Imaging tools revealed the strongest relationship between Extension professionals’ use of online tools as educators and as learners.
- Communication tools revealed the weakest relationship between Extension professionals’ use of online tools as educators and as learners.
- Incentives were the highest rated factor considered by Extension professionals in their decisions about the use of online tools in their educational programs.
• Barriers were the lowest rated factor considered by Extension professionals in their decisions about the use of online tools in their educational programs.

• The Motivator factor explained the most variance associated with the use of online tools by OSU Extension professionals in their educational programs. Inhibitor and Incentive factors also explained a significant proportion of the variance.

• The Barrier factor did not explain a significant proportion of the variance associated with the use of online tools by OSU Extension professionals in their educational programs.

• Age and years of working in Extension were negatively correlated with the OSU Extension Educator Use Score.

• Demographic characteristics of sex, education level, Extension program area, and geographic service area were not related to OSU Extension professionals’ use of online tools in their education programs.

Discussion

Analysis of the data revealed that Communication tools were the most often used online tools by OSU Extension professionals in conducting their educational programs. Respondents reported using Communication tools more often as educators than any other online tool category. Examples of Communication tools included email, text messaging, Skype, and MSN messenger. Online tools such as these were likely used on a daily basis.
for communication, not only in OSU Extension professionals’ educational programs, but also in their professional communications and personal lives.

The next two most frequently used tool categories by OSU Extension professionals in their educational programs were Conferencing tools and Social Media tools. The Conferencing tool category included programs that Extension used internally to conduct meetings in order to reduce travel costs. Conferencing programs were also widely used and easily accessible in Extension for professional development programs. Extension professionals also had access to these programs to use as a resource in order to fulfill their job duties.

Social Media has experienced increased use and has evolved in the form of many different programs over the past decade. Much like Communication tools and Conferencing tools; Social Media tools can be used for educational programs, in addition to other professional activities and personal use. Using online tools for activities other than educational programs may contribute to a sense of familiarity and comfort level supporting the use of Social Media tools in OSU Extension professionals’ educational programs.

Website Design tools were the least used online tools by OSU Extension professionals in conducting their educational programs. Examples of Website Design tools included: KomPozer, SeaMonkey Composer, Adobe Muse, and Dreamweaver; although there are many other website design programs available commercially. However, while website design programs have become more user-friendly in recent years, they may still be perceived as difficult to master and time consuming to use.
Audio tools such as Audacity, Gabcast, Impatica, Podomatic, and Microsoft Media Player were identified as the next least frequently used online tool category. This finding could be due to the perception that some respondents may have perceived online educational formats to be primarily text based.

The third least frequently used online tool category by OSU Extension professionals in their educational programs was Course Management System. Course Management Systems have become relatively accessible in university systems, but they are generally used for online academic courses, rather than informal educational programs. Course Management Systems are generally designed to support formal course work and activities, although modifications can be made to adapt them to informal learning contexts.

The Educator Use Score (EUS) was calculated as a measure of Extension professionals’ use of online tools in conducting their educational programs. The mean EUS ($\bar{x} = 24.5$) was slightly below the midpoint of the response scale (i.e. 27). Extension professionals’ EUS reflected a normal, bell-shaped distribution with individual respondent scores ranging from the minimum score of nine to the maximum score of forty-five. Therefore, Extension professionals’ use of online tools in their educational programs spanned the full range from never to very often for all nine tool categories. One tool category (i.e. Communication tools) received a rating between often and very often; however, viewing the use of online tools collectively; OSU Extension professionals rarely to sometimes used online tools for educational program delivery.
Communication tools were the most frequently used online tools by OSU Extension professionals as learners, as well as educators. Again, the prior use of Communication tools by OSU Extension professionals may not have been limited to educational purposes, but may have also been for personal and professional communication. Learners may have been expected to use Communication tools to correspond with their instructors and fellow learners in an online environment, because face-to-face contact is limited for most online courses.

Conferencing tools were the second most frequently used online tool category. Extension professionals may have used Conferencing tools as learners due to the fact that much like Communication tools, Conferencing tools have been used more frequently as a means of communicating within the university environment. Although online learning environments lack face-to-face interaction, Conferencing tools allow learners to correspond synchronously using voice, video, and text. These formats differ from the text-based communication associated with many other online tools.

Survey/polling/testing/assessment/evaluation was the third most frequently used online tool category for OSU Extension professionals as learners. This could be because academic course instructors have learned to assess learning and secure feedback in an online learning environment similar to a face-to-face classroom. Survey/polling/testing/assessment/evaluation programs provide learners the opportunity to complete learning assessments without requiring travel to campus or a testing center to complete course assessments. Such online tools may also have been used by Extension
professionals participating in and responding to surveys and polls similar to the method of data collection used in this study.

Website Design tools were the least frequently used online tool category by OSU Extension professionals as learners. As learners, Extension professionals were less likely to have used Website Design tools because they were not the ones conveying information, but the ones receiving information. Although, some formal course instructors may require learners to develop a website for an assignment or project, website design may not have been a common activity for most learners unless they were enrolled in a communications or public relations course.

Course Management System tools were the second least frequently used tool category by OSU Extension professionals as learners. Course Management System tools are generally used in online learning environments in higher education. Many OSU Extension professionals may have completed their undergraduate and graduate degree programs before Course Management System tools were introduced at the college level. However, younger Extension professionals were more likely to have experienced Course Management Systems as learners than older, more experienced Extension professionals.

Online tool use scores were higher in each category for OSU Extension professionals’ as learners than as educators (with the exception of Website Design tools). This suggests that OSU Extension professionals used online learning tools to a greater extent as learners than they did as educators. Most tool categories were ranked in the same relative order as a learner and as an educator. Communication tools and Conferencing tools were the most frequently used by learners and educators. Website
Design tools and Course Management System tools were the least frequently used tool categories by learners and educators. Images tools were the fifth most frequently used online tool category by Extension professionals as a learner and an educator.

The similarity in rankings suggests that while there may be a slight difference in the extent of use of each category between learners and educators; online tools used by Extension professionals as learners is clearly related to online tools used as educators. Learners may experience the use of online tools more often than educators in order to complete course requirements. However, the similarity in the ranking of online tool use corroborates the strength of the relationship between online tools used as a learner and as an educator.

Imaging tools produced the strongest relationship between OSU Extension professionals’ use of online tools as educators and as learners. This indicates that if Extension professionals used Imaging tools as a learner they were quite likely to use Imaging tools as an educator. Imaging tools were not reported as a frequently used tool category, and were ranked as the fifth most often used online tool category by Extension professionals as learners and as educators. However, Extension professionals indicated they used Imaging tools only slightly more often as learners than as educators. This slight difference might suggest that learners’ use of Imaging tools is closely tied to educators use of Imaging tools in delivering their educational programs. Video and photographic images have become popular and easy-to-use, based upon access to sources such as Google Images, and YouTube videos.
Communication tools revealed the weakest relationship between OSU Extension professionals’ use of online tools as educators and as learners. Communication tools were rated as the most frequently used online tool category for Extension professionals as both educators and learners. A weak relationship between educator and learner use for this online tool category could indicate that the specific tools listed in the Communication tools category were commonly used by Extension professionals, regardless of the role in which they were used. Online tools comprising the Communication tool category were used often to very often by Extension professionals as learners and educators.

Incentives were the highest rated factor considered by OSU Extension professionals in their decisions regarding the use of online tools in their educational programs. In chapter one Incentives were defined (for the purpose of this study) as extrinsic considerations that prompt Extension professionals to use online tools. Incentives in this study included: software, equipment, recognition, funding, internet connectivity, and demand from clientele.

Inhibitors were the third lowest rated factor considered by OSU Extension professionals in their decision-making regarding the use of online tools in their educational programs. In chapter one, Inhibitors were defined (for the purpose of this study) as intrinsic considerations that discouraged Extension professionals from using online tools. Inhibitor items in this study included concerns about: program quality, difficulty using programs and equipment for educators, difficulty using programs and equipment for learners, receiving lower teaching evaluations, and longer preparation time for online educational programs.
Barriers were the lowest rated factor considered by OSU Extension professionals in their decision-making regarding the use of online tools in their educational programs. In chapter one, Barriers were defined (for the purpose of this study) as extrinsic considerations that discouraged Extension professionals from using online tools. Barrier items in this study included: increased work load, equipment failures, cost of maintaining equipment, activities that require hands on methods, and lack of administrative support. Extension professionals may be discouraged from using electronic equipment, software, and internet connectivity in their educational programs due to their unfamiliarity with the tools. Extension professionals may not feel that using online tools in their educational programs is what their clientele base wants. Demand by clientele for online learning opportunities may not be perceived as strong enough to justify developing online educational programs. Therefore, it appears that external considerations had the least impact on OSU Extension professionals’ decisions to use online tools in conducting their educational programs.

The Motivator factor explained the most variance associated with the use of online tools by OSU Extension professionals in their educational programs. Motivator factors were defined (for the purpose of this study) as intrinsic considerations that prompted Extension professionals to use online tools. Although the Incentives factor received the highest mean rating, the Motivator factor explained the most variance associated with Extension professionals’ use of online tools in their educational programs. This suggests that intrinsic positive items were the most important factor considered by Extension professionals regarding the use of online tools in conducting
their educational programs. Therefore, Extension professionals’ use of online tools can be explained more by intrinsic positive forces, than by negative or extrinsic forces. Further, Extension professionals who are internally driven to use online tools are more likely to use online tools in their educational programs.

Inhibitor and Incentive factors also explained a significant portion of the variance associated with the use of online tools. Inhibitor factors were defined (for the purpose of this study) as intrinsic considerations that discourage Extension professionals from using online tools. Inhibitors are the intrinsic counterpart to Motivators. Inhibitors and Motivators represent intrinsic influences that Extension professionals may have considered in their decisions to use online tools in their educational programs. Intrinsic factors (both positive: Motivators and negative: Inhibitors) explained the most variability associated with Extension professionals use of online tools. Therefore, external factors including: organizational structure, administrative pressure, equipment and software availability, and demand from the clientele were less important considerations of Extension professionals regarding their decision to use online tools in their educational programs.

Incentives and Barriers were the two factor categories that reflected extrinsic influences on Extension professionals use of online tools in their educational programs. The Incentive factor explained a significant portion of the variability associated with the Extension professionals’ EUS. However, the Barrier factor did not explain a significant portion of the variance associated with the use of online tools by OSU Extension professionals in their educational programs. Therefore, collectively the Extrinsic factors
explained some variance associated with the EUS, but not as much as the two intrinsic factors. This could mean that while previously held perceptions that extrinsic factors, such as equipment and organizational influences, were the major influence on Extension professionals’ use of online tools in their educational programs, their actual decisions appeared to be more closely related to intrinsic factors.

Two demographic characteristics were significantly correlated with EUS in this study. Using the Davis (1971) convention, a correlation coefficient of .70 or higher, indicated a very strong association; a coefficient of .50 to .69 indicated a substantial association; a coefficient of .30 to .49 was considered a moderate association, and a coefficient of .10 to .29 was considered a weak association. Age and years of working in Extension were negatively correlated with the Educator Use Score of OSU Extension professionals. The correlations revealed that as age and years of working in Extension increased, use of online tools by Extension professionals declined. Conversely, younger and less experienced Extension professionals were more likely to use online tools in conducting their educational programs. Although the correlation coefficients were statistically significant for both demographic characteristics, the strength of the relationship was negligible (Davis, 1971).

Younger Extension professionals who produced higher EUS may reflect a generational difference in their comfort level using online tools. Use of online tools as a learner may also be higher for younger Extension professionals, which may coincide with generational differences that include higher comfort levels with online tools. Assuming that most Extension professionals have spent or plan to spend much of their career
working in Extension, there is likely an inter-correlation between the number of years working in Extension and Extension professionals’ age category. Other explanations for the fewer number of years worked in Extension resulting in a higher EUS could be that Extension professionals who have not worked for Extension very long may have been exposed to more online learning tools during their education and training which could have been more recent than for more experienced Extension professionals.

Demographic characteristics of sex, education level, Extension program area, and geographic service area were not found to be related to OSU Extension professionals’ use of online tools in their education programs. Age and years working in Extension were the only two demographic characteristics that were statistically significant, and they were inversely correlated with the use of online tools by Extension professionals. This indicated that none of the other demographic characteristics explained the variance associated with Extension professionals’ use of online tools in their educational programs.

Conclusions

OSU Extension professionals identified the extent to which they used online tools as educators in conducting their educational programs and as learners. Respondents reported using most online tools more as learners than as educators. Extension professionals may have used online tools as learners in order to complete assignments or projects to meet course requirements. Extension professionals may also have used online
tools to complete a course for an advanced degree, professional development, or technical training.

The most frequently used online tool category was Communication tools for Extension professionals, both as educators and as learners. The least frequently used online tool category was Website Design tools for Extension professionals, both as educators and as learners. Each pair-wise comparison of online category tools for Extension professionals as learners and educators were positively correlated. This suggests that Extension professionals, who use online tools as learners, are more likely to use those tools as educators. Each pair-wise relationship reported between Extension professionals’ use of online tools as a learner and as an educator produced a highly significant (p ≤ .01) correlation coefficient. The strongest relationship was for the Image tool category between educators and learners. Website Design tools exhibited the second strongest relationship, but was the least frequently used online tool category. Based upon the data examined in this study, use of online tools as a learner is clearly linked to the use of online tools as an educator.

There were several non-pair-wise correlations that were also statistically significant, indicating that using online tools as learners may contribute to the likelihood that Extension professionals will use other online tools as educators. Non-pair-wise comparisons that produced significant correlation coefficients were Social Media as an educator was linked to the use of each of the other online tool categories as a learner. Similarly, the use of Video, Images, Audio, Website Design, and Survey/Polling/Testing/Assessment/Evaluation tools as an educator was related to the use of most other online
tool categories as a learner. Based on the data examined in this study it appears that the use of online tools as educators is related to the use of several of the online tools as learners. Conversely, providing opportunities to use online tools as learners may increase the likelihood of using online tools as educators.

An Educator Use Score (EUS) was calculated as a measure of Extension professionals’ use of online tools in conducting their educational programs. The mean EUS ($\bar{x} = 24.5$) was slightly below the midpoint of the response scale (i.e. 27). Based upon the response distribution it appears that the use of online tools by Extension professionals in conducting their educational programs was slightly below average. The lower than average EUS could be explained by the fact that age was negatively correlated with the EUS, and the average age range of OSU Extension professionals was 50-59. In addition, the demographic characteristic of years working in Extension was also negatively correlated with the computed EUS scores. The average number of years working in Extension for OSU Extension professionals surveyed was 15.5 years. This observation would suggest that younger Extension professionals who have worked fewer years in Extension are more likely to use online tools in their educational programs than their older, more experienced counterparts. Other demographic characteristics such as educational level, Extension program area, sex, and geographical area served were not related to EUS and cannot be used to identify Extension professionals who are more likely to use online tools in their educational programs.

Extension professionals reported that Incentives and Motivators were the factors considered most when making decisions about the use of online tools in their educational
programs. The data supports the contention that Extension professionals agreed that they consider Incentives, Motivators, and Barriers slightly more than Inhibitors when making decisions about the use of online tools in their educational programs. Conversely, Extension professionals tended to disagree that the Inhibitor factor was a consideration regarding their use of online tools. Extension professionals tended to agree with positive (Incentives and Motivators) factors that promote the use of online tools, and disagree with negative factors (Barriers and Inhibitors) that discourage use of online tools. Based on the four factors examined in this study, it appears that Extension professionals consider positive factors to a greater extent than negative factors concerning the use of online tools in their educational programs.

Each of the four factor categories were examined to determine which, if any, (i.e. Motivator, Incentive, Inhibitor, and Barrier) factors explained a significant portion of the variance associated with OSU Extension professionals use of online tools in their educational programs. Three of the factors explained a statistically significant proportion of the variance. The Motivator factor accounted for the highest percentage of the variance in the EUS ($R^2 = .123$), which suggested that OSU Extension professionals who possess an internal drive or desire to use online tools were more likely to use those tools in delivering their Extension programs.

The Inhibitor factor produced a negative beta value, but contributed to the explained variance in the EUS. Inhibitors were viewed as intrinsic factors that Extension professionals may consider that discourage use of online tools in educational programs. The negative beta associated with the Inhibitor factor supported the assumption that the
items comprising the Inhibitor factor tended to discourage the use of online tools, but Inhibitors still contributed to the overall percentage of explained variance. Inhibitor factors suggest that OSU Extension professionals, who face internal conflicts regarding the use of online tools were somewhat less likely to use those tools in their Extension programs.

The Incentive factor produced a positive beta value and contributed to the explained variance in the EUS. Incentives were extrinsic items that encourage the use of online tools in Extension professionals’ educational programs. It appears that external items that encourage the use of online tools were considered by OSU Extension professionals in their decision to use online tools in their educational programs, but not as much as the two intrinsic (i.e. Motivators and Inhibitors) factors.

The Barrier factor was not significant and therefore not included in the analysis. Overall, it appears that external items that detract from using online tools were not considered by OSU Extension professionals in their decisions regarding the use of online tools in their educational programs.

Implications

The use of computers and the Internet have greatly increased over the last two decades. Increased use of technology and access to the internet have resulted in a higher rate of information and data sharing. Online educational programs have also increased with this trend. As people demand more access to information and learning experiences online; universities, companies, and organizations have made efforts to address the
growing demand for online information. Efforts by Extension to keep up with this growing trend and develop ways to remain relevant have resulted in providing some online educational programs.

Extension has historically been an important component of land grant universities by extending research findings and information throughout the state; especially in rural communities. Over time, Extension delivery methods have evolved to meet the need and demand of the clientele they serve. As Extension continues to keep pace with the growing trend of online education and information access, it is essential that we understand the needs and interests of the client base, what Extension professionals’ need to conduct their programs, and how to maximize efficiency and effectiveness.

Using online tools for educational program delivery has been encouraged in recent years by Extension administrators. Online education programs may result in financial benefits in the form of reduced travel costs and decreased need for facilities. Offering online education programs also enables Extension professionals to reach a broader target audience, both geographically and demographically. Online education programs also address the increasing demand among clients for more immediate access to information and programs that may otherwise have been restricted due to time, location, financial, and other logistical constraints.

Previously mentioned in chapter one and two, educational program planners consider several dimensions when choosing an appropriate delivery method. One quadrant in the Conceptual Framework model (see Figure 1.1) relates to the capability of the instructor. Assessing the experiences of Extension professionals regarding their use
of online tools, the factors considered in making decision about the use of online tools in their educational programs, and the demographic characteristics related to their use of online tools, is prerequisite to promoting increased use of online tools for Extension program delivery.

The role of Extension within a land grant university is to deliver educational programs based upon research conducted at the universities. Beyond the basic foundation of providing of an educational program, is the need to develop and provide effective and accessible programs from which participants can benefit and gain knowledge. The more information Extension administrators and faculty can assimilate into the Extension professionals’ learning and professional development, the more the Extension professionals may use online tools in their educational programs. Expanding what we know about Extension professionals’ previous knowledge and experience with online tools and the factors that influence their decision to use online tools will provide insight that can be used to design and conduct educational programs and professional development activities in the future. Results from this research provide support for the assumption that understanding Extension professionals’ decision making processes regarding the use of online tools in their educational programs is important and a concerted effort is needed to address those factors.

**Recommendations**

Extension professionals will continue to develop and deliver educational programs to address the needs of their Extension clientele. This charge requires continual
modification and evaluation of delivery methods to meet changing standards, criteria, requirements, and learner needs. The strategic implementation of online programs in Extension requires prerequisite knowledge, skills, and dispositions within the cohort of Extension professionals. Teaching in Extension, no matter the subject or program area, must continue to evolve. Extension administrators should monitor and evaluate the experience, perceptions, and factors that influence Extension professionals’ decision to use online tools in their educational programs.

Understanding the importance and impact that using online tools as learners has on the use of online tools as educators is vital for the future of online program delivery in Extension. This situation supports the need for Extension professionals to experience many opportunities to use online tools as learners in order to positively impact their use of online tools as educators. Extension administrators and support staff make important decisions about training professional development opportunities. Continued efforts are needed to identify knowledge and skills needed to use online tools for those Extension professionals that plan and coordinate educational programs. These programs could be professional development activities, continuing education programs, and/or training sessions in which Extension professionals use online tools as learners in order to translate that knowledge and experience as an educator in Extension programs.

Other demographic characteristics found to be related to online tool use were age and years working in Extension. During the hiring process, Extension may want to specify a preference for candidates whose comfort level and experience with computers and online technology is higher. Familiarity with technology or online courses as a
learner are situational characteristics that may also be considered when hiring Extension professionals who would be more likely to use online tools in their educational programs.

Hiring candidates who lack previous work experience in Extension may also be a potential benefit, rather than viewed as a possible deficiency. Candidates who have experience working with online tools (outside of Extension) may be desirable even if their professional experience was not associated with Extension. Experience and knowledge with online tools is easily transferable and applicable to any subject matter.

This research revealed that intrinsic factors explained the most variance associated with the EUS. Applicants for Extension professional positions should be reviewed with respect to their intrinsic motivations and inhibitions regarding the use of online tools in their educational programs. Use of online tools appears to be primarily influenced by intrinsic factors. Based on the assumption that intrinsic factors are not something that Extension can modify through practice or policies from within the organization, they should screen potential candidates for those qualities during the hiring process. Hiring Extension professionals who are intrinsically motivated and less intrinsically inhibited may be an important prerequisite to expanding the use of online tools by OSU Extension professionals in the future.

Extension should also continue to address extrinsic factors that Extension professionals consider in their decision about the use of online tools. Although extrinsic factors may not have explained the most variance associated with Extension professionals’ use of online tools in their educational programs, they still need to be addressed. Some of those extrinsic factors include: increased recognition for Extension
professionals who use online tools, funding allotments for required technology to conduct online educational programs, providing adequate and updated equipment and software, and providing technical and staff support for technology issues and to accommodate increased workloads.

Suggestions for Further Research

This research provides insight into important considerations of Extension professionals in their decisions about the use of online tools in their educational programs. Based on the results of this research, the following questions should be addressed in further research:

1. What are the best practices for teaching Extension education programs using online tools?

2. What are the needs of Extension professionals for training sessions or workshops to learn how to use online tools in their educational programs?

3. What is the need and demand for online educational programs among Extension audiences?

4. How many Extension professionals have completed an online course or degree program and what impact does that have on the amount of online tools they use in their educational programs?

5. What events and elements outside of the Extension organization contribute to the use of online tools by Extension professionals?
6. What are the perceived positive and negative effects of using online tools in Extension educational programs?

7. What are the attitudes of Extension professionals toward the use of online tools in their educational programs?

8. How is program quality and effectiveness affected by the use of online tools?

9. What strategies are most effective in promoting the use of online tools among older and more experienced Extension professionals?

Summary

Educational programs conducted by Extension professionals have historically been associated with rural farm families. Demographic shifts in the American population have occurred; which has important implications for the educational programs that Extension offers. Over the years, Extension professionals have shifted away from conducting farm and home demonstrations and using radio programs to deliver educational programs to their target audience. Extension professionals need to continue to modify delivery methods in order to meet the lifestyles and expectations of the target clientele. Computers and the Internet have provided people with unprecedented quantities of information that may be accessible from anywhere in the world, on many different devices. OSU Extension must continue to evolve its program delivery methods to be efficient and remain current. Extension administrators need to continue to promote, and model the use of online tools. In order for Extension to expand online delivery of educational programs, it is important to know who among Extension professionals are
using online tools in delivering their educational programs, and how to use adoption/diffusion theory to extend that innovation through the ranks of Extension colleagues.

Extension professionals in this study reported that they used online tools more as learners than as educators. Therefore, it is reasonable to expect that the more Extension professionals use online tools as learners, the more likely they will use those tools as educators.

Extension professionals agreed that Incentive factors were considered most in their decision to use online tools. Even so, the Motivator and Inhibitor factors explained Extension professionals’ use of online tools in their educational programs. Furthermore, examining age and years of working in Extension revealed that younger Extension professionals with fewer years of experience working in Extension, were more likely to use online tools in their educational programs.

Expanding the use of online tools within OSU Extension should ultimately be addressed on two levels. Applicant screening for OSU Extension professionals should specify the ability to use online tools as a required qualification in position descriptions and applicant review processes. Extension professionals currently employed in OSU Extension should also be encouraged to use online tools, through exposure to online tools at every opportunity. Extension professionals should also be provided with the opportunity to observe colleagues using online tools in delivering their educational programs. Overtime these strategies are expected to continually expand the reach of OSU Extension programs to meet the needs of the target audience.
Extension administrators should recognize the need to demonstrate and model the use of online tools at every opportunity. Engaging Extension professionals as learners in using online tools appears to be an effective strategy to promote the use of those tools in their educational programs.
References


Appendix A: Data Collection Instrument
Greetings!

This message is being sent to request your participation in a research project about the use of online tools in Extension educational programs. Information provided by respondents will be used to better understand the use of online tools and possible barriers. Your participation in this study is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

You are assured that your responses will be kept confidential and that only I (as the co-investigator) and my advisor will have access to the data. Although every effort to protect confidentiality will be made, no guarantee of internet survey security can be given. Although unlikely, transmissions can be intercepted and IP addresses can be identified. We will not maintain any record of who participates in this research beyond the list of subjects who were initially invited to participate. Nor will there be any attempt to match the data collected with any of the participants.

If you are willing to participate in this research, it will involve about 10-15 minutes of your time. The questionnaire will ask you to provide a response indicating your experience using online tools as a learner and an Extension educator. You will also be asked to respond to statements about your agreement/disagreement with several potential barriers and incentives related to the use of online tools in your educational programs. You may skip any question(s) that you do not want to answer.

There are no known risks associated with your participation and I hope that you feel comfortable in responding to this brief questionnaire.

There are no direct benefits to individual participants. However, information from this study may be used by OSU Extension administrators in the future to improve and promote use of online tools in Extension educational programs.

For questions, concerns, complaints, or if you feel you have been harmed as a result of study participation please contact Julie Robinson at (501) 733-3101 or Dr. Robert J. Birkenholz at (914) 292-8521. For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact the Office of Responsible Research Practices at 1-800-876-6251. Completing this electronic questionnaire implies that you are giving permission for the researcher to use the data you provide for research purposes.

Thank you in advance for your consideration.

Respectfully,

Julie Robinson
Doctoral Candidate
Department of Agricultural Communication,
Education, and Leadership
The Ohio State University
1. To what extent have you used the following online tools as a LEARNER?

<table>
<thead>
<tr>
<th>Online Tool</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
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<tr>
<td>Conferencing Tools (e.g. Adobe Connect, Elluminate, Centro, DimDim, Winma,</td>
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<td>GroupWeb, WebEx)</td>
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<td>Social Media (e.g. Facebook, Twitter, Blog, YouTube, Classroom 20, MySpace,</td>
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<td>Ning, Rock Browser)</td>
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<td>Communication Tools (e.g. Skype, MSN messenger, Email, Text messaging)</td>
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<td>Video (creating and sharing) (e.g. DigitalFlip, Dolink, Adobe Premiere</td>
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<td>Elements, Posterous, Teacher Tube, Viddler, Vimeo, VoiceThread, YouTube</td>
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<td>EDU, Camtasia Studio, Jing, ScreenCast-o-Matic, Screen Toaster)</td>
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<td>Images (still photos &amp; digital) (e.g. Flickr, Posterous, VoiceThread,</td>
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<td>Paint.NET, Picasa, Picasa, Picasa)</td>
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<td>Ronik)</td>
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<td>Audio (e.g. Audacity, Gabcast, Impaica, Podomatic, Microsoft Media Player)</td>
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<td>Website Design (e.g. KompoZer, SeaMonkey Composer, Adobe Muse, Dreamweaver)</td>
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<td>Course Management System (e.g. Blackboard, Desire2Learn, eCollege.com,</td>
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<td>Carmen, WebCT, Moodle)</td>
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<td>Survey/Polling/Testing/Assessment/Evaluation (e.g. Doodle, Survey Monkey,</td>
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<td>Zoomerang, Blackboard, Carmen, WebCT, ClassMarker, EasyTestMaker, Hot</td>
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<td>Potatoes, MyStudyo, ProProfs Quiz School, ZohoChallenge)</td>
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2. To what extent have you used the following online tools as an EDUCATOR?

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<tr>
<th>Tools</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
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<td>Communication Tools (e.g. Skype, MSN messenger, Email, Text messaging)</td>
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<tr>
<td>Video (creating and sharing) (e.g. Digiva, Dlnk, Adobe Premiere Elements, Posterous, Teacher Tube, Viddler, Vimeo, VoiceThread, YouTube EDU, Camtasia Studio, Jing, Screencast-o-Matic, Screen Toaster)</td>
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<tr>
<td>Images (still photos &amp; digital) (e.g. Flickr, Posterous, VoiceThread, Paint.NET, Picasa, Ronik)</td>
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<tr>
<td>Audio (e.g. Audacity, Gabcast, Impala, Podomatic, Microsoft Media Player)</td>
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<tr>
<td>Website Design (e.g. Kompozer, SeaMonkey Composer, Adobe Muse, Dreamweaver)</td>
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<tr>
<td>Course Management System (e.g. Blackboard, Desire2Learn, eCollege.com, Carmen, WebCT, Moodle)</td>
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<tr>
<td>Survey/Polling/Testing/Assessment/Evaluation (e.g. Doodle, Survey Monkey, Zoomerang, Blackboard, Carmen, WebCT, ClassMarker, EasyTestMaker, Hot Potatoes, MyStudysto, ProProfs Quiz School, ZohoChallenge)</td>
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</tbody>
</table>
3. Please indicate the extent to which you agree or disagree with the following statements in the context of your Extension educational programs.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not Applicable</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension administrators encourage use of online tools.</td>
<td></td>
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<td>I feel pressure from my target audience to integrate online tools into my educational programs.</td>
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<td>The equipment required to use online tools is readily available.</td>
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<tr>
<td>My target audience prefer online learning.</td>
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<tr>
<td>Tools.</td>
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<td>Using online tools saves travel time for me.</td>
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<tr>
<td>I appreciate that I can access my online educational program any time at my convenience.</td>
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<tr>
<td>I incorporate online tools into my Extension programs when it is requested from audience/participants.</td>
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<tr>
<td>It is important to me that learners can access my online programs from any place in the world.</td>
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<tr>
<td>Using online tools has the potential to generate revenue for my program and Extension.</td>
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</tbody>
</table>
4. What is your age?
   - 20-29
   - 30-39
   - 40-49
   - 50-59
   - 60 and over

5. Sex?
   - Male
   - Female

6. Education Level (check your highest education level achieved)
   - High School
   - Bachelors
   - Masters
   - PhD

7. What is your predominant Extension Program area?
   - Family and Consumer Sciences (FCS)
   - Community Development (CD)
   - 4-H Youth Development (4-H)
   - Agriculture and Natural Resources (ANR)

8. Please estimate the proportion of your target audiences that lives in a (Please Total to 100%):
   - Rural Area
   - Suburban Area
   - Urban Area

9. How many years of work experience do you have in Extension?

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Appendix B: Notification Letter to Participants
Greetings!

Recent trends have prompted the need to consider online delivery of OSU Extension educational programs. Therefore, we are proposing a research project to better understand how OSU Extension personnel make decisions about the use of online tools in delivering their educational programs.

My name is Julie Robinson and I am a doctoral candidate in Agricultural and Extension Education (AEE). My graduate advisor is Dr. Robert J. Birkenholz and we are conducting this study about the use of online tools in OSU Extension programs.

The purpose of this message is to inform you about the study which is titled: *Factors Related to the Use of Online Tools in OSU Extension Programs* which is part of my doctoral dissertation. Your participation will only require about 10-15 minutes of your time and the information you provide will be kept confidential. Research reports will only involve summary data, and no individual responses will be revealed.

You will soon be receiving an email message from me requesting your participation in this study. If you would prefer a paper copy of the survey please email me at robinson.1180@osu.edu. Your participation is voluntary. We appreciate your input as for the future use of online tools for program delivery in OSUE.

Your perceptions are extremely important in this process, so please consider participating in this study.

Sincerely,

Julie Robinson  
Doctoral Candidate  
Department of Agricultural Communication, Education, and Leadership (ACEL)  
The Ohio State University
Appendix C: Reminder Letter to Participants
Dear Participant,

Just a friendly reminder to ask for your participation in completing the OSU Online Tools Survey. The survey is due November 30th and we need as many responses as possible in order to use this data most effectively.

We realize your time is valuable. The survey will take you approximately 20 minutes to complete. If you choose to participate, please click on the link below or copy and paste the entire URL into your web browser. Please do not share this link with others as it is unique to this email.

Your responses are confidential and will only be used by the researchers for this study. Your privacy is important to us and your answers will be combined with others and not linked to you personally. You are not required to participate in this study and may withdraw at any time by simply closing your browser and not submitting your responses.

If you have any questions regarding this research you may contact Julie Robinson at 501-733-3101 or robinson.1180@osu.edu. Your perceptions are extremely important in this process, so please consider participating in this study. Thank you for your time and willingness to assist with this project.

Sincerely,

Julie Robinson  
Doctoral Candidate  
Department of Agricultural Communication, Education, and Leadership (ACEL)  
The Ohio State University
Appendix D: Final Reminder Letter to Participants
Dear Participant,

Just a friendly reminder to ask for your participation in completing the OSU Online Tools Survey. The survey ends TODAY and we need as many responses as possible in order to use this data most effectively.

We realize your time is valuable. The survey will take you approximately 10-15 minutes to complete. If you choose to participate, please click on the link below or copy and paste the entire URL into your web browser. Please do not share this link with others as it is unique to this email.

Your responses are confidential and will only be used by the researchers for this study. Your privacy is important to us and your answers will be combined with others and not linked to you personally. You are not required to participate in this study and may withdraw at any time by simply closing your browser and not submitting your responses.

If you have any questions regarding this research you may contact Julie Robinson at 501-733-3101 or robinson.1180@osu.edu. Your perceptions are extremely important in this process, so please consider participating in this study. Thank you for your time and willingness to assist with this project.

Sincerely,

Julie Robinson
Doctoral Candidate
Department of Agricultural Communication, Education, and Leadership (ACEL)
The Ohio State University
Appendix E: IRB Approval Letter
Dear Investigators,

The Office of Responsible Research Practices has determined the above referenced project exempt from IRB review.

Please note the following:

- Retain a copy of this correspondence for your records.
- Only the OSU staff and students named on the application are approved as OSU investigators and/or key personnel for this study.
- No changes may be made to exempt research (e.g., personnel, recruitment procedures, advertisements, instruments, etc.). If changes are needed, a new application for exemption must be submitted for review and approval prior to implementing the changes.
- Per university requirements, all research-related records (e.g., application materials, letters of support, signed consent forms, etc.) must be retained and available for audit for a period of at least three years after the research has ended.
- It is the responsibility of the investigators to promptly report events that may represent unanticipated problems involving risks to subjects or others.

This determination is issued under The Ohio State University’s OHRP Federalwide Assurance #00005378. All forms and procedures can be found on the ORRP website: www.orrp.osu.edu.

Please feel free to contact the Office of Responsible Research Practices with any questions or concerns.

Thanks,

Tani

Tani Prestage, MA, MPH, CIP | Quality Improvement Specialist |
Office of Responsible Research Practices | The Ohio State University
1960 Kenny Road, Columbus, OH 43210 | prestige.2@osu.edu | 614-292-0214
Appendix F: Table F1. Response Data for Individual Items
Table F1. Response Data for Individual Items

<table>
<thead>
<tr>
<th>Statement</th>
<th>n</th>
<th>( \bar{x} )</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>Extension administrators encourage use of online tools.</td>
<td>211</td>
<td>3.82</td>
<td>0.88</td>
</tr>
<tr>
<td>I feel pressure from my target audience to integrate online tools into my educational programs</td>
<td>209</td>
<td>2.90</td>
<td>1.06</td>
</tr>
<tr>
<td>I have sufficient funding for equipment and/or software for teaching online educational programs</td>
<td>209</td>
<td>2.10</td>
<td>1.05</td>
</tr>
<tr>
<td>I receive financial compensation for utilizing online tools.</td>
<td>212</td>
<td>1.53</td>
<td>0.71</td>
</tr>
<tr>
<td>My department/unit receives financial compensation for utilizing online tools.</td>
<td>208</td>
<td>1.80</td>
<td>0.83</td>
</tr>
<tr>
<td>Extension appropriately recognizes staff who use online tools.</td>
<td>211</td>
<td>2.74</td>
<td>0.98</td>
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<tr>
<td>I am concerned about increasing my work load if I use online tools.</td>
<td>211</td>
<td>3.00</td>
<td>1.19</td>
</tr>
<tr>
<td>There is a lack of administrative support for me to learn online learning technologies</td>
<td>212</td>
<td>2.30</td>
<td>1.10</td>
</tr>
<tr>
<td>I am concerned about program quality if I use online tools.</td>
<td>210</td>
<td>2.54</td>
<td>1.06</td>
</tr>
<tr>
<td>Equipment failures discourage me from using online tools.</td>
<td>211</td>
<td>2.80</td>
<td>1.05</td>
</tr>
<tr>
<td>The cost of maintaining equipment discourages me from using online tools.</td>
<td>211</td>
<td>3.00</td>
<td>1.10</td>
</tr>
<tr>
<td>Technical problems do not discourage me from using online tools.</td>
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<td>3.00</td>
<td>1.12</td>
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<tr>
<td>Technical support personnel are available to assist me when I use online tools in my educational programs.</td>
<td>212</td>
<td>2.70</td>
<td>1.11</td>
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<tr>
<td>Online learning software is available.</td>
<td>212</td>
<td>3.19</td>
<td>0.84</td>
</tr>
<tr>
<td>I find it difficult to design online programs.</td>
<td>210</td>
<td>3.14</td>
<td>0.98</td>
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<tr>
<td>Using online learning environments is complicated for me.</td>
<td>210</td>
<td>2.90</td>
<td>1.08</td>
</tr>
<tr>
<td>Using online learning environments is difficult for learners.</td>
<td>211</td>
<td>2.74</td>
<td>0.91</td>
</tr>
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<td>I feel competent in using communication tools in the online environment (e.g., chat rooms, threaded discussion, etc.)</td>
<td>210</td>
<td>3.10</td>
<td>1.54</td>
</tr>
<tr>
<td>I have easy access to online conferencing programs (Webex, Adobe Connect, etc.) through Extension.</td>
<td>209</td>
<td>3.70</td>
<td>1.07</td>
</tr>
<tr>
<td>The internet connectivity I use for teaching online is reliable.</td>
<td>212</td>
<td>3.30</td>
<td>1.06</td>
</tr>
<tr>
<td>My target audience prefer online learning.</td>
<td>212</td>
<td>2.46</td>
<td>0.83</td>
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</table>
Table F1. Response Data for Individual Items (continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
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<tr>
<td>I am concerned about receiving lower teaching evaluations from using online tools.</td>
<td>210</td>
<td>2.55</td>
<td>0.95</td>
</tr>
<tr>
<td>Using online tools is gratifying to me as an educator.</td>
<td>210</td>
<td>3.18</td>
<td>0.85</td>
</tr>
<tr>
<td>Using online tools allows me reach students who otherwise would not be able to participate in my Extension programs.</td>
<td>3.63</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>The subject matter content of my Extension program influences my decision to use online tools.</td>
<td>210</td>
<td>3.53</td>
<td>0.81</td>
</tr>
<tr>
<td>I have access to internet at my office to utilize online tools.</td>
<td>208</td>
<td>4.10</td>
<td>0.79</td>
</tr>
<tr>
<td>I have access to internet at my home to utilize online tools.</td>
<td>208</td>
<td>3.68</td>
<td>1.16</td>
</tr>
<tr>
<td>The clientele that I serve with my Extension programs have internet access.</td>
<td>209</td>
<td>3.18</td>
<td>0.93</td>
</tr>
<tr>
<td>The age of my target audience is a determining factor in my decision to utilize online tools.</td>
<td>208</td>
<td>3.57</td>
<td>0.96</td>
</tr>
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<td>It takes me longer to prepare for an online educational programs than for face-to-face educational program.</td>
<td>210</td>
<td>3.15</td>
<td>0.97</td>
</tr>
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<td>I avoid online tools when my educational program requires hands-on activities.</td>
<td>208</td>
<td>3.68</td>
<td>0.78</td>
</tr>
<tr>
<td>Using online tools saves travel time for me.</td>
<td>209</td>
<td>3.93</td>
<td>0.79</td>
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<tr>
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<td>0.78</td>
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<tr>
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</tr>
<tr>
<td>It is important to me that learners can access my online programs from any place in the world.</td>
<td>210</td>
<td>3.35</td>
<td>1.02</td>
</tr>
<tr>
<td>Using online tools has the potential to generate revenue for my program and Extension.</td>
<td>210</td>
<td>3.41</td>
<td>1.08</td>
</tr>
</tbody>
</table>
Appendix G: Factor Category Instrument Items
**Barriers**

I am concerned about increasing my work load if I use online tools.

Equipment failures discourage me from using online tools.

The cost of maintaining equipment discourages me from using online tools.

I avoid online tools when my educational program requires hands-on activities.

**Incentives**

Extension administrators encourage use of online tools.

I have sufficient funding for equipment and/or software for teaching online educational programs.

I receive financial compensation for utilizing online tools.

My department/unit receives financial compensation for utilizing online tools.

Extension appropriately recognizes staff who use online tools.

Technical support personnel are available to assist me when I use online tools in my educational programs.

Online learning software is available.

I have easy access to online conferencing programs (Webex, Adobe Connect, etc.) through Extension.

The internet connectivity I use for teaching online is reliable.

The equipment required to use online tools is readily available.

My target audience prefer online learning.

The subject matter content of my Extension program influences my decision to use online tools.

I have access to internet at my office to utilize online tools.

I have access to internet at my home to utilize online tools.
The clientele that I serve with my Extension programs has internet access.

The age of my target audience is a determining factor in my decision to utilize online tools.

Using online tools saves travel time for me.

Using online tools saves travel time for my learners.

Using online tools saves travel (transportation) expenses for me.

Using online tools saves travel (transportation) expenses for my learners.

Online learning is beneficial when it is difficult to schedule and/or coordinate meeting times.

I incorporate online tools into my Extension programs when it is requested from audience/participants.

It is important to me that learners can access my online programs from any place in the world.

Using online tools has the potential to generate revenue for my program and Extension.

**Inhibitors**

I am concerned about program quality if I use online tools.

I find it difficult to design online programs.

Using online learning environments is complicated for me.

Using online learning environments is difficult for learners.

I am concerned about receiving lower teaching evaluations from using online tools.

It takes me longer to prepare for an online educational programs than for face-to-face educational program.

**Motivators**

I feel competent in using communication tools in the online environment (e.g., chat rooms, threaded discussion, etc.)
Using online tools is gratifying to me as an educator.

Using online tools allows me to reach students who otherwise would not be able to participate in my Extension programs.

I receive recognition from Extension administrators when I utilize online tools.

I receive recognition from my Extension peers when I utilize online tools.

The flexibility provided by an online environment is important to me.

I appreciate that I can access my online educational program any time at my convenience.