AN ASSESSMENT OF THE QUALITY AND FUNCTIONALITY OF THE FOOD AND FIBER SYSTEMS LITERACY WEBSITE

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CHAPTER I

INTRODUCTION

In 1985, the National Research Council (NRC) initiated a study on the status of agricultural education in the United States' secondary schools. The study was precipitated by concerns about declining profitability and international competitiveness of American agriculture. The NRC was also interested in whether instructional content in and about agriculture was adequate to reflect the overall economic importance of agriculture in the United States. The committee found few systematic efforts had been made to teach or develop agricultural literacy in non-agricultural students of any age and recommended systematic instruction about agriculture for all students beginning in kindergarten and continuing through twelfth grade (NRC, 1988). Attributable to this committee's findings, many efforts have been undertaken to substantiate the status of agricultural knowledge and instruction in elementary, middle, and secondary schools.

Agricultural educators interested in promoting agricultural literacy were provided opportunities and ideas to develop measures to address the findings published by the NRC. Swortzel (1996) suggested education leaders across the nation develop and implement plans to foster school instruction about scientific, economic, and public health aspects of agriculture. Additionally, Leising and Zilbert (1994) encouraged that measurable standards and benchmarks for grade groupings to guide teaching and learning about agriculture. With these suggestions in mind, it was necessary to develop support materials and resources in order to accomplish the goal of attaining an agricultural literate public.

A research grant from the W.K. Kellogg Foundation in 1996 to Oklahoma State University provided support for the Food and Fiber Systems Literacy Project. The overall goal of the Project was to develop a framework of learning standards of agricultural knowledge and understandings an agriculturally literate person should acquire by grade twelve. These learning standards were supplemented with grade level appropriate benchmarks. This goal was accomplished with the publication of A Guide to Food and Fiber Systems Literacy (Leising, Igo, Heald, Hubert, and Yamamoto, 1998).

Additional findings from the NRC included a determination that teachers were generally unaware of how to secure better agricultural literacy materials or receive help in the use of available instructional materials. This concern was also addressed within the objectives of the Food and Fiber Systems Literacy Project funding proposal (Leising, 1995). The eight original objectives as outlined in the project proposal were:

1. Align the food and fiber systems framework and learner outcomes with national standards, instructional activities, and resource materials.
2. Develop food and fiber systems learner outcomes for grades 9-12.
3. Establish field test sites in seven geographic regions of the United States.
4. Establish comprehensive food and fiber systems teacher training institutes.
5. Establish a working relationship between science and teaching professionals through The Coalition for Education about the Environment, Food, Agriculture, and Renewable Resources (CIPHER).

6. Develop assessment instruments and conduct project evaluation.
7. Develop an electronic clearinghouse and data base support system.
8. Provide an annual project evaluation which clearly describes the achievement of each objective. (p.2)

Addressing the NRC's concern regarding teacher awareness of agricultural literacy materials, the means to disseminate Project materials and information was formulated into Objective Seven with the development of an electronic clearinghouse system. To achieve this goal, the Food and Fiber Systems Literacy Website was developed as a logical means of electronic dissemination of the framework and supporting materials.

By 1998, the ever-expanding World Wide Web (WWW) was an indispensable part of business. Fandray (1998) identified a Microsoft Corporation, Inc. claim that there were between 35 and 40 million active users of the Internet in the United States. For many, Websites provided a cost effective means to advertise and disperse ever-growing amounts of information and educate people about an organization's mission (Wong, 1997). However, there was no authority or governing body overseeing information presented on Websites (Pealer and Dorman, 1997). In response to this inadequate official supervision , numerous researchers have promoted and endorsed the necessity for the evaluation of online resources accuracy and value (Knupfer, Clark, and Mahoney, 1997; Pealer and Dorman, 1997). Through evaluation measures, both Website owners and visitors would benefit from higher quality and more user-friendly Websites. Radosevich (1997) acknowledged that building usable sites, as opposed to "cool" sites, had never been more important.

Statement of the Problem

The Food and Fiber Systems Literacy Website was developed primarily for use by its Project educators during the 1997-98 academic year. However, as the Website would remain available indefinitely through the World Wide Web, an assessment of user perceptions regarding its characteristics and overall usability was necessary in order affirm its merit to educators. Therefore, to provide the most useful Website for educators, a need existed to ascertain the quality and functionality of the Food and Fiber Systems Literacy Project Website.

Purpose

The purpose of the study was to assess the overall quality of the Food and Fiber Systems Literacy Project Website as perceived by Project and selected Non-Project groups of educators.

Objectives

Five objectives were established to achieve the purpose of this study. The objectives were to:

1. Identify selected characteristics of Food and Fiber Systems Literacy Project and selected Non-project educators.
2. Compare Project and selected Non-Project educators' computer knowledge and Computer Anxiety Index scores.

3. Identify selected profile characteristics of users accessing the Food and Fiber Systems Literacy Website.

4. Compare motivational quality scores of Project and selected Non-project educators.

5. Determine if relationships exist between and among selected educator characteristics, computer anxiety, and Website quality.

Scope

The population of this study included educators from Oklahoma, Montana, California, Pennsylvania, Texas, and Nebraska. The educators represented two groups: Food and Fiber Systems Literacy Project educators and selected Non-project educators.

Assumptions

The following assumptions were made regarding this study.

1. The instruments utilized obtained accurate responses.

2. The respondents had available personal computers with Internet access and World Wide Web browser software.

3. Educators of the selected sites responded in an honest manner.

4. Respondents may be limited by computer hardware and software installed on school-owned computers.

5. Educator-owned computers used at home may have differed in various capacities to browse the Internet.

Limitations

1. The results of this study could not be generalized to other educators outside of scope of this study.

2. Because of limited Internet access availability at specific schools, evaluators may have been restricted to using one specific computer on campus to complete the tasks necessary for the evaluation.

3. Webtracker© data could not delineate between the selected evaluators from this study and other non-evaluation visitors.

Definition of Terms

Agricultural Literacy: Possessing knowledge and understanding of Food and Fiber Systems. Possession of such knowledge would enable one to synthesize, analyze, and communicate basic information about agriculture.

Cookie: A special piece of electronic information about a computer system, an HTML link, or a user that is stored in a text file on the hard drive of a computer. A server usually accesses this user or computer information when connection is accomplished and the Website wants to know information about the visitor. This browser option can be disabled, in which case, inquiring computer receives no information on the user.

Domain name: The address or Universal Resource Locator (URL) of a particular website. Also how the name to the right of the @ sign in an Internet address is described (e.g. "aol.com" and "okstate.edu" identifies America Online© and Oklahoma State University as the address on the Internet).

Educator: Any of a number of certified school personnel that are integral to the education process including teachers, administrators, librarians, or technology specialists.

Food and Fiber Systems: Term used synonymously with the term agriculture.

Food and Fiber Systems Literacy: Term used synonymously with the term agricultural literacy.

Food and Fiber Systems Literacy Framework: A curriculum model delineating what a person should know to be agriculturally literate. The Framework was divided into five thematic areas relating to agriculture:

Food and Fiber Systems – Understanding Agriculture
History, Culture, and Geography
Science – Agricultural and Environmental Interdependence
Business and Economics
Food, Nutrition, and Health.

The Framework included a narrative explanation of the concepts and information that an agriculturally literate person would understand. The Framework also included grade-grouped standards with accompanying benchmarks.

Homepage: The welcome page or initial page of a Website from which navigation using hyperlinks is accomplished. It usually ends in the domain name of a server with no other subdirectories shown. For example, http://www.okstate.edu is the homepage of Oklahoma State University.

Hyperlink or link: Text, graphic, or picture found on a Website that can be "clicked on" with a mouse which in turn will navigate to another Website, Webpage, or a different area of the same Webpage.

Internet: A system of linked computer networks, international in scope, that facilitates data communication services such as remote login, file transfer, electronic mail, and newsgroups.

Non-project educator: An educator from a school not contracted to pilot-test the Food and Fiber Systems Literacy Framework.

Project educator: An educator from a school contracted to pilot-test the Food and Fiber Systems Literacy Framework.

Webpage: A single HTML file that when viewed by a browser on the World Wide Web could be several screen-dimensions long, meaning one would scroll down to view contents located off the viewing area of the screen.

Website: A “place” on the Internet or World Wide Web. The term Website refers to the all-encompassing body of information as a whole, for a particular domain name.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter was to provide theoretical support for this study. An analysis of professional journals, books, proceedings from research meetings, and magazines were utilized to provide a broad representation of relevant literature. This review of literature was divided into the following sections: a) Introduction, b) Agricultural Literacy, c) The Internet and World Wide Web, d) Evaluation of Websites, and e) Summary

Introduction

Formal and informal agricultural instruction in the United States has been documented beginning with its first use in Georgia schools in 1733 (Moore, 1987) to various levels and types of instruction in elementary schools and thousands of secondary school agricultural education programs in the 1980s (NRC, 1988). Secondary school agriculture programs have evolved from agricultural production to technical focused curricula for 21st Century high-tech careers.

The NRC's Committee on Agriculture Education in Secondary Schools (1988) recognized a need to broaden instruction in and about agriculture to include the diversified utilization of agricultural commodities, agribusiness marketing and management in a global economy, public policy, environment and resource management, nutrition, and health. Consequently, representative groups associated with these aspects of the agriculture industry developed instructional materials and resources that explained their contribution to the agricultural industry. Teachers appreciate materials that support class instruction. Terry, Herring, and Larke (1992) found that a great number of fourth grade teachers in Texas were interested in available resources to assist them in teaching about agriculture. These researchers also suggested that for teachers to better utilize such resources the availability of these resources must be increased.

With each new generation, Americans become further separated from family farm experiences. Thus, a need to increase educational efforts and development of resources about agriculture became more evident. The Internet and World Wide Web (WWW) provided assistance in the effort to educate children and adults about agriculture. While some educators were enthused by the advantageous dissemination characteristics, speed, and breadth of resources on the WWW (Hertzberg, 1995), unfortunately many other educators still lacked either knowledge of or a positive attitude toward computer adoption and use as a teaching resource (McNamara and Pedigo, 1995). The division between computer experience and attitude may also have reflected in a less than satisfactory utilization of electronically accessible agricultural resources. Educational and technological developments challenged educators to redefine traditional approaches to teaching and learning. This included new partnerships formed between public and private elementary and secondary schools and post-secondary institutions (Morton and Mojkowski, 1991). Accordingly, efforts to develop guidance and instruction in accessing and utilizing quality educational resources about agriculture must reflect these challenges.

Agricultural Literacy

Numerous researchers (Mayer and Mayer, 1974; NRC, 1988; and Tisdale, 1991) discussed shifts in populations from rural areas to urban and suburban centers. This transition had reduced the practical knowledge base about agriculture within many societies (as cited in Flood and Elliot, 1994). Consequently, that loss of knowledge translated into a population that was less equipped to make informed decisions about food and fiber in their personal lives. Law and Pepple (1990) considered two critical consequences of a society having a shallow understanding of the role of agriculture in their lives. First, it was important for citizens to have basic agricultural knowledge to make policy decisions affecting food and fiber systems. Secondly, they cited the continued need for high school and college graduates to embrace careers in agriculture.

Following the 1988 release of the NRC report, agricultural educators' consideration for new agricultural literacy efforts became more apparent. The renewed attention by agricultural educators acknowledged the importance of the various resources and materials in existence prior to the release of the report such as those from states' Ag in the Classroom programs, the National FFA Organization's Food For America program, and many commodity groups and organizations. These resources were developed for teachers and students with a general objective of increasing student awareness of agriculture and agricultural products. However, the capacity of teachers to use those resources to increase students' understanding of food and fiber systems had not been documented.

A variety of research efforts to identify levels of agricultural knowledge exhibited by students and teachers had also been established. Horn and Vining-Koch (1986) and Frick, Birkenholz, Gardner, and Machtmes (1994) indicated youth and teachers have limited knowledge about agriculture. The low level of agricultural literacy among urban youth was even more evident. Mabie and Baker (1994) concluded that few Los Angeles County elementary students could neither provide a definition for agriculture nor identify state grown crops. Students were also unfamiliar with agriculturally related careers and common agricultural terminology.

Although the food and fiber industry existed in all states, teachers were not necessarily aware of the importance of agriculture in communities, or in many cases that it even existed. As such, Cox (1994) recommended an emphasis be placed on broadening teachers' perceptions of agriculture to enhance their understanding of food and fiber systems. Igo (1998) identified a need, as well, for inservice training of teachers at all grade levels to assist them in understanding relevant connections between core academic instruction and food and fiber systems literacy standards.

Teachers and students were not the only citizens identified to have a limited understanding of food and fiber systems. Other groups of professionals were also found to have a low level of agricultural understanding. Lockaby and Ryan (1996) found city government officials in a mid-size, Southwestern U.S. city had greater agricultural awareness than agricultural knowledge, particularly at the national rather than the local level. Additional research of this nature revealed professionals in education and information dissemination or news reporting held inaccurate perceptions and limited knowledge of agriculture (Terry, Herring, and Larke, 1992; Terry, 1994; Howell and White, 1996).

Researchers also suggested providing opportunities to enrich teachers' lack of understanding about agricultural. In 1994, Flood and Elliot advocated developing effective educational programs incorporating agricultural concepts and expanding agricultural awareness. Studies conducted by Trexler and Suvedi (1997) and Cox (1994) also noted the need to create programs or courses that assist teachers in integrating agriculture into core academic subjects, particularly those in science. Most recently, A Guide to Food and Fiber Systems Literacy (Leising et al., 1998) provided descriptive instructions for infusing agricultural literacy in schools.

The Internet and World Wide Web

The evolution and adoption of the Internet and WWW by business and educational industries changed the world of communications. At the click of a mouse or with a few keystrokes, near instantaneous dialogue between computers around the world allows for information to be exchanged or read.

The Internet was the result of a late 1960s Department of Defense computer network connecting scientific research sites, originally termed ARAPnet (Advanced Research Agency Project). This limited computer network was intended to advance secure sharing of information between United States defense strategists and researchers in the event of nuclear war (Leiner et al., 1998). Since inception, the Internet was transformed from a limited number of privately connected research computers to a global infrastructure of information and resource sharing by virtually all sectors of society (Leiner et al., 1998 and Ryder and Hughes, 1995).

Though once a small computer network for defense researchers, the rapidly growing Internet provided information and entertainment to limitless numbers of people. According to Emerging Technologies Research Group's 1997 American Internet User Survey, more than 20 million Americans viewed the Internet as indispensable. It was also reported that another 55 million U.S. adult non-users desired to learn more about the Internet or planned to use it in the next year (Emerging Technologies Group, 1997).

Evolution of the World Wide Web

The World Wide Web (WWW) was the medium that provided the general, world population simple and easy use of the Internet. Created by computer scientists in Switzerland during 1989, the WWW was a hypertext system that used the Internet as a transport mechanism for the interchange and sharing of information. Hypertext, a specific method of writing and displaying text on screen, enabled alphanumeric text to be linked in multiple ways, available at several levels of detail, and contain links to other related documents (Netlingo, 1997). With the hypertext system, non-linear navigation of Internet documents was capable through the use of WWW browser software such as Microsoft Internet Explorer©, Netscape Navigator© and Communicator©, Mosaic©, and Opera©. This browsing software provided a graphical interface (e.g. a visual interaction platform) that allowed users to select hyperlinks (e.g. words or pictures) with the mouse and cursor to display other documents. Through browser software computer users were also able to read and post messages to newsgroups, access databases, and send and retrieve files (Williams, 1995). Much of the excitement and usefulness of the WWW rested in the prospect that the next viewed document might be housed as close as a neighboring computer or possibly in a system being operated on the other side of the world. According to Newman, Raven, and Day (1996), the WWW had developed into the most user-friendly and fastest way to share information on the Internet. As such, the ability to communicate without distance and time constraints provided unparalleled value for both marketing and information dissemination purposes.

The Information Superhighway, as the Internet and WWW were commonly referred, grew exponentially from its commercial development in 1995 (Appendix A). Approximately 16 million Internet Protocol (IP) addresses or hosts, i.e. individually registered computers, were projected for January 1997 with approximately 14 million additional hosts projected registered during the 1997 calendar year (Rutkowski, 1997). According to Leiner et al (1998), two reasons for the phenomenal growth included the ease of use of WWW browser software and the free and open access to basic documents. From a communications perspective, this accessibility made the world smaller and the Internet became an essential communications and marketing tool to many businesses, organizations, and educational institutions worldwide.

IP hosts could house numerous subsystems that could then maintain many individual personal computers. Thus, attaining "Web presence" literally could be achieved by anyone who had access to the WWW. There were no legal qualifications as to who may create a Webpage and place it on the Internet. There were, however, copyright laws that must be followed prior to using resources from a Website.

Computer Anxiety

To fully utilize the resources available through the Internet and WWW, educators must be comfortable with available computer technology. However, not all individuals feel secure when confronted with using computers. Simonson, Montag, Maurer, Oviatt, and Whitacker (1987) defined computer anxiety as the "fear or apprehension felt by individuals when they use computers, or when they consider the possibility of computer utilization" (p.12). Doronina (1995) further described computer anxious individuals as having behavior characterized by "excessive timidity in using computers, negative comments against computers and information science, attempts to reduce the amount of time spent using computers, and even avoidance of computers in places where they are located" (p.79). It followed that the phenomenon of computer anxiety was identified as one factor that served to reduce the effectiveness of computerization (Heinssen, Class, and Knight, 1987; Simonson and Mauer, 1987)

Computer use by educators was critical if classrooms were to reflect the use of computers by contemporary society. Barker (1994) found that teachers who had high levels of anxiety were less likely to integrate computer technology into their curricula. Various researchers discovered indicators to educators' use and integration of computers. Rosen and Weil (1995) identified computer anxiety and technophobia predictors included age, gender, teaching experience, and computer availability. It followed that teachers' use of the Internet as a teaching resource was most influenced when the associated discomforts of using computers decreased.

Alleviating computer anxiety within identified individuals was thought to be a factor in facilitating the adoption and utilization of computers. In order for adoption to occur, the perception of the computer must be positive. Doronina (1995) believed preliminary training with computers served to minimize barriers and provided an adaptation period to increased further use. An adaptation period allowed individuals to gather perceptions about a new situation and then draw a conclusion. Rogers (1995) described this as the "innovation-decision process."

> The five steps of the process through which an individual passed were (1) from first knowledge of an innovation, (2) to forming an attitude toward that innovation, (3) to decision to adopt or reject, (4) to implementation of the new idea, and (5) to confirmation of this decision. (p. 161)

Developing positive experiences through key training sessions and identifying a usefulness for computers by teachers not only diminished anxious feelings, but also it provided many teachers with unique resources and ideas not located or previously available by conventional means.

Website Development

Website were developed to contain numerous Webpages or documents. Gray (1996) defined a Website as all documents having Uniform Resource Locators (URLs) beginning with a unique hostname. Basically, URLs were to the Internet what telephone numbers were to telephones or a street addresses were to houses. A Website could be further characterized as a collection of Web files including a beginning file called a "homepage."

Webpages were files written in a computer language called Hypertext Markup Language (HTML). These files contained links in the forms of graphics, buttons, icons, images, text, animation, audio, and video that allowed users to access the contents of other pages (Knupfer et al. 1997). Accessing a Website was accomplished by typing its URL on the location or address line in the browser. Upon entry to a Website's homepage, other pages within the Website were then accessible through identified links on the page.

A Website's design and scheme was considered important to attracting and maintaining visitors. Designs were as simple as text only on a solid color background or it had incorporated any combination of pictures, art, graphics, sound, movement, and video. Blumenthal (1998) suggested that building strictly informational Websites required fewer resources and technical skills than creating revenue-producing Websites. Websites were also more complex. They were also able to incorporate programs such as electronic mail, simulations, and games, or submittable forms. However, hardware capacities of computers housing the Website were perhaps the true limits to Webpage design extent and complexity.

The process of designing a Webpage was not considered simple and encompassed more than impulsively writing HTML codes and uploading to the WWW for patrons' use. Lindsay (1997) proposed that many decisions were considered when designing a Webpage. These included how a page would look, the kind of technology required for its use, links the page would provide, and kinds of patrons who used the page. Emery

(1998) cautioned that too often the rush to create a Webpage for the sake of establishing a Web presence appeared to drive Webpage development and Internet usage rather than careful consideration of goals, objectives, and intended audience.

During Webpage development, the concepts of motivational quality, visual aesthetics, and functionality were also considered. Motivational quality was identified as a key measurement of overall effectiveness of Websites. Motivational quality based on Keller's ARCS Model of Motivational Design and its four motivational strategy components: Attention, Relevance, Confidence, and Satisfaction (1983; 1987) (as cited by Small, 1997). Small further stressed that information be presented in a way that was engaging and meaningful to users, organized for ease of use and access, and satisfying so visiting the website provided an enjoyable experience. It was believed consideration of motivational criteria during Website design subconsciously influenced return visitations by Website users.

The visual design of Websites was another factor identified by researchers. Knupfer, Clark, et al. (1997) emphasized that the visual design of Webpages' was as important as content. According to Spool, Scanlon, Schroeder, and Snyder (1997) good design concepts for print were not considered good design concepts for Webpages, even though the perception was that print and Web publishing were similar. Thus, by utilizing design concepts that were both aesthetically appealing and functional, combined with quality content, a Website would be produced that warranted return visits by Web users.

An excellent Website had to be user-focused and was described as more like going to a department store with quality merchandise than like reading a brochure containing goals, visions, or organizational structure of the store (Electronic Recruiting

Index, 1996). The ERI concluded most WWW users' interest in a Website was based on how well it met the user needs, not the needs of the entity responsible for the Website. More often than not, Website design was based with marketing and business objectives in mind, rather than the customers' needs. Conversely, online marketers who provided valuable, free content kept users returning to the particular Website (Anonymous, 1998; Radosevich,1997; and Skinner, 1998).

By the end of the 20th century, if a person, group, or organization had a message or product to distribute, then strategic utilization of Websites was a high marketing priority. Green (1998) expected nearly two-thirds of all medium to large businesses would have Websites by the end of 1998. A quality, attractive, and functional Website greatly enhanced the likelihood of return visits and had a greater chance for success in meeting organizational or business objectives.

Evaluation of Websites

Evaluation had been identified as a basic aspect of human behavior. It was described as informal, such as when one chooses from among available items. Worthen and Sanders (1987) described evaluation as sometimes thorough, structured, and formal. It was also found very formal and important as exemplified by the United States' Government Performance and Results Act (GPRA), a federal mandate of 1993.

Scriven (1973) noted that evaluation had a single goal: to determine the worth or merit of whatever is being evaluated (as cited in Worthen and Sanders, 1987).

Manufacturers, government, and production groups were often asked to perform quality controls or product assessments that assured product and public safety. The

GPRA (Public Law 103-62) required that federally funded agencies develop and implement an accountability system based on performance measurement, including setting goals and objectives, and measuring progress toward achieving them. According to Brown (1998) the purpose of this act was to enhance the confidence of the American public in its government by improving the effectiveness of its operations and the public accountability of its agencies. This was accomplished by focusing on results, quality, and customer service, outcomes rather than outputs, and effectiveness rather than efficiency. Agency performance was also evaluated through the setting of program goals, measuring program performance, and then reporting on progress made towards those goals.

As disseminators of immense volumes of information, federal agencies had also recognized the usefulness of the Internet and Websites as viable means of distributing reports, fact sheets, and data. With a purpose similar to the GPRA and based on current policies regarding information dissemination, assessment procedures were developed to measure the performance of the federal Websites (Eschenfelder, Beachboard, McClure, and Wyman, 1997). Establishing the GPRA not only forced governmental agencies to improve evaluation and accountability procedures, but it also stressed the importance of validity and confidence in programs and projects, including Internet-available government materials.

The tremendous increase in the number of Websites since 1996 raised questions from a number of professional fields regarding the quality of those electronic resources. From a review of health-related Websites, Pealer and Dorman (1997) speculated that lack of consistent evaluation and oversight, plus the ease of publication, have led to inaccurate publications on the Internet. Blumenthal (1998) indicated that building and maintaining a

Website was important, but an ongoing requirement of this task was to show how the goals of the Website were being met in relation to its purpose.

Although few models for evaluating Websites were identified in this review of literature, criteria for Website evaluations were discovered. In particular, United States' Federal Cabinet-level departments' Websites were evaluated using a set of criteria found in the Office of Management and Budget's CircularA-130, section 8a(5). The criteria used were similar to those employed by librarians to distinguish reputable, trustworthy information resources (Adams, 1996). Among the Website characteristics evaluated were: accurate departmental information, Website maintenance return over costs, quality of disseminated information, site navigation ease, contact person availability, and up-to-date information.

A small number of educationally focused Website evaluation criteria were identified. However, these focused predominantly on students' perspectives. In particular, Shrock's (1998) instruments were categorized for use by elementary, middle, and secondary school students, respectively. They did not provide quality feedback to the Websites in review unless mailed to the Website administrator. Providing feedback to the administrator was not an objective of the evaluation

A review of agricultural literacy content Websites provided support to the inclusion of evaluation capabilities in Website design considerations. The USDA's Cooperative State Research, Education, and Extension Service (CSREES) Webpage for Ag in the Classroom state contacts (http://www.reeusda.gov/serd/hep/agclass.htm) listed nineteen states with active Ag in the Classroom Websites. Fourteen additional states had e-mail address hyperlinks to key individuals from the respective programs. The individual state Websites ranged in design from text only (a Kiosk design) with no hyperlinks to further pages, to Websites with downloadable guides for additional print resources. Only one state had available materials (three lessons) that could be downloaded by users. A number of Websites did identify lending libraries in which materials were available through the mail. None of the nineteen states' Ag in the Classroom Websites reviewed had an identified evaluation component incorporated into its design.

Summary

An increase in urban sprawl during the 1980s and 1990s may have suggested, among many factors, a lack of understanding of agriculture's value to society. This may have been reflected by the people's diminishing level of basic agricultural knowledge as society became more city based and less rural in nature. Numerous studies, beginning late in the 1980s and continuing into the mid-1990s, described this lack of knowledge. Efforts had been initiated by many commodity groups and interested agricultural educators to increase the agricultural knowledge level of the general population. Reflecting those efforts, Ag in the Classroom programs and similar well-intentioned agricultural groups developed instructional materials and campaigns illustrating the importance of agriculture in daily living. These materials provided assistance to teachers for instruction about Food and Fiber Systems.

The development and exponential growth of the Internet and the World Wide Web provided a viable means to inexpensively disseminate information to large numbers of people. For companies and organizations, it was not important to just have a presence on the WWW, rather it was critical to provide active Websites that were appealing and functional to attract and maintain visitors. Developers stressed motivation and functional quality characteristics during Website design as a means to influence the number of users revisiting a Website. By utilizing Website quality assessments, improvements could be implemented for the good of all Web users.

CHAPTER III

METHODOLOGY

The purpose of this chapter was to describe the methods and procedures used to develop and conduct this study. The purpose of the study was to assess the overall quality of the Food and Fiber Systems Literacy Project Website as perceived by Project and Non-project groups of educators. The content of this chapter included a) objectives of the study, b) description of the population surveyed, c) study design and instrumentation, and d) data collection and analysis.

Objectives

Five objectives were established to achieve the purpose of this study. The objectives were to:

1. Identify selected characteristics of Food and Fiber Systems Literacy Project and selected Non-project educators.
2. Compare Project and selected Non-Project educators' computer knowledge and Computer Anxiety Index scores.
3. Identify selected profile characteristics of users accessing the Food and Fiber Systems Literacy Website.

4. Compare motivational quality scores of Project and selected Non-project educators.

5. Determine if relationships exist between and among selected educator characteristics, computer anxiety, and Website quality.

Research Design

This research study was based in a descriptive-correlational design that sought to describe selected educator characteristics and the nature and strength of relationships among these characteristics and two dependent variables: computer anxiety and Website quality. According to Keppel (1991), descriptive research studies are designed to obtain information on the current status of particular phenomena. They are also directed toward determining the nature of a situation as it existed at the time of the study. Correlational research may be used to investigate associations that exist among variables or use a known correlation to predict from one variable to another. Establishment of a causal relationship among variables was not a purpose of the correlational approach.

Institutional Review Board

Federal regulations and Oklahoma State University policy required review and approval of all research studies that involved human subjects before investigators initiated their research. The Office of University Research at Oklahoma State University and the Institutional Review Board conducted the aforementioned review to protect the rights and welfare of human subjects involved in biomedical and behavioral research. In compliance with university policy, this study received the proper surveillance and was granted permission to continue. The Institutional Review Board assigned the number

AG-99-000 to the Food and Fiber Systems Literacy Website Evaluation. Refer to Appendix B for IRB approval form.

Population

The population for the study included elementary and junior high school educators from Oklahoma, Montana, California, Pennsylvania, Nebraska, and Texas. Two purposive samples were taken from this population. According to Dillman (1994) purposive sampling is a type of non-probability sampling in which the researcher selects a sample because it is convenient, or because he or she believes it is "typical" (p.62). Educators were selected from Food and Fiber Systems Literacy Project pilot-test schools and selected Non-project schools. Non-project schools were identified by the researcher through personal contacts. One individual at each site served as the site's evaluation coordinator to identify Website evaluation participants and to distribute and collect the Website evaluation instruments.

The selected educators represented two groups. The first group was comprised of educators in Oklahoma, Montana, Pennsylvania, and California and represented Food and Fiber Systems Literacy Project pilot-test schools. The second educator group included selected educators from Non-project schools located in Oklahoma, California, Texas, and Nebraska. To limit bias of Project educators' perspectives of the Website, it was important to compare their Website quality scores to the scores of a group of educators unassociated with the implementation of the Food and Fiber Systems Literacy Framework. These educators had no official affiliation with the Project and had not used the Website previously. A total of 64 educators completed Website evaluation instruments. Thirty-five (54.69%) of the educators were from the Project schools while 29 (45.31%) represented Non-project schools.

Study Design and Instrumentation

To gather the desired information to fulfill the purpose and objectives of this study, a two-part instrument was assembled. The instrument is located in Appendix C.

Instrument—Part I

Part one sought to identify selected educator characteristics and to ascertain educators' opinions of computers. The initial page consisted of a seven-item questionnaire to identify selected characteristics of educators. These items focused on gender, teaching experience, grade level taught, Internet access location, computer training, and computer skill level perception.

To determine educators' opinions of computers, the Computer Anxiety Index (CAIN) was utilized. This one-page, survey questionnaire was available for a $25 site-license fee from the Iowa State University Research Foundation. The CAIN consisted of 26 statements that respondents rate using a six-point, Likert-type scale (1=Strongly Agree, 2=Agree, 3=Slightly Agree, 4=Slightly Disagree, 5=Disagree, and 6=Strongly Disagree). Half of these 26 statements were negatively worded. During data entry, reverse-coding of these 13 responses was necessary to arrive at a total CAIN score. Scores could range from 26 (low anxiety) to 156 (high anxiety). Simonson, et al. (1988) noted reliabilities of .90 (test-retest) and .94 (coefficient alpha) for the CAIN.

Instrument—Part II

Part II of the instrument entailed the utilization of the Website Motivational Analysis Checklist (WebMAC) version 2.0. According to Small (1997), a Website's motivational quality level was a key indicator of overall quality of a Website. The intent of the WebMAC was to quantify Website characteristics based on the motivational elements of Keller's ARCS Model of Motivational Design: Attention, Relevance, Confidence, and Satisfaction (1983; 1987). The developer's permission to use the WebMAC was granted previous to its incorporation into this researcher's survey instrument.

The 40 statements of the WebMAC were classified into the categories: Capture Interest, Maintain Interest, Useful Information, Credible Information, Easily Navigable, Shared Control, and Satisfying Experience. For the purpose of this study, the seven categories were subgrouped to delineate content and functionality components of motivational quality. Capture Interest, Maintain Interest, Useful Information, and Credible Information categories were grouped into a sub-category of content, while Easily Navigable, Shared Control, and Satisfying Experience were evaluated as a group to indicate functionality. The 40 randomly distributed statements had an overall total possible score of 200 (40 questions x 5 points). The WebMAC scoring key was:

Score	Rating
160-200	Your website is high in motivational quality
80-159	Your website is somewhat motivating, but could be improved
0-79	Your website needs improvement of its motivational quality

Content validity and content reliability of the instrument were determined by Food and Fiber Systems Literacy personnel, university faculty, and selected graduate students. The internal consistency of the WebMAC was determined using the Cronbach's alpha procedure which yielded a coefficient of 0.87. Appendix C provides the instrument and rating scale.

Collection of Data

Data were collected from study participants April through October 1998. Project schools' site administrators distributed the Website evaluation instrument to educators during the 1997-98 spring semester. Following the selection of Non-project schools, evaluation instruments and instructions were mailed to the lead teacher at each respective location. All educators were provided complimentary Food and Fiber Systems Literacy mousepads in appreciation of their efforts.

Data regarding general use and access of the Website were collected using the commercial Website tracking service, Webtracker©. This was a secure service whereby a password was needed to gain entry to the Webtracker© server to view current access statistics for the Food and Fiber Systems Literacy Website. Upon registration, an HTML code was supplied to the Food and Fiber Systems Literacy Website administrator. By incorporating this HTML code a Webtracker© graphic and counterbox were placed on a previously selected page of the newly registered Website.

The profile of user characteristics identified was limited to:

Total page accesses	Browsers reaching the site
Domain hit percentages	Hits by day of the week
Hits by hour of the day	Hits by operating system
Average hits per day	Return visitor percentages

Analysis of Data

The data from the survey were quantitative and entered into Statistical Analysis System version 6.12 (SAS 6.12) for analysis. Data were analyzed using descriptive statistics, comparison, and correlation procedures. All statistical tests were conducted at an alpha level of 0.05. The researcher additionally summarized unsolicited respondent comments and suggestions.

The following presents a description of data analysis for each objective.

Objective 1: Selected educator characteristics were represented as frequencies, means, and percentages.

Objective 2: General computer knowledge was assessed through indications of previous enrollment in computer courses. CAIN scores were computed for the selected educators to determine computer anxiety levels. T-tests were used to compare Project and Non-project educators group mean scores.

Objective 3: Selected characteristics of Website users were determined from Webtracker© profile data. These characteristics were described using frequencies, means, and percentages.

Objective 4: Motivational quality scores of the Food and Fiber Systems Literacy Website were determined by summing the WebMAC subscores for Website content (120 points possible) and functionality (80 points possible). Content was determined from the areas: Capture Interest, Maintain Interest, Useful Information, and Credible Information. Functionality was assessed using the total subscore for the areas: Easily Navigable, Shared Control, and Satisfying Experience areas. T-tests were used to compare Project and Non-project group mean scores and subscores.

Objective 5: To determine relationships between and among selected educator characteristics, CAIN scores, and WebMAC scores and subscores, SAS procedures for General Linear Means, T-tests, Analysis of Variance, and Pearson Product-Moment Correlations were utilized.

All findings were reported in the aggregate.

CHAPTER IV

DATA ANALYSIS AND FINDINGS

The purpose of this chapter was to present the research data succinctly in narrative and graphical formats. Following analysis, the data were organized to address the objectives of the research study. The purpose of the study was to assess the quality of the Food and Fiber Systems Literacy Project Website as perceived by subgroups of selected educators from both Project and Non-Project schools. Five objectives were established to achieve the purpose of this study. The objectives were to:

1. Identify selected characteristics of Food and Fiber Systems Literacy Project and selected Non-project educators.
2. Compare Project and selected Non-Project educators' computer knowledge and Computer Anxiety Index scores.
3. Identify selected profile characteristics of users accessing the Food and Fiber Systems Literacy Website.
4. Compare motivational quality scores of Project and selected Non-project educators.
5. Determine if relationships exist between and among selected educator characteristics, computer anxiety, and Website quality.

Selected Educator Characteristics

Objective 1: Identify selected characteristics of Food and Fiber Systems Literacy Project and selected Non-project educators.

Gender

Sixty-four Website evaluations returned to the researcher by October 30, 1998. Thirty-five (54.69%) educators, 28 females and seven males, represented Food and Fiber Systems Literacy Project test schools. Twenty-nine (45.31%) Non-project educators participated. This group included 26 females and 3 males. Inclusive of both groupings, gender distribution sifted out to fifty-four females (84.38%) and ten males (15.62%).

Within the Project educator group, females accounted for 80.00 percent of the group total. Females in the Non-project educator group accounted for 89.60 percent of its total. A graphical description of the responding educators gender is provided in Figure 1.

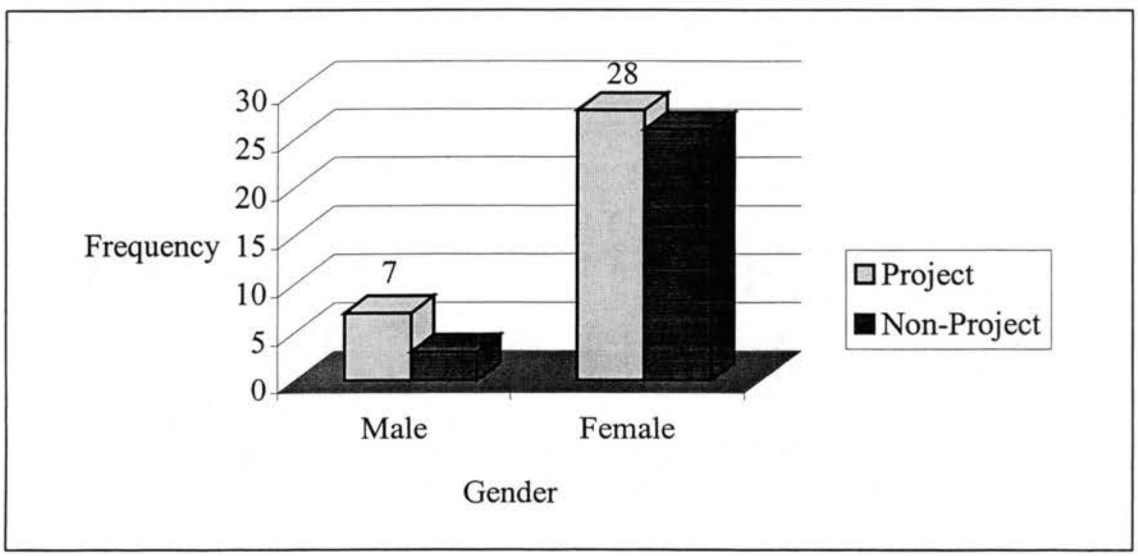

Figure 1. Summary of selected educators by gender .

Grade level teaching assignment

Educators in the study represented grade levels kindergarten through eighth grade. Additionally, there were a number of educator participants who had administrative and resource responsibilities (i.e. administrators, technology specialists, and librarians). Item responses were classified by the grade level groupings outlined in the Standards and Benchmarks of the Food and Fiber Systems Literacy Framework (Appendix D). The groupings were K-1, 2-3, 4-5, and 6-8. An "other" category was created to account for the individuals who had no official teaching responsibilities at the time of the evaluation. Table I reports the summary of educators' grade level responsibilities.

Cumulative totals by grade grouping revealed 25 (39.06%) respondents were teaching in grades 6-8, 16 of these educators representing Project schools. Almost one-fifth of the total (18.75%), seven Project and five Non-project teachers, were classified in the Grade 4-5 group. Grade groups K-1 and 2-3 respectively accounted for nine (14.06%) and seven (10.94%) total teachers. Eight (13.12%) educators represented the category "other" with seven of these educators belonging to Non-project schools.

Within the Project group, almost 50 percent taught in grade levels K-5 with all but two of the remaining respondents representing grades 6-8 (45.71%). Just fewer than forty percent of the Non-project educators were teaching in K-5 and with another one-third of the group aggregated in the 6-8 grouping. Different from the Project group, the Non-project "other" category contained almost 25 percent of its respondents.

Table I

Summary of grade level assignment by educator group

	Distribution By Group					
	Project		Non-project		Total	
Grade Level	n	%	n	%	N	%
K-1	6	17.14	3	10.34	9	14.06
2-3	4	11.43	3	10.34	7	10.94
4-5	7	20.00	5	17.24	12	18.75
6-8	16	45.71	9	31.04	25	39.06
[a]Other	1	2.86	7	24.14	8	12.50
No response	1	2.86	2	6.90	3	4.69
TOTAL	35	100.00	29	100.00	64	100.00

[a]Other—comprised of administrators, technology, or reference staff.

Teaching Experience

Respondents were asked to indicate the number of years they had taught. Educators' experience ranged from one to 33 years. Table II shows that across both groups, over one-quarter of the educators (28.13%) had taught over twenty years. Another 26.56 percent had six to ten years of teaching experience with 13 educators indicating less than six years of experience. Six (9.38%) had taught 16-20 years with the remaining eight (12.50%) educators falling into the 11-15 year category. The mean number of years taught by all educators was 13.87 with a standard deviation of 8.78 years. Nearly half of the Project educators (45.72%) had taught ten years or less.

Table II

<u>Summary of teaching experience by educator group</u>

	Distribution By Group					
	Project		Non-project		Total	
Years	n	%	n	%	N	%
1-5	8	22.86	5	17.24	13	20.31
6-10	8	22.86	9	31.03	17	26.56
11-15	6	17.14	2	6.90	8	12.50
16-20	2	5.71	4	13.79	6	9.38
> 20	11	31.43	7	24.14	18	28.13
No response	0	0.00	2	6.90	2	3.12
TOTAL	35	100.00	29	100.00	64	100.00

Overall Mean = 13.87; SD = 8.78
Project Mean = 14.02; SD = 9.48
Non-project Mean = 13.67; SD = 7.99

One-third (31.43%) were veterans of over 20 years experience with the remaining eight (22.85%) having experience of 11-20 years. Non-project educators were most represented in the 6-10 year category with nearly one-third representation (31.03%). Almost one quarter had taught for greater than 20 years while nearly a fifth (17.24%) had taught less than five years. The mean number of years taught was nearly identical for both Project and Non-project groups at 14.02 and 13.67 years, respectively.

Internet Access

Educators were asked to indicate the location most often used to access the WWW. All 64 educators answered the item. Their responses are presented in Table III. The majority of educators, 45 (70.31%), identified school as their most common location of accessing the WWW. Twenty-eight of the 35 Project educators and 17 of the 29 Non-project participants selected this category. Almost 22 percent, split evenly between 14 Project and Non-project educators, indicated they most often accessed the WWW from home. Only five (7.81%) most frequently utilized the library. Non-project educators accounted for all five of these responses.

Table III

Summary of World Wide Web access location by educator group

	Distribution By Group					
	Project		Non-project		Total	
Location	n	%	n	%	N	%
School	28	80.00	17	58.62	45	70.31
Library	---	---	5	17.24	5	7.81
Home	7	20.00	7	24.14	14	21.88
TOTAL	35	100.00	29	100.00	64	100.00

Computer Knowledge and Computer Anxiety Levels

Objective 2: Compare Project and selected Non-Project educators' computer knowledge and Computer Anxiety Index scores.

Computer Training

To determine previous formal computer training, educators were asked to indicate if they had taken any computer applications or programming classes. Table IV illustrates the responses of educators regarding formal computer education. Overall, forty-four (68.75%) educators affirmed they had completed a computer class. These were nearly evenly distributed, 21 and 23 respectively, between Project and Non-project groups. The remaining 20 (31.25%), 14 Project educators and six Non-project educators, had no previous formal education with computers. A majority of both Project (60.00%) and Non-project (79.31%) educators denoted previous formal training in the form of computer programming or computer applications courses.

Table IV

Summary of computer training by educator group

	Distribution By Group					
	Project		Non-project			
Computer Training	n	%	n	%	N	%
Yes	21	60.00	23	79.31	44	68.75
No	14	40.00	6	20.69	20	31.25
TOTAL	35	100.00	29	100.00	64	100.00

Perceived Computer Skill Level

Data illustrated in Table V reflects the selected educators' self-perceived computer skill level. Respondents could choose one of four levels: beginner, novice, intermediate, or advanced. Approximately 75 percent of both Project and Non-project educators rated themselves at the novice or intermediate skill level. Approximately 20 percent indicated they were beginners, while only 5 of the 64 respondents designated themselves as having advanced computer skills. Four of these educators were from the Non-Project group.

Table V

Summary of perceived computer skill level by educator group

	Distribution By Group					
	Project		Non-project		Total	
Perception	n	%	n	%	N	%
Beginner	7	20.00	5	17.24	12	18.75
Novice	14	40.00	12	41.38	26	40.63
Intermediate	13	37.14	9	31.03	22	34.37
Advanced	1	2.86	3	10.35	4	6.25
TOTAL	35	100.00	29	100.00	64	100.00

Computer Anxiety

Summary statistics for mean Computer Anxiety Index scores are presented in Table VI. It should be noted that a larger score (a maximum score of 156 possible)

Table VI

Summary of mean Computer Anxiety Index (CAIN) scores by educator group

Group	n	M	SD	t	p
Project	35	46.13	17.37	--	--
Non-Project	29	45.00	16.78	--	--
All educators	64	45.62	16.92	0.5451	0.5876

df = 62; $\alpha = 0.05$

indicated a higher computer anxiety level. Scores ranged from the lowest possible score of 26 to a high of 92. The overall mean score was 45.62 with a standard deviation of 16.92. The was below the reported CAIN score norm of 58.06 (Simonsen, et al., 1988).

The results by educator group found Project educators scored an average of 46.13 with a standard deviation of 17.37, while the Non-project educators' mean score was 45.00 with a standard deviation of 16.78. T-test results comparing Project and Non-project educator group means revealed no statistically significant difference (t=0.5451, df=62, p=0.5876).

Characteristics of Website Users

Objective 3: Identify selected profile characteristics of users accessing the Food and Fiber Systems Literacy Website.

Visits and Web browsers

There were a variety of methods available to track the number of accesses, or hits, the Website received. One Internet source, Webtracker©, provided the most appropriate summary profile of Website user characteristics. Website user data were determined by information generated from electronic tags or "persistent cookies".

A limitation to this service, however, was that it could not differentiate between Project and Non-project educator visitors. Thus only cumulative Web visitor characteristics could be recovered.

From October 27, 1997 to October 26, 1998, there were 4933 hits on the Food and Fiber Systems Literacy Project Website. An average of 14 hits per day was reported. Ninety-six percent of the hits were associated with two WWW browser programs. Netscape software programs, such as Navigator© and Communicator©, were associated with 4011 (81.00%) of the hits while Microsoft's Internet Explorer© accounted for 766 hits (15.00%). Table VII provides a summary of selected access statistics.

Table VII

Summarized access statistics for the Food and Fiber Systems Literacy Project Website ending October 26, 1998

WebTracker© Statistics	f	
Days in operation	364	
Total page accesses (hits)	4933	
Average hits per day	14	
Browsers Reaching FFSLP Website	f	%
Netscape Navigator© or Communicator©	4011	81.00
MS Internet Explorer©	766	15.00
Other/unknown	156	4.00

Return Visitors to the Website

In addition to the total number of hits, it was also important to understand if visitors returned to the Website after initially visiting. Figure 2 was created to provide a graphic depiction of return visitor percentages. Ninety-four percent of the visitors fell into one of two categories. Visitors accessed the Website only once (33.00%) or they returned eight or more times (61.00%). The remaining six percent of the visitors had accessed the Website from two to seven times.

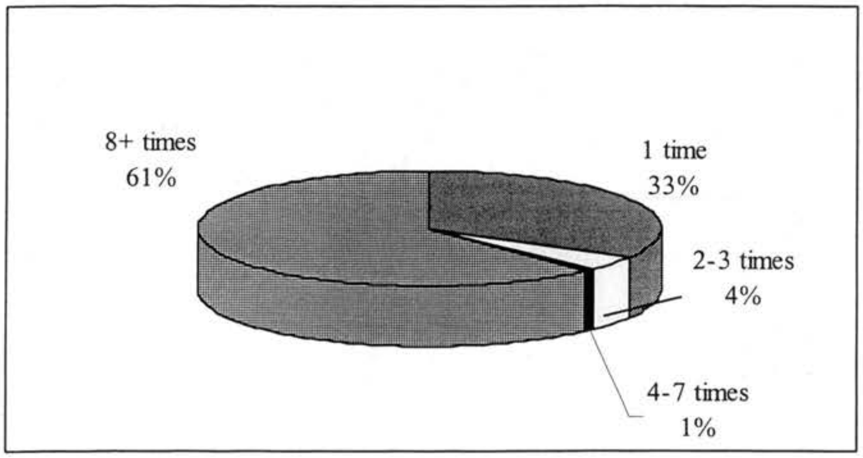

Figure 2. A Summary of Food and Fiber Systems Literacy Project Website return visitor percentages.

Operating Systems

Figure 3 illustrates the types of computer operating systems associated with the identified WWW browser software programs that accessed the Website. Microsoft Windows 95© and Windows 98© were the primary operating systems used to access the Website, accounting for 72 percent of the visits. Windows NT© represented an additional

16 percent of the computer operating systems. Macintosh© systems accounted for only nine percent of the systems reported.

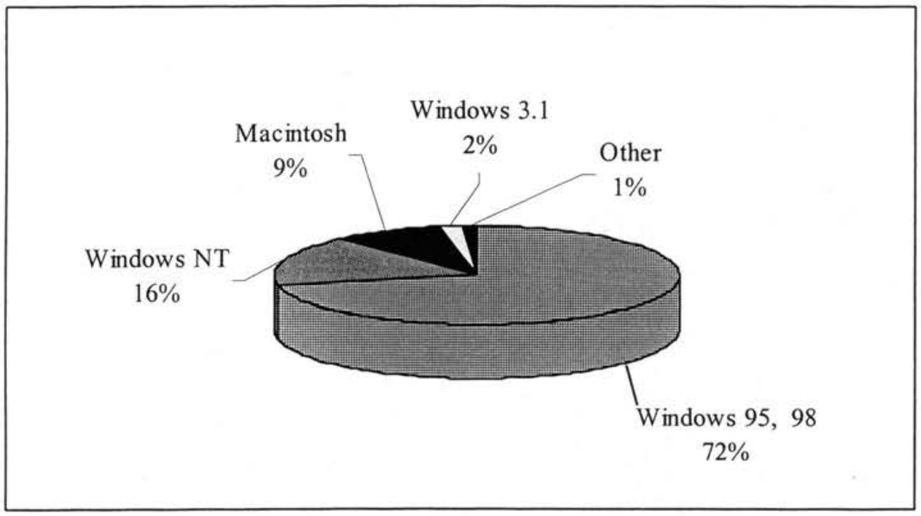

Figure 3. Summary of Food and Fiber Systems Literacy Project Website hits by computer operating system.

Visitor Host Domains

The Food and Fiber Systems Literacy Project Website was accessed by eleven different recognized domains. Educational domains, addresses ending in ".edu," represented the largest accessing group with 1,926 hits (39.00%). Commercial domains (.com) were next with 825 hits followed by network domains (.net) with 390 hits. These accounted for 16.70 percent and 7.90 percent of the hits, respectively. Note that almost one-third of the hits (1524) were from unreported host domains. Although the "other" category accounted for only 2.10 percent of the total number of hits, there were six domains representing foreign countries accessing the Website. These included Australia, Canada, Japan, Norway, Netherlands, and the United Kingdom.

Table VIII

Summary of Food and Fiber Systems Literacy Website accesses by domain name

Domain name	f	%
.edu	1926	39.0
.com	825	16.7
.net	390	7.9
.us	148	3.0
[a]Other	102	2.1
Hosts unreported	1542	31.3
Total	4933	100.0

[a]Other= domain names: .gov, .uk, .au, .no, .nl, .org, .ca, .jp

Time of Website Access

WebTracker provided an hourly breakdown of accesses to the Website. The hour reported was inclusive of the entire hour; i.e. "8 a.m." represented the period from 8:00 to 8:59 a.m. As the Website was designed for use by teachers, the hours of access were grouped into eight hour blocks most representative of school day hours. The groups were 9 a.m. to 4 p.m., 5 p.m. to 12 a.m., 1 a.m. to 8 a.m. Figure 4 renders a graphical representation of the time distribution of Website accesses by these groupings.

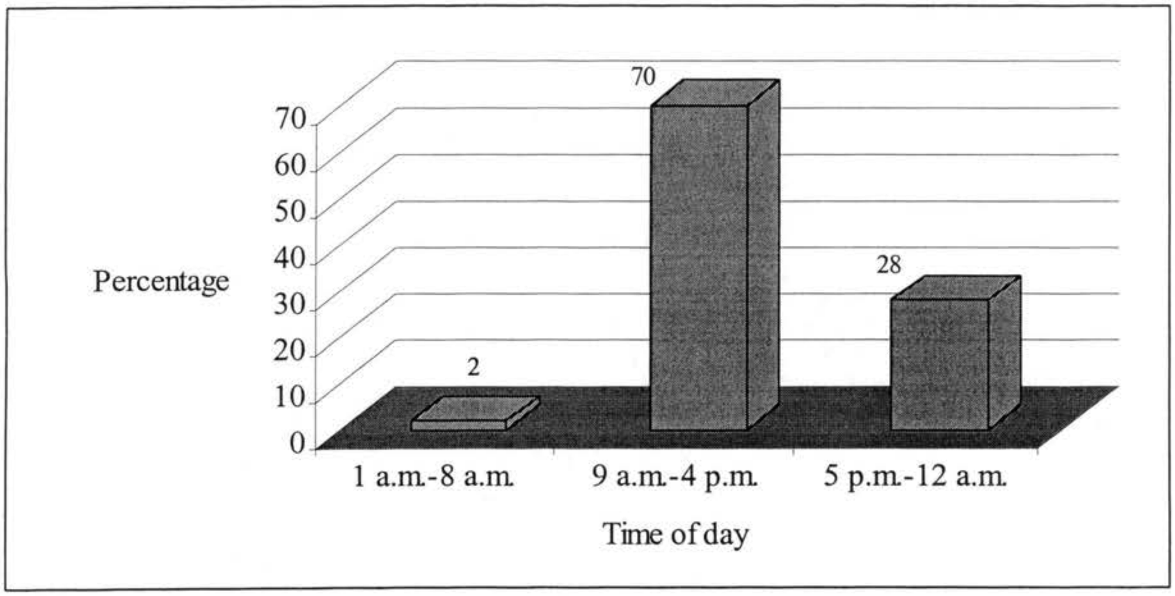

Figure 4. Summary of Food and Fiber Systems Literacy Project Website hits by hour of the day.

It was not surprising to find 70.00 percent of the hits occurred during the 9 a.m. to 4 p.m hours. The second most frequent time period was the 5 p.m. to 12 a.m. stage. This period accounted for 28.00 percent of the hits. A very small number of hits (2.00%) fell into the overnight time period of 1 a.m. to 8 a.m.

Visitors by Day of the Week

Figure 5 illustrates the distribution of Website visits throughout the week. Again it was not surprising to observe that 94 percent of the Website visits mirrored the school days. This weekday percentage broke down to 20, 18, 19, 19, and 18, Monday through Friday, respectively. The remaining six percent were evenly distributed over Saturdays and Sundays.

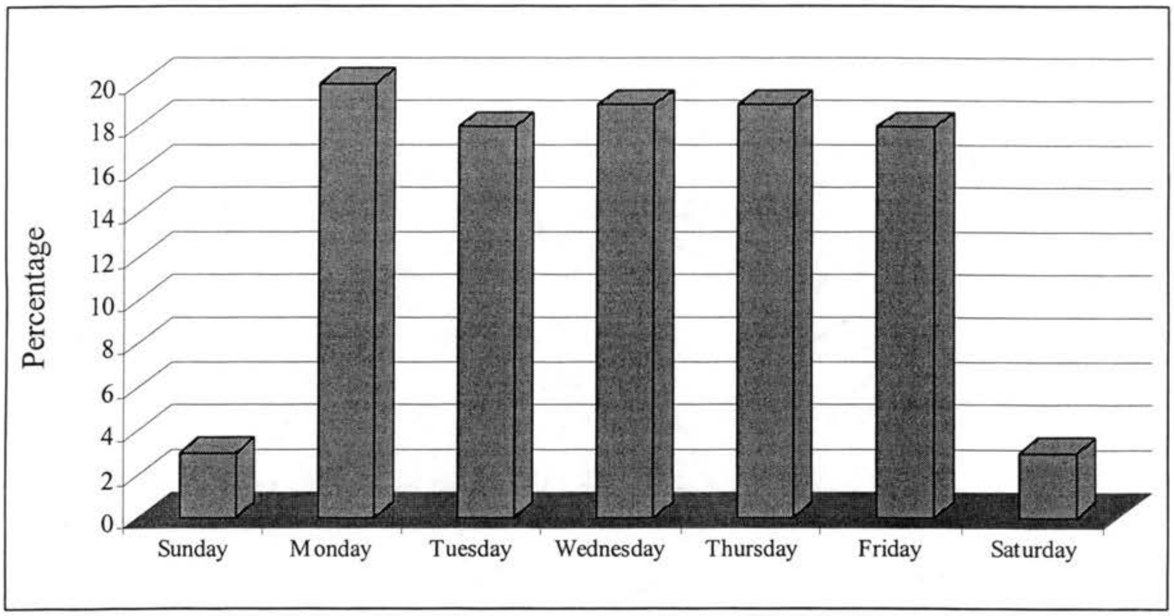

Figure 5. Summary of Food and Fiber Systems Literacy Project Website hits by day of the week.

Website Motivational Quality

Objective 4: Compare motivational quality scores of Project and selected Non-project educators.

WebMAC summary statistics and Motivational Quality Mean Score Analysis

Website motivational quality was measured through the analysis of WebMAC scores. Scores ranged from a low of 62 to a high of 190 out of 200 possible points. According to the WebMAC developer, a score of 160-200 (80.00% or greater) indicated the website was high in motivational quality. A score of 80 to 159 (40.00 to 79.50%) showed the website was somewhat motivating, but could be improved. Finally, a score between zero and 79 exemplified a website that needed improvement of its motivational quality.

The overall mean WebMAC score was 151.38 with a standard deviation of 25.99. This indicated that the Website was "somewhat motivating, but could be improved." Subscores representing content areas were out of 120, or 60 percent, of the total overall points possible. Functionality areas were from the remaining 80 points, or 40 percent of the total possible. These were reported subcategorized from the overall WebMAC scores. WebMAC content scores ranged from 41 to 111 with a mean score of 91.44 (76.20%) and a standard deviation of 14.79. WebMAC functionality scores ranged from 15 to 79 with a mean of 59.94 (74.93%) and a standard deviation of 12.82. An overview of WebMAC summary statistics is located in Table IX.

A comparative analysis of WebMAC mean scores was also conducted. Results are also found in Table IX. Overall WebMAC mean scores between groups differed by 1.15 points, while mean subscores for content and functionality were 91.49 and 91.38 (content) and 59.37 and 60.62 (functionality) for Project and Non-project educators, respectively. Tests for equal variances associated with WebMAC group mean total scores indicated the variances were unequal. Therefore, the t-value calculated for unequal variances was used to determine if the Project and Non-project group means were significantly different. Across all WebMAC mean scores and subscores, the differences between Project and Non-project groups means were not statistically different at the 0.05 level of significance.

Table IX

Summary of WebMAC scores by educator group (N=63)

		WebMAC Scores							
		Content		Functionality		Total			
Group	n	M	SD	M	SD	M	SD	t	p
Project	34	91.49	17.30	59.37	14.80	150.85	31.12	--	--
Non-Project	29	91.38	11.48	60.62	10.24	152.00	18.81	--	--
All educators	63	91.44	14.79	59.94	12.81	151.38	25.99	0.1798	0.8579

df = 61; $\alpha = 0.05$

Relationships Between and Among Variables

Objective 5: Determine if relationships exist between and among selected educator characteristics, computer anxiety, and Website quality.

Analysis of Variance

Table X presents analysis of variance (ANOVA) results for mean CAIN scores by the selected educator characteristics grade level taught, WWW access location, and perceived computer skill level. Comparisons of mean CAIN scores within grade level and WWW access location were not statistically significant. However, analysis of variance results for CAIN scores by perceived computer skill level were statistically different (df=3, F=4.30, p =0.0089) at the 0.05 level of significance. Further analysis of this variable demonstrated the Least Squares Mean value in the beginner category

Table X

Analysis of variance results for mean CAIN score by selected educator characteristics (N=64)

Source	Least Squares Means	Df	F-value	p
Variable				
Grade level taught		4	0.92	0.4605
WWW access location		2	2.13	0.1292
Computer skill level		3	4.30	0.0089*
Beginner	58.49a			
Novice	38.44b			
Intermediate	37.97b			
Advanced	32.14b			

Note: Least Squares Means with the same letter are not significantly Different; *p< .05

differed significantly (α=0.05) from novice, intermediate and advanced self-perception scores.

Analysis of CAIN scores by the characteristics gender and computer training were also found not to be statistically significant. T tests for the variable gender, resulted in a non-significant t-value of 0.4008 (df=62, p=0.6900). Similarly for computer training, a t-test detected no statistically significant difference in mean CAIN scores between those individuals who had and not had previous coursework in computer subject matter (t=1.777, df=62, p=0.0804).

Table XI presents analysis of variance results for mean WebMAC scores and subscores by selected educator characteristics. Mean WebMAC scores and subscores were analyzed within the selected characteristics grade level taught, WWW access location, and perceived computer skill level. These analyses did not reveal any

Table XI

Analysis of variance for WebMAC scores by selected educator characteristics (N=63)

Source	df	F	p
Variable			
WebMAC	9	0.57	0.8119
Grade level taught	4	0.92	0.4685
Internet access location	2	0.21	0.8099
Computer skill level	3	0.29	0.8348
WebMAC—content	9	0.91	0.5280
Grade level taught	4	1.70	0.1646
Internet access location	2	0.45	0.6382
Computer skill level	3	0.15	0.9316
WebMAC—functionality	9	0.52	0.8525
Grade level taught	4	0.49	0.7412
Internet access location	2	0.10	0.9095
Computer skill level	3	0.49	0.6922

$\alpha = 0.05$

statistically significantly differences at the 0.05 level. Analyses of WebMAC scores and subscores for gender and computer training were also found to not be statistically significant.

T tests on WebMAC scores by gender, produced a non-significant t-value of 0.4110 (df=61, p=0.6893). The t-values for mean subscores for WebMAC content and WebMAC functionality were 0.2228 (df=61, p=0.8244), 0.5766 (df=61, p=0.5663) were also non-significant. Similarly for computer training, t-tests revealed no statistically significant difference in WebMAC mean scores (t=0.6595, df=61, p=0.5121), WebMAC-content mean scores (t=.6402, df=61, p=.7349), and WebMAC-functionality mean scores (t=.9469, df=61, p=.3474) between those individuals who had and not had previous coursework in computer subject matter. All t-tests were conducted at the 0.05 level of significance.

Correlations

Pearson Product-Moment Correlation tests were conducted with individual CAIN scores and WebMAC scores and subscores. These tests were to determine if relationships existed between computer anxiety levels and perceptions of Website motivational quality, including the component areas of content and functionality. Davis (1971) described relationships between and among variables as follows: .70 and higher equaled very strong association; .50 to .69 equaled substantial association; .30 to .49 equaled moderate association; .10 to .29 equaled low association; and .01 to.09 equaled negligible association (as cited in Terry, Herring, and Larke, 1992).

Strong significant positive correlations were found between overall WebMAC scores and the subscores for content (r=0.95) and functionality (r=0.93). Correlations between computer anxiety and the motivational quality sub-area of functionality yielded a low significant negative correlation (r= -0.25). This indicated that as computer anxiety level increased the perception of Website functionality decreased. Table XII presents the correlations between computer anxiety and motivational quality and its component sub-areas. All correlations were tested at the 0.05 level of significance.

Table XII

Summary of Pearson Product Moment Correlations between individual CAIN scores and individual WebMAC scores and subscores (N=64)

	CAIN	WebMAC total	WebMAC content	WebMAC functionality
CAIN	---	-0.21	-0.15	-0.25*
WebMAC		---	0.95*	0.93*
WebMAC content			---	0.77*
WebMAC functionality				---

*p < .05

Educator comments

Respondents were not prohibited from adding personal thoughts, comments, and suggestions to their evaluations of the Website. Evaluators made the following unedited comments.

- No sound on our system
- Didn't get sound
- These questions don't seem appropriate for a person with a computer (Computer Opinion Survey
- I'm not sure of interactivity opportunities beyond the guestbook
- I got instantly frustrated! It was fun to get to the web site but then I couldn't look at lessons. I don't know enough to know if its me, my computer, the site or who ever else's problem, but I'm not playing! And besides, my picture isn't in there so I don't count anyway!
- When trying to view the guestbook, it did not show me the next 10 guests when I clicked there. I could only get the first 10 guests.
- Attached is a copy of the error message I received when trying to sign the guest book. I have encountered different errors (which I was able to correct at this end) before.
- When I clicked on "HOME" from the Kids Farm, and in the lessons section, I encountered the second attached error message.
- Personnel information is out-of-date
- I have only visited the site twice…first in our initial training, and then last Monday when we were asked to evaluate the site and we went to XXXX Jr. High since it hasn't been available @ XXXXXX. Therefore, I'll only respond to items that I feel comfortable rating and adequately exposed to.
- The spinning food & fiber emblem on the home page bothers me; it never stops!

- Job well done! When I have more time, I would like to send you some URL's that you might want to use on the F&F website. Keep up the good work! I really enjoy the web page. My favorite is the top 1000! I was delighted to find it.
- When I click on rotating "Home" at bottom of Framework, I go to http://food_fiber.edu/index.html which seems to be a "Table of Contents" by Dwayne Hunter which seems unrelated to Food & Fiber. Same when I click rotating "Home" on "How to Use This Page," and everywhere else I tried it.
- Did not have sufficient time to complete before school was out.
- I found the spinning wheel on the homepage to be quite distracting to me! Otherwise, I loved the website!
- Site of the week did not change.
- A very well-organized web site and easy to maneuver. I was very impressed with the thorough and complete lesson plans. I looked at other links and lesson plans available on the web and found many to be slight with little information beyond a one paragraph activity and a couple of books listed. I appreciated your complete plans.
- As a public library reference and children's librarian, I have used your site and especially the lesson plans, suggested web sites and links to help answer reference questions for my customers. It has been very helpful because of the wide range of topics relating to agriculture that you cover. My only suggestion would be to add to your links page, using sites you refer to in lesson plans and then linking back to the appropriate lesson would be helpful.
- Thanks for a useful site. I'm sure I'll be visiting again.
- Although I am not teaching at this time, I taught Math 4-5-6. I enjoyed the website – especially the related activities.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The intent of this chapter was to present concise summaries of the a) rationale and purpose of the study, b) objectives of the study, c) design of the study, and d) major findings of the research. In addition, conclusions and recommendations were formulated based on the analysis of data and findings.

Rationale and Purpose

The Food and Fiber Systems Literacy Website was developed primarily for use by its Project educators during the 1997-98 academic year. However, as the Website would remain available indefinitely through the World Wide Web, an assessment of user perceptions regarding its characteristics and overall usability was necessary in order affirm its merit to educators. Therefore, to provide the most useful Website for educators, a need existed to ascertain the quality and functionality of the Food and Fiber Systems Literacy Project Website as perceived by educators.

The purpose of the study was to assess the quality of the Food and Fiber Systems Literacy Project Website as perceived by Project and selected Non-project groups of educators.

Objectives

Five objectives were established to achieve the purpose of this study. The objectives were to:

1. Identify selected characteristics of Food and Fiber Systems Literacy Project and selected Non-project educators.
2. Compare Project and selected Non-Project educators' computer knowledge and Computer Anxiety Index scores.
3. Identify selected profile characteristics of users accessing the Food and Fiber Systems Literacy Website.
4. Compare motivational quality scores of Project and selected Non-project educators.
5. Determine if relationships exist between and among selected educator characteristics, computer anxiety, and Website quality.

Design of Study

Population

The population for the study included elementary and junior high school educators from Oklahoma, Montana, California, Pennsylvania, Nebraska, and Texas. Two purposive samples were used from this population.

The selected educators represented two groups. The first group was comprised of educators in Oklahoma, Montana, Pennsylvania, and California and represented Food and Fiber Systems Literacy Project pilot-test schools. The second educator group included selected educators from Non-project schools located in Oklahoma, California, Texas, and Nebraska. These educators had no official affiliation with the Project and had not used the Website previously. A total of 64 educators completed Website evaluation instruments, 35 from Project schools and 29 from Non-project schools.

Instrumentation

To gather the information needed to fulfill the purpose and objectives of this study, a two-part instrument was assembled. Part I sought to identify selected educator characteristics and to ascertain educators' opinions of computers using the Computer Anxiety Index (CAIN). The initial page consisted of seven items related to selected characteristics of educators. These items focused on gender, teaching experience, grade level taught, Internet access location, computer training, and computer skill level perception. The CAIN was comprised of 26 computer-related statements that respondents rated using a six-point Likert-type scale (1=Strongly Agree, 6=Strongly Disagree). One half of the statements were negatively worded and reverse-coded. Scores could range from 26 (low anxiety) to 156 (high anxiety). Internal consistency, as measured by Cronbach's alpha coefficient, was calculated to be 0.94.

Part II incorporated the Website Motivational Analysis Checklist (WebMAC) Version 2.0 to gather quality perceptions through content and functionality scores of the Website. The WebMAC was created at Syracuse University and was used with permission granted from its developers. It contained 40 randomized statements that were classified into seven categories; four identifying content-related characteristics and three identifying functionality characteristics. A total overall score of 200 was possible (40 questions x 5 points). A score of 160-200 indicated the website was high in motivational quality. A score of 80 to 159 showed the website was somewhat motivating, but could be improved. A score between zero and 79 exemplified a website that needed improvement of its motivational quality.

Content validity and reliability of the instrument were determined using Food and Fiber Systems Literacy personnel, Agricultural Education faculty, and selected Agricultural Education graduate students. The internal consistency of WebMAC version 2.0 was calculated using Cronbach's alpha procedure and yielded a coefficient of 0.87.

Additional data regarding Website visits and visitor profiles were reported by WebTracker, a Website visitor tracking service.

Collection of Data

Data were collected from Project and Non-project educators from April through October 1998. Website evaluation instruments were distributed to Project schools at the end of the spring semester of the 1997-98. Following the identification of selected Non-project educators, evaluation instruments were mailed to site coordinators at each respective school. The researcher downloaded Webtracker summary statistics exactly one year after its initial registration.

Major Findings of the Study

Objective 1

Due to Project educators' affiliation with the Food and Fiber Systems Literacy Framework pilot-testing, it was expected that the group was well distributed through all grade groupings. The greatest representation occurred within the 6-8 grade grouping. The Project group had been teaching fourteen years and most often accessed the World Wide Web through their schools.

Non-project educators were generally grade 6-8 teachers, but representation by administrators, technology, or resource educators was also more common. These educators also had taught approximately 14 years on average with their most customary means of WWW access at school.

Objective 2

A majority of the Project educators indicated previous formal educational training in computer programming or computer applications. They perceived their computer skills at the novice to intermediate level. This group had a mean CAIN score of 46.13, twelve points less than the reported norm of 58.06.

The Non-project group of educators also had previous formal educational training in computer programming or computer applications, but indicated a more advanced computer skill perception than the Project educators. The group had a mean CAIN score of 45.00 compared to the norm of 58.06.

A comparison of Project and Non-project educators' mean CAIN scores found no statistical difference at the 0.05 level of significance.

Objective 3

Visitors to the Food and Fiber Systems Literacy Website were mainly using Netscape or Microsoft Internet Explorer browsing software and running Windows 95 or NT operating systems. The majority of the visitors entered the site during school hours and had been to the Website eight or more times. First time visitors represented about one-third of the hits. As determined from persistent cookies (electronic tags) just under half of the visitors were using computers at educational institutions (.edu) while nearly twenty percent represented commercial domains (.com). Visitors also represented eight different countries. Unfortunately, about thirty percent of the visitors were not trackable.

Objective 4

Mean WebMAC scores determining Website motivational quality were calculated and analyzed. Non-project educators scored slightly higher than Project educators, 152.00 to 150.85. According to the WebMAC rating scale, this indicated the website was somewhat motivating, but could be improved. Subsection scores for content and functionality were also calculated. Project educators' mean scores for content and functionality appeared similar to Non-project educators' scores. A statistical comparison of the Project and Non-project educators' mean WebMAC scores found no statistical difference at the 0.05 level of significance.

<u>Objective 5</u>

Analysis of variance tests across selected educator characteristics and overall mean CAIN scores found no statistically significant differences except with the variable perceived computer skill level. The mean CAIN score for educators with self-perceptions as beginners were statistically different than novice, intermediate, and advanced mean scores

Pearson Product-Moment Correlation tests between all scores revealed a statistically significant, negative correlation between CAIN scores and WebMAC functionality subscores ($r = -0.25$). As computer anxiety levels increased, scores for Website functionality decreased slightly.

Conclusions

The conclusions were not to be generalized beyond the educator groups within this research. Examination and analysis of the major findings for each objective led to the following conclusions.

It was concluded:

1. Selected Educator characteristics across both groups were similar in regards to gender distribution, grade level teaching assignments, years of teaching experience, Internet access location, and previous formal computer training.
2. Computer anxiety existed for Project and Non-project educators with previous formal computer education experiences. Although the two groups indicated

comparable levels of computer anxiety, they were less computer anxious than the reported norm.

3. The typical profile of a computer user who accessed the Food and Fiber Systems Literacy Website included operating Windows© system software, utilizing Netscape© browser programs, and accessing the Internet predominantly from an educational institution. The average user had visited the Website more than eight times, most often during the school day.

4. Project and Non-project educators' perceptions of the motivational quality of the Food and Fiber Systems Literacy Website were nearly equal. Based on the WebMAC rating scale, the Food and Fiber Systems Literacy Website was "somewhat motivating, but there was room for improvement." From Website content and functionality perspectives, both educator groups also had near equal perceptions.

5. As educators' computer anxiety levels increased, perception of Website functionality tended to decrease.

Recommendations and Implications

Based upon the conclusions and major findings of the research, the following recommendations were made.

It was recommended:

1. User movement within the Website should be studied. As the Food and Fiber Systems Literacy Website consisted of numerous levels and contained many

hyperlinks, an onsite tracking program would assist the Website administrator in understanding the key visitor interests within the Website.

2. More Websites be evaluated using the WebMAC to establish norms for quality indicators of Websites. This would provide WebMAC users a comparative rating scale for the Website under evaluation.

3. Include selected open-ended questions to identify ways to improve the Website as WebMAC version 2.0 included only perception rating statements and no means to identify areas for Website improvement.

4. Attention be given to addressing computer anxiety when educators receive computer training. Although computers are very pervasive in our educational systems, computer anxiety continues to be an area of concern to educators.

5. WebMAC users' computer specifications including operating system specifications, hardware, modem, and browser software programs be identified by the instrument. Although technical in nature, gathering this information would allow researchers to better assess Website functionality perceptions.

6. Further investigation of the Food and Fiber Systems Literacy Website continue to determine specific areas for motivational quality improvement. This would provide guidance to the Website administrator in addressing specific areas of concern.

7. Further research be conducted with the WebMAC on similar content Websites and compare those findings to the Food and Fiber Systems Literacy Website Evaluation.

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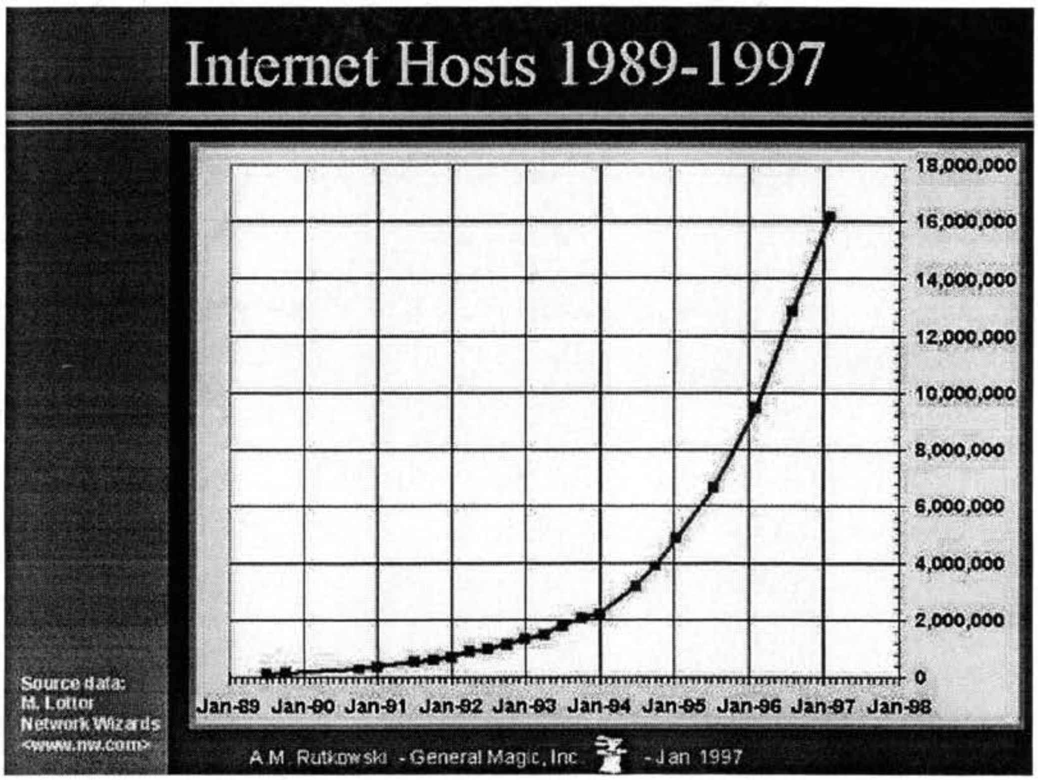
APPENDIXES

APPENDIX A

INTERNET HOST TRENDS


Internet Hosts 1989-1997
18,000,000
16,000,000
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
Jan-89 Jan-90 Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98
Source data:
M. Lottor
Network Wizards
<www.nw.com>
A.M. Rutkowski - General Magic, Inc. - Jan 1997

APPENDIX B

INSTITUTIONAL REVIEW BOARD APPROVAL

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 07-21-98 **IRB #: AG-99-000**

Proposal Title: FOOD AND FIBER SYSTEMS LITERACY WEBSITE EVALUATION

Principal Investigator(s): James G. Leising, Dan Hubert

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING, AS WELL AS ARE SUBJECT TO MONITORING AT ANY TIME DURING THE APPROVAL PERIOD.
APPROVAL STATUS PERIOD VALID FOR DATA COLLECTION FOR A ONE CALENDAR YEAR PERIOD AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Disapproval are as follows:

Signature: Thomas C. Collins

Date: July 27, 1998

Interim Chair of Institutional Review Board
and Vice President for Research
cc: Dan Hubert

APPENDIX C

WEBSITE EVALUATION INSTRUMENT

Food and Fiber Systems Literacy Project

Website Evaluation

Part I

Directions: Please complete the following statements and questions. The results of this evaluation will be used to revise and continue development of the Food and Fiber Systems Literacy Project website, making it more useful to as many teachers across the country as possible.

1. My gender is ____ ***Male*** ____***Female***

2. This is my ______________ year of teaching in a school.

3. The grade level(s) I teach this year is/are ________________.

4. I most often access the World Wide Web at:

   School ***Library*** ***At home*** ***Other*** ***Please specify*** ______________

5. I have taken a one or more course(s) in computer applications and/or computer programming.

   Yes ***No***

6. If your response to # 5 was "yes", how many semester credit hours in computer applications and/or computer programming have you completed?

   __________ ***Semester credit hours***

7. I would rate my computer skill level as:

   Beginner ***Novice*** ***Intermediate*** ***Advanced***

Computer Opinion Survey

Instructions: please indicate how you feel about the following statements. Use the scale below to indicate your feelings. Click the box that you believe best reflects your level of agreement.

1= Strongly Agree 2= Agree 3=Slightly Agree 4=Slightly Disagree 5=Disagree 6=Strongly Disagree

1.	Having a computer available to me would improve my productivity.	1 2 3 4 5 6
2.	If I had to use a computer for some reason, it would probably save me some time and work.	1 2 3 4 5 6
3.	If I use a computer, I could get a better picture of the facts and figures.	1 2 3 4 5 6
4.	Having a computer available would improve my general satisfaction.	1 2 3 4 5 6
5.	Having to use a computer could make my life less enjoyable.	1 2 3 4 5 6
6.	Having a computer available to me could make things easier for me.	1 2 3 4 5 6
7.	I feel very negative about computers in general.	1 2 3 4 5 6
8.	Having a computer available to me could make things more fun for me.	1 2 3 4 5 6
9.	If I had a computer at my disposal, I would try to get rid of it.	1 2 3 4 5 6
10.	I look forward to a time when computers are more widely used.	1 2 3 4 5 6
11.	I doubt I would ever use computers very much.	1 2 3 4 5 6
12.	I avoid using computers whenever I can.	1 2 3 4 5 6
13.	I enjoy using computers.	1 2 3 4 5 6
14.	I feel that there are too many computers around now.	1 2 3 4 5 6
15.	Computers are probably going to be an important part of my life.	1 2 3 4 5 6
16.	A computer could make learning fun.	1 2 3 4 5 6
17.	If I were to use a computer, I could get a lot of satisfaction from it.	1 2 3 4 5 6
18.	If I had to use a computer, it would probably be more trouble than it was worth.	1 2 3 4 5 6
19.	I am usually uncomfortable when I have to use computers.	1 2 3 4 5 6
20.	I sometimes get nervous just thinking about computers.	1 2 3 4 5 6
21.	I will probably never learn to use a computer.	1 2 3 4 5 6
22.	Computers are too complicated to be of much use to me.	1 2 3 4 5 6
23.	If I had to use a computer all the time, I would probably be very unhappy.	1 2 3 4 5 6
24.	I sometimes feel intimidated when I have to use a computer.	1 2 3 4 5 6
25.	I sometimes feel that computers are smarter than I am.	1 2 3 4 5 6
26.	I can think of many ways that I could use a computer.	1 2 3 4 5 6

Website Quality Analysis

Food and Fiber Systems Literacy Project

Part II

Directions for Using WebMAC:
Before using this instrument, you need to explore as much of our web site as possible to have some familiarity with its content and structure.

You may need to navigate through the website areas more than once to complete this checklist.

For each item, choose the corresponding number that best reflects your opinion. If you believe an item is *not applicable* or *not appropriate* to this website, circle the N/A for that item. If the item is not present in the website *but it could or should have been used*, select the N/P column for the corresponding item.

Special thanks to Dr. Ruth Small**, Syracuse University for use of the WebMAC--Website Motivational Analysis Checklist (version 2.0)**

WebMAC--Website Motivational Analysis Checklist (version 2.0)

	Very Poorly				Very Well	
1. Summaries at key points of large blocks of text	1	2	3	4	5	NA
2. Pleasing colors and background patterns	1	2	3	4	5	NA
3. Interactive feedback available	1	2	3	4	5	NA
4. Logical organization and sequence of content	1	2	3	4	5	NA
5. User control of amount of information accessed	1	2	3	4	5	NA
6. Only necessary and useful information	1	2	3	4	5	NA
7. Familiar vocabulary and examples	1	2	3	4	5	NA
8. Crisp, clear graphics	1	2	3	4	5	NA
9. Graphics that contribute to the content	1	2	3	4	5	NA
10. Navigation cues to prevent becoming lost	1	2	3	4	5	NA
11. Accurate information	1	2	3	4	5	NA
12. Content/links match needs of intended audience	1	2	3	4	5	NA
13. Early introduction to or overview of scope of content	1	2	3	4	5	NA
14. Eye-catching title and/or visual on home page	1	2	3	4	5	NA
15. Video that contributes to the content	1	2	3	4	5	NA
16. User-control of pacing (when/how fast to move through system)	1	2	3	4	5	NA
17. Appropriate use of humor	1	2	3	4	5	NA
18. Interesting content	1	2	3	4	5	NA
19. Navigation that requires minimal user skills	1	2	3	4	5	NA
20. Up-to-date information	1	2	3	4	5	NA

	Very Poorly				Very Well	
21. Adequate response speed (minimum of high-end graphics)	1	2	3	4	5	NA
22. Access to system help at all times	1	2	3	4	5	NA
23. Easy to browse	1	2	3	4	5	NA
24. User control of type of information accessed	1	2	3	4	5	NA
25. Variation in use of text, images and/or sound	1	2	3	4	5	NA
26. Large blocks of text broken up with white space & visuals	1	2	3	4	5	NA
27. Credible sources of information	1	2	3	4	5	NA
28. Fun to explore	1	2	3	4	5	NA
29. Sound that contributes to the content	1	2	3	4	5	NA
30. All links are active	1	2	3	4	5	NA
31. Inclusion of unique elements	1	2	3	4	5	NA
32. Simple, clear directions	1	2	3	4	5	NA
33. Surprising features	1	2	3	4	5	NA
34. Content that is consistent with its purpose	1	2	3	4	5	NA
35. Adequate coverage of topic	1	2	3	4	5	NA
36. Consistent placement of navigational mechanisms	1	2	3	4	5	NA
37. Content written in a clear and consistent language and style	1	2	3	4	5	NA
38. Opportunities to interact with authors	1	2	3	4	5	NA
39. User control of difficulty level of content	1	2	3	4	5	NA
40. Opportunities for interactivity	1	2	3	4	5	NA

Website Motivational Analysis Checklist 2.0 (WebMAC)
Scoring Sheet

Directions for Scoring WebMAC: All WebMAC items have been categorized to allow more specific assessment of the motivational quality of your website. For each of the six categories listed below, add the scores for all of its related WebMAC items. Assign a score for each category. Then go back and count all N/A and N/P items for that category and write that number on the appropriate line.

Capture Interest:		
Items 2, 8, 14	Your Website Score:	__ (out of 15)
	# Items N/A or N/P:	__ (out of 3)
Maintain Interest:		
Items 7, 17, 18, 25, 26, 30, 31, 33, 37	Your Website Score:	__ (out of 45)
	# Items N/A or N/P:	__ (out of 9)
Useful Information:		
Items 1, 6, 9, 12, 13, 15, 29, 34	Your Website Score:	__ (out of 40)
	# Items N/A or N/P:	__ (out of 8)
Credible Information:		
Items 11, 20, 27, 35	Your Website Score:	__ (out of 20)
	# Items N/A or N/P:	__ (out of 4)
Easily Navigable:		
Items 3, 4, 10, 19, 22, 23, 32, 36	Your Website Score:	__ (out of 40)
	# Items N/A or N/P:	__ (out of 8)
Shared Control:		
Items 5, 16, 24, 38, 39	Your Website Score:	__ (out of 25)
	# Items N/A or N/P:	__ (out of 5)
Satisfying Experience:		
Items 21, 28, 40	Your Website Score:	__ (out of 15)
	# Items N/A or N/P:	__ (out of 3)
	Total WebMAC Score:	___ (out of 200)

Key:

160-200:	Your website is high in motivational quality.
80-159:	Your website is somewhat motivating but could be improved.
0-79:	This website needs serious improvement of its motivational quality.

[If your score for one or more categories is low or if you have a large proportion of N/A or N/P for any category, you may want to consider ways to incorporate some of the specific strategies for that category into your website to improve its motivational quality.]

APPENDIX D

FOOD AND FIBER SYSTEMS LITERACY FRAMEWORK
STANDARDS AND BENCHMARKS

I. Understanding Food and Fiber Systems

Benchmarks	Standards: A. Understand the meaning of Food and Fiber Systems/agriculture.	B. Understand the essential components of Food and Fiber Systems (e.g production, processing, marketing, distribution, research and development, natural resource management, and regulation).	C. Understand Food and Fiber Systems' relationship to society.
K-1	Students will discover food, clothing, and shelter originate from plants and animals. They will match and/or illustrate a product and its origin.	Students will identify types of farms. They will match different kinds of farms to their products.	Students will identify Food and Fiber Systems products. They will give examples of agricultural products they use.
2-3	Students will tell how agriculture provides people's basic food, clothing, and shelter needs. They will identify regional agricultural products and the basic needs they fulfill.	Students will describe the journey of an agricultural product from the farm to the consumer. They will label the sequence of steps a food or fiber product takes from production, processing, marketing and distribution to the consumer.	Students will identify people who work in Food and Fiber Systems. They will categorize people in the community who provide food, clothing, and shelter.
4-5	Students will identify the natural resources Food and Fiber Systems use to provide people's basic needs. They will describe how resources (rivers, forests, oceans, range land, etc.) contribute to world agricultural production.	Students will determine the role of natural resource management in Food and Fiber Systems. They will explain the importance of managing soil, air, water and energy to agricultural production.	Students will identify major agricultural commodities produced in their state. They will compare commodity output at state and national levels.
6-8	Students will define agriculture in terms of the Food and Fiber System components . They will show agriculture is a complex system of production, processing, marketing and distribution.	Students will describe the function of Food and Fiber System components, including production, processing, marketing, distribution, research and development, natural resource management, and regulation. They will discuss the function of each component.	Students will recognize Americans spend the smallest proportion of personal income on food. They will compare how much Americans spend on food to the amount others spend.
9-12	Students will explain why agriculture is the foundation of a nation's standard of living. They will demonstrate that Food and Fiber Systems must be sustainable, and resources used must be renewed and replenished.	Students will explain the importance of the essential components of Food and Fiber Systems and describe their interdependence. They will discuss how the components have changed.	Students will identify plant and animal products that serve as ingredients for producing products that meet societal needs other than food, clothing and shelter. They will explain plant and animal products and byproducts are used to manufacture medical, cosmetic, cleaning and other products.

Standards		
D. Understand the local, national, and international importance of Food and Fiber Systems.	**E. Understand Food and Fiber Systems careers.**	**Benchmarks**
Students will identify local Food and Fiber Systems businesses. They will match these businesses to agricultural products.	Students will identify Food and Fiber Systems jobs in the community. They will collect pictures of people doing agricultural work.	**K-1**
Students will determine resources, such as water and land, are shared by households, businesses, and agriculture. They will describe examples of multiple uses for land and water resources.	Students will generate a list of Food and Fiber Systems careers. They will research characteristics of agricultural careers.	**2-3**
Students will explain how traders, explorers, and colonists brought plants and animals to this country. They will locate the origins of regional agricultural products available.	Students will examine the changes in Food and Fiber Systems due to technological advances, and subsequent changes in occupational opportunities. They will identify agricultural careers and how they have changed.	**4-5**
Students will examine why agriculture is the oldest, largest, and most-essential industry. They will discuss the national and international importance of Food and Fiber Systems.	Students will recognize that agricultural inventions and discoveries produce new career opportunities. They will compare knowledge, skills, and attitudes required for entry-level, technical, and professional careers in Food and Fiber Systems.	**6-8**
Students will explain how globalization has impacted commodities traded on world markets. They will cite examples of how global markets affect personal and professional choices.	Students will discuss non-traditional agricultural careers and their effects on other industries. They will create a career path and determine its relationship to Food and Fiber Systems.	**9-12**

II. History, Geography, and Culture

Benchmarks	Standards: A. Understand Food and Fiber Systems' role in the evolution of civilizations.	B. Understand Food and Fiber Fystems' role in societies throughout world history.	C. Understand Food and Fiber Systems' role in U.S. history.
K-1	Students will illustrate how agriculture provides food, clothing and shelter. They will classify agricultural products as food, clothing, or shelter.	Students will illustrate how events, such as seasonal festivals, focus on Food and Fiber Systems . They will identify agriculture-based celebrations or festivals in the community.	Students will realize most early Americans were agriculturalists. They will identify prominent early Americans involved in Food and Fiber Systems .
2-3	Students will explain how agriculture is the foundation of civilizations. They will identify family experiences or involvement with Food and Fiber Systems .	Students will identify an early society. They will illustrate agriculture's role in sustaining that society.	Students will describe how native and settler populations interacted with the environment. They will identify the origins of food, clothing, and shelter of American Indians and early settlers.
4-5	Students will analyze how early inhabitants mostly relied on hunting and gathering. They will describe agricultural changes from nomadic societies to permanent settlements.	Students will discuss how the desire to obtain exotic foods and spices, and precious gems and minerals motivated European exploration. They will trace the origins of food, fiber, and natural resources early European explorers traded.	Students will illustrate how people seeking to meet their basic needs moved from region to region as resources became scarce. Students will describe examples of immigration and migration in U.S. history.
6-8	Students will determine agriculture's role in the development of civilizations. They will evaluate innovations that increased the availability of food, clothing, and shelter.	Students will explain how expanded trade led to development of industrialized societies. They will evaluate the importance of agricultural commodities in the growth of international trade during the Age of Exploration.	Students will identify historical events that influenced agricultural development. They will describe positive and negative impacts on Food and Fiber Systems, resulting from historical events.
9-12	Students will compare nomadic life to settlements and towns. They will analyze how the barter system evolved and encouraged economic growth, communication, and multiculturalism.	Students will identify nations where international food and fiber involvement exists. They will investigate the impact of global societies on food and fiber systems.	Students will identify the role agriculture played in U.S. development. They will analyze agriculture's role in events that shape the nation.

Standards		
D. Understand the relationship between Food and Fiber Systems and world cultures.	**E. Understand how different viewpoints impact Food and Fiber Systems.**	**Bench-marks**
Students will discover foods they consume originated from different countries. They will trace foods back to the original country.	Students will realize people live in cities, towns, and rural areas. They will illustrate characteristics of cities, towns, and rural areas.	**K-1**
Students will explain why agriculture influences food and clothing in cultures. They will compare food and clothing among cultures.	Students will determine whether they live in a city, suburb, town, or rural area. They will give examples of contrasting views of Food and Fiber Systems in the community.	**2-3**
Students will identify geo-graphic origins of plants and animals. They will locate current world-production areas of Food and Fiber Systems products.	Students will identify Food and Fiber Systems issues in the community or state. They will contrast different viewpoints of each issue.	**4-5**
Students will explain how geography influences food and fiber production. They will analyze regional geographic characteristics influencing food, clothing, and shelter choices.	Students will summarize national Food and Fiber Systems issues. They will analyze the viewpoints of major stakeholders.	**6-8**
Students will recognize world cultures affect agriculture. They will explain how consumer trends impact Food and Fiber Systems.	Students will compare global issues impacting Food and Fiber Systems. They will justify personal viewpoints based on research.	**9-12**

III. Science, Technology, and Environment

Benchmarks	Standards: A. Understand how ecosystems are related to Food and Fiber Systems.	B. Understand Food and Fiber Systems dependence on natural resources.
K-1	Students will identify the natural life cycles of plants and animals. They will illustrate life-cycle stages.	Students will identify natural resources. They will illustrate natural resources used by Food and Fiber Systems.
2-3	Students will describe components of an ecosystem. They will illustrate specific components of an ecosystem in the community.	Students will describe renewable and non-renewable natural resources. They will classify natural resources used in the production of food, clothing, and shelter into renewable or non-renewable categories.
4-5	Students will discover ecosystems regenerate. They will analyze the interaction of Food and Fiber Systems with natural cycles.	Students will examine how living organisms transform natural resources into consumer products. They will analyze food, clothing, and shelter to determine the natural resources used.
6-8	Students will discover similarities of ecosystems in the world. They will categorize ecosystems by common characteristics (e.g. topography, climate, soil type and other factors).	Students will identify classes of organisms involved in Food and Fiber Systems. They will explain the roles of these organisms in agriculture.
9-12	Students will identify how Food and Fiber Systems affect ecosystems. They will evaluate the positive and negative impacts of agriculture on ecosystems.	Students will explain why all countries' agricultural systems depend on natural resources. They will evaluate why Food and Fiber Systems compete for natural resources.

Standards: C. Understand management and conservation practices used in Food and Fiber Systems.	Standards: D. Understand science and technology's role in Food and Fiber Systems.	Benchmarks
Students will define natural resource conservation. They will describe ways to conserve natural resources.	Students will identify tools and machines used in Food and Fiber Systems. They will give examples of tools and machines used to produce food and fiber products.	K-1
Students will identify natural resource-management practices that limit pollution. They will cite agricultural practices used to manage and conserve soil, water, and air.	Students will recognize inventors and their inventions related to Food and Fiber Systems. They will describe the agricultural importance of the inventions.	2-3
Students will identify pest-management practices in Food and Fiber Systems. They will compare traditional and alternative pest-management practices.	Students will explain how technological advancements enhance Food and Fiber Systems' efficiency. They will list technologies that reduce manual labor needs in agriculture.	4-5
Students will identify agencies and policies that regulate natural resources-management and conservation of Food and Fiber Systems. They will determine the impact these policies and regulations on food and fiber systems.	Students will identify Food and Fiber Systems careers dependent on science and technology skills. They will contrast these skills needed for agricultural and non-agricultural careers.	6-8
Students will recognize U.S. management and conservation practices impact other countries. They will evaluate the impact of these practices on Food and Fiber Systems in other countries.	Students will recognize how science and technology impact Food and Fiber Systems. They will analyze the effects of science and technology on food, clothing, shelter, and career choices.	9-12

IV. Business and Economics

Benchmarks	Standards: A. Understand Food and Fiber Systems and economics are related.	Standards: B. Understand Food and Fiber Systems have an impact on local, national, and international economies.
K-1	Students will recognize agricultural products have monetary value. They will explain how food and clothing are worth money.	Students will identify people in the community who rely on Food and Fiber Systems to make a living. They will connect Food and Fiber Systems to local businesses.
2-3	Students will describe how a shortage or surplus of a product provides an opportunity for trade. They will predict what happens when shortages or surpluses occur.	Students will recognize people responsible for delivering agricultural products to consumers. They will compare jobs performed from production to consumption.
4-5	Students will define agribusiness. They will give examples of agribusinesses in the community.	Students will identify how value is added to raw agricultural products after production. They will compare the value of raw and processed products.
6-8	Students will identify Food and Fiber Systems-related careers. They will compare business and economic skills and educational qualifications for agricultural careers.	Students will identify industries whose inputs are from Food and Fiber Systems. They will evaluate industries to determine the agricultural inputs.
9-12	Students will identify events affecting food and fiber trade. They will analyze the economic impact of these events on Food and Fiber Systems .	Students will identify economic activities generated by Food and Fiber Systems. They will compare how agricultural and non-agricultural businesses influence the economy.

Standards: C. Understand government's role in Food and Fiber Systems.	Standards: D. Understand factors influencing international trade of food and fiber products.	Bench-marks
Not applicable at this level.	Students will recognize food and clothing comes from other countries. They will give examples of food and fiber products from other countries.	K-1
Students will recognize the government regulates Food and Fiber Systems. They will classify government functions, including safety, inspection, and grading.	Students will define import and export. They will identify U.S. food and fiber products exported to other countries.	2-3
Students will explain the need for government regulation in agriculture. They will give examples of regulations and laws impacting Food and Fiber Systems.	Students will explain why nations trade products and services. They will make a list of agricultural services the U.S. trades with other nations.	4-5
Students will recognize the government responds to people's needs related to Food and Fiber Systems. They will evaluate how these responses impact agriculture.	Students will explain "free trade" and "balance of trade." They will compare U.S. food and fiber trade policies to other nations' policies.	6-8
Students will identify international Food and Fiber Systems issues. They will analyze governments' roles in international agricultural issues.	Students will identify factors influencing international trade. They will explain how these factors impact U.S. food and fiber products and services.	9-12

V. Food, Nutrition, and Health

Benchmarks	Standards: A. Understand Food and Fiber Systems provide nourishment for people and animals.	B. Understand Food and Fiber Systems provide healthy-diet components.
K-1	Students will explain people and animals obtain sustenance from Food and Fiber Systems products. They will illustrate products people and animals eat.	Students will identify the parts of the Food Guide Pyramid. They will illustrate a well-balanced meal.
2-3	Students will distinguish between processed and unprocessed foodstuffs people and animals eat. They will compare how common foodstuffs eaten by humans and animals are differently processed.	Students will match food groups with their recommended daily servings. They will plan healthy meals for one day.
4-5	Students will identify ways of processing foodstuffs for people and animals. They will explain reasons for processing foodstuffs.	Students will identify the six basic food nutrients: carbohydrates, protein, water, vitamins, minerals, and fats. They will categorize foods based on nutritional content.
6-8	Students will identify agricultural products in food and feed. They will compare food and feed ingredient labels.	Students will interpret food nutritional labels. They will compare personal food intake to the USDA Food Guide Pyramid recommendations.
9-12	Students will recognize that food and feed products contain additives. They will categorize additives from ingredient labels.	Students will recognize life stages and activity levels change human nutrition requirements. They will construct healthy diet and exercise plans for different life stages and activity levels.

Standards		
C. Understand Food and Fiber Systems provide food choices.	**D. Understand Food and Fiber Systems promote a safe food supply.**	**Bench-marks**
Students will recognize how individual preferences affect food selection. They will show where their food preferences fit into the Food Guide Pyramid.	Students will recognize safe food practices. They will illustrate ways to practice food safety.	**K-1**
Students will identify food advertisements. They will explain the relationship between food choice and advertising.	Students will describe safe food handling, preparation, and storage. They will show proper handling, preparation and storage of foods.	**2-3**
Students will explain how factors, such as culture and convenience, affect food choices. They will analyze how food preferences have changed over time.	Students will recognize the government makes food safety policies. They will explain how these policies promote a safe food supply.	**4-5**
Students will explain how food choices are influenced by economics. They will compare food choices based on cost.	Students will recognize food contaminants. They will classify the contaminants that make food unsafe.	**6-8**
Students will describe how research and development influences food choices. They will research new food choices.	Students will recognize factors affecting a safe food supply. They will evaluate how food safety issues impact Food and Fiber Systems.	**9-12**

VITA

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Doctor of Philosophy

Thesis: AN ASSESSMENT OF THE QUALITY AND FUNCTIONALITY OF THE FOOD AND FIBER SYSTEMS LITERACY WEBSITE

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