EFFECT OF COGNITIVE PROBLEM-SOLVING STYLE, INTERNET USAGE, AND LEVEL OF INTERACTIVITY ON ATTITUDES TOWARD AND RECALL OF WEB-BASED INFORMATION

By

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This document is dedicated to my husband Aaron. Thank you.

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This study examined the effects of problem-solving style, level of Website interactivity, and Internet usage on an individual's attitude toward an information-driven Extension Website and subjects' recall of the information presented on that site. This study is based on a conceptual framework relating Kirton's Adaption Innovation Theory and Uses and Gratifications.

Successful problem-solving is in demand in the area of agriculture. As Extension services and communicators move to designing information online, it is cruicial that this information be presented in a form that will be usable, valuable, appropriate, and easy to recall. By understanding how problem-solving styles affect users' perceptions of Websites, with respect to such attributes as attitude and recall information, Extension, agricultural communicators, and commodity groups who are utilizing the Internet to

reach audiences will be better able to develop communications processes that match audience needs in order to inform them, educate them, and effect productive change.

This study shows that problem-solving styles, coupled with an individual's Internet usage have an affect on information recall. While researchers continue to debate if interactivity affects attitude and recall of information, these findings show no individual effects of interactivity on attitude and information recall when presenting information-driven content to a young adult population. However, it was found that for interactive or non-interactive versions of an information-driven site, information recall could vary based on problem-solving style and level of Internet usage.

There are populations such as innovative problem-solvers who retain information better from the non-interactive versions of online Extension information. The more adaptive individuals will actually do better with less structure and ambiguity when working online successfully. It is also noted that for low users of the Internet, the novelty of interactivity attracts and keeps the interest of users to increase their retention of information, as supported by the literature. These findings encourage designers of information-driven sites to take inventory of how they are presenting their information to specific audiences.

CHAPTER 1
INTRODUCTION

Introduction to the Study

> "A cow that was cleared of having mad cow disease last fall by the U.S. Department of Agriculture was in fact infected with the brain-wasting disease, the department announced Friday, making it the second confirmed case of the disease in this country" *The Chicago Tribune* reported on June 25, 2005 (U.S. Confirms Mad Cow, 2005).

Communicating information about science has always been an important endeavor, but perhaps never as crucial as it is today. In an age which the technology to create the science seems to be in a race to outpace the technology used to communicate it, communicators must be set to address the changing needs of audiences. Today, the public is faced with many information choices, presented through a multitude of different communication channels. One such channel that has emerged as an important tool for those seeking science information is the Internet (Morris & Ogan, 1996).

Science-based information has the potential to create situations that save lives (Henroid, Ellis, & Huss, 2004). After completion of formal education, most people will only be exposed to science through chance encounters with news reporting (Treise & Weigold, 2002) and occasional informal education. Much of the information presented through mass media informs audiences about breakthroughs in science, food safety, medicine, and technology, all topics that have the potential to greatly influence lifestyles. While science information is usually thought of as being related to biology, biotechnology, food science, or horticulture, science topics covered by organizations like Extension also include social sciences and economic research. One such topic covered by

Extension science information includes budgeting and purchasing of large items like automobiles (University of Iowa, 1998).

The Internet can offer new challenges to those communicating science-based information to audiences (Henroid, Ellis, & Huss, 2004). Through the power to integrate other forms of media on the Web, communicators are now able to present complex, science-based information in new ways, such as interactive video, animations, and graphics, which create memorable learning experiences for viewers. Finding and retrieving information is considered to be more convenient by online users who are able to find information on many topics in a short amount of time (Henroid, Ellis, &Huss, 2004). Along with these new opportunities, however, come many challenges. Research is just beginning to examine the answers as to how user characteristics relate to the processing of design and display of information online. Given the importance of effectively conveying scientific information, researchers must examine the best methods available to help people successfully discover and interpret the information they find online.

Communication and Agricultural Science

Today's world is science-driven, and for the benefits of scientific advancements to be dispersed, publics need to be able to interpret and understand that information (Shortland & Gregory, 1991). A society's understanding of this information is important not only for the well-being of its citizens, but also for the continued support of these endeavors. Educated publics should be able to choose between conflicting reports on information concerning scientific advancements (Treise & Weigold, 2002). By effectively communicating science to audiences, favorable attitudes that are created

toward science and science funding will allow for a clearer understanding of the benefits that science adds to society (Treise & Weigold, 2002).

Scientific information tends to be complex, detailed accounts of new advancements or findings. Research has shown that science communicators often frame the news by only reporting on the breakthroughs (Gunter, Kinderlerer, & Beyleveld, 1999). For example, researchers, looking at the opinions of scientists and journalists, found that both groups agreed media coverage of biotechnology information was questionable, taking into account the complexity of the subject (Gunter, Kinderlerer, & Beyleveld, 1999). Poor reporting of this information has been a concern of scientists and researchers alike (Gunter, Kinderlerer, & Beyleveld, 1999; Treise & Weigold, 2002).

As a subset of the scientific community, agricultural science is an important aspect of science with respect to America's economy and environment (Ruth, Telg, Irani, & Locke, 2004). Many current scientific issues that have been extensively reported on, such as mad cow disease, biotechnology, and animal cloning, are all deeply embedded within agriculture.

Developments in agriculture over the last few years have created many opportunities, as well as challenges, to researchers and communicators. Agricultural and science information affects everyone on an everyday basis, whether they are aware of it or not (Saunders, Akers, Haygood, & Lawver, 2003; Lundy, Ruth, Telg, & Irani, 2005). It is vital that this information is perceived accurately by the general public, due to the significant impact of agriculture on society and public health (Terry & Lawver, 1995).

For generations, agriculture has been intertwined with greater human society by serving as a support and underpinning (Pawlick, 2001). However, as important as the

information is, many argue that agriculture science is minimally covered through the media (Pawlick, 2001). “The changes in agriculture and its impact on the American economy make the need for communicating agriculture crucial for creating an agriculturally literate public” (Lundy, Ruth, Telg, & Irani, 2005, p. 6). Frick, Birkenholz, and Machtmes (1995) also contend that every person should possess a minimum amount of knowledge and understanding of the scientific industry that provides food for human survival. The decreases in the farming and ranch populations have made this an even more vital need, as members of the general public, far removed from the rural setting, may no longer have accurate perceptions of agriculture (Saunders, Akers, Haygood, & Lawver, 2003). Consumers need to be literate on agricultural issues in order to respond aptly when issues that deal with the intersection of food and science occur. For this to take place, however, these issues must be communicated effectively.

The agricultural industry, the federal and state-mandated land grant institutions, the farm press, and academic journals continue to disseminate information on agricultural issues. Land grant institutions in particular, through their Cooperative Extension Services and public information specialists, are charged with the task of technology transfer and disseminating public-value information to their clientele and members of the general public (Seevers, Graham, Gamon, & Conklin, 1997). Until the advent of the Internet, Extension communicators were forced to use traditional mass media as their primary communications channel. However, traditional media gatekeepers, often focusing on news value as a function of their audience’s demographics and occupations, have been viewed by some as not always highly valuing agricultural news, and information with

respect to determining what is on the public, and consequently, the media agenda (Cartmell, Dyer, Birkenholz, & Sitton, 2004).

Extension's Role in Communicating Agriculture

As discussed earlier, one such organization charged with communicating science to audiences is the U.S. Cooperative Extension Service. Extension links education and research resources of the land-grant university, the United States Department of Agriculture (USDA), and county administrative units to provide scientific information to non-formal educational audiences (Seevers et al., 1997).

The Smith-Lever Acts of 1862, 1890, and 1990 formally integrated these resources to provide instruction and information in agriculture and home economics and related subjects to those not currently taking courses in the Land Grant colleges. The land grant College system was established through the Morrill Acts in 1862 and 1890 to provide at least one college in each state that would have a leading objective to provide learning opportunities related to agriculture and the mechanic arts to the industrial class (Seevers, Graham, Gamon, & Conklin, 1997).

Cooperative Extension has changed its focus over the years to include broader initiatives and issues by serving as problem solvers in issues of the environment and other social and economic changes going on in communities (Seevers et al., 1997). While Extension programs were historically seen as rural programs, they now cover almost every aspect of people's lives. They have also begun moving to reach greater audiences, including rural and non-rural audiences of all ages through new technological and communication outlets (Seevers et al., 1997).

Researchers over the last several years have been providing evidence of Extension's need to embrace Internet technologies to reach audiences (Howell & Harbon,

2004). The broader audiences and community-based needs being addressed by Extension in the 20th century caused researchers and Extension professionals to look into new and more cost-effective methods of information dissemination (Bull, Cote, Warner, & McKinnie, 2004; Wood-Turley & Tucker, 2002). The need to provide these diverse audiences with timely, pertinent information that allows them to maintain a working dialogue with these audiences has caused many Extension communicators to develop communication via the Internet (Siegrist, Labarge, & Prochaska, 1998). Several studies on Extension have encouraged the continued movement online. Kaslon, Lodl, and Greve (2005) studied the effectiveness of online leaders training for 4-H volunteers, and found that the Internet is a good method to reach these audiences with training and continued education. Lippert, Plank, and Radhakrishna (2000) looked at the effectiveness of regional Internet Extension in-service training to reach agents. The researchers found that it was not only successful in knowledge acquisition, but was also seen as just as effective as face-to-face administration by participants. Dunn, Thomas, Green, and Mick (2006) found that an interactive online multimedia Extension product can increase knowledge and influence behaviors on nutrition with high school students. They recommended that multimedia was a good way for Extension to educate young people on health-related topics.

In a consumer focus group study focusing on the value of Extension services, Irani, Ruth, Telg, and Lundy (2005) recommended that Extension adopt the communication technology used by their target audiences. The researchers also noted that for the participants they assessed, that technology was the Web. The ability of the Internet to provide cost efficient information that can reach large audiences has been described as a

valuable tool for Extension and its clientele, especially with younger audiences (Jackson, Hopper & Clatterbuck, 2004). A study of landowners in 2004 indicated age was a significant factor as to whether the public wanted information on watershed conservation issues via the Internet or through written communication. Younger landowners showed a higher preference for computer-based information (Howell & Harbon, 2004), while the majority of respondents still preferred traditional written communication. Howell and Harbon (2004) concluded that while current trends may still prefer traditional communication methods, Extension must move toward targeting these younger audiences who will be the landowners of the future.

Bull and colleagues, in 2004, called for Extension to pay specific attention to underserved audiences who have typically not been original stakeholders in the program. Young adults ranging in age from 18 to 24 are among one of the groups not traditionally serviced through Extension programs that are traditionally aimed at youth, pre-college, and adult homeowners (Seevers, et al, 1997). While research has shown that younger adults are some of the lowest users of Extension, they are interested in Extension services such as community development programs (Warner, Christenson, Dillman, & Salant, 1996). Audiences of young adults are also the future users of Extension programs as they graduate and become involved in communities and purchase homes.

Nationally, Extension has attempted to answer this call to move online by introducing the e-Xtension initiative, led by the Extension Committee on Organization and Policy (MSState, 2005). The goal of this program is to implement a national Web-based information and education network for all Extension clientele (MSState, 2005). This modern marketplace will facilitate engagement with audiences in new subject areas

in a manner that is accessible and timely. Users of the system will be prompted to provide information that allows them to receive personalized assistance for the information contained in the 3,000-plus counties in the U.S., and yet still be connected to their state and local Extension organizations (MSState, 2005).

By focusing on answering users' questions and problems, plans are for e-Xtension to provide information in various interactive formats, including frequently asked questions, fact sheets, chat sessions, discussion boards, streaming video, Web-based conferencing, and educational modules (e-Xtension, 2005). By providing convenient, quick-access to information, the goal is that users will be able to solve problems and find information to improve their daily lives, thus supporting the mission of Extension. The foundation for this initiative was set in place and in September 2005, communities of practice, or topic areas that will be focused upon, were developed. These included parenting, horticulture, disaster education, financial security, local economics and entrepreneurship, wildlife management, fire ants, and equine resources (e-Xtension, 2005).

Internet as an Information Source

One reason organizations like Extension are moving online is because of the dramatic increase in Internet usage. Nielsen/NetRatings reported that 135.82 million Americans were active Internet users in 2004 (ClickZ, 2005). As of February 2003, Americans spent an average of 25.5 hours per month using the Internet (CyberAtlas, 2003).

Recent studies have shown that one major use of the Internet by these populations has been for news information. The Web has been found to be the third-most important source of news following radio and newspapers (Chan & Leung, 2005). It was noted in

2003 that 40% of adults in the United States use the Web to get news, weather, and sports information (Lieb, 2005). A survey done by the Pew Research Center found that one-third (and almost half of those under 30) of respondents now receive news information online at least once a week (Bogart, 2000). Conway (2001) reported that more than four out of every 10 respondents to his study were using computers to find out what was happening in the world. In a survey of 400 Midwest university students, it was found that 47.8% use the Internet frequently for reference or research materials (Bressers & Bergen, 2000). Stempel, Hargrove, and Bernt (2000) found a decline in the use of local and network television and newspapers while there was a huge gain in Internet use by the general public. Chan and Leung (2005), on the other hand, found that heavy users of newspapers and radio tended to spend a longer amount of time online reading news than light users.

Communicators are attempting to reach their changing audiences by offering online news and information. Garrison (2001) found, that as of 1999, almost 90 % of U.S. daily newspapers were actively using new online technologies to reach new markets. It can be assumed this number only continues to grow as more users are logging on.

In a national study done by the Pew Internet & American Life Project, 80% of all Americans said they would expect to find information online about health and news (Horrigan & Rainie, 2002). One in five Americans revealed that they rely heavily on the Internet to find information. Of those who go to the Internet for government and health information, the majority was white females with children under the age of 18 (Horrigan & Rainie, 2002). According to a recent survey of Internet users, 49% are college graduates, 38% have family incomes over $75,000, and their main transaction online is to

gather information or for entertainment (Fallows, 2004). Men are more likely than women to use the Internet for information, while women use it more to communicate. In 2005 it was noted that 68% of males and 66% of females were Web users, and 80% of males and 86% of females ages 18-19 were using the Internet (Burns, 2005).

College students represent the largest population of Internet users (Eastin, 2001) making them an important subset to study. An overwhelming 96% of all 18-29 year-old users find the Internet a good way to get information, compared to 91% of all older users (Fallows, 2004). And with more than 15 million college students in the United States who represent a $9.2 billion market for consumer goods (Ness, Gorton, & Kuznesof, 2002) this audience is one to pay close attention to. Fallows (2004) found in a recent survey of Internet users that 49% are college graduates, making future graduates an important audience segment to study.

When the Internet began growing as a communication outlet, Morris and Ogan (1996) called for scholars to rethink definitions and categories of communication and mass media in terms of the new technology. Webster and Lin (2002) also found that the Internet is a viable communication outlet that should be looked at by researchers. Scholars have answered this call with research in this area; however, many questions remain unanswered.

Dibean and Garrison (2001, p. 88) concluded, “development of the technology of the Internet and the Web itself may become the most significant change in world communication in a half-century or longer.” Based on the growing influence of this new medium, researchers and communicators need to understand how users best process

information presented online. The Internet has created the opportunity for new methods of news delivery by combining components of print and broadcast media (Berry, 2001).

Although use of the Internet has been studied in the context of news and information dissemination in general, limited research has been done in the area of agricultural communications, in particular, in terms of providing information online that is preferred and is recalled by audiences. Davis and colleagues (2005) found that adults studied recalled agricultural communication information better when presented to them in a print, video, or radio news release over electronic text. Based on a thorough review of the literature, however, few studies have assessed how the level of interactivity of online, Web-based Extension communication efforts and one's psychometric traits, such as problem-solving style, affects the information recall and attitudes of users.

Website Design and Structure

Many researchers have begun to study the Internet from a visual communication, or graphical and structural, perspective in order to analyze how Websites are using design to reach general audiences, as well as how certain components on these sites aid in recall of information and perceived preference (Cho, 2003; Bogart, 2000; Diao & Sundar, 2004; Lang, Borse, Wise, & David, 2002). Abraham (2001) argued that online communication, by its very nature, is a presentation that is driven by visuals and visual communicators.

Esrock and Leichty (1999) call for communicators to think of their users and to develop sites that are not only efficient in terms of technology, but also visually pleasing. In a medium that allows for displaying graphics and multimedia, it is easy to provide information on pages that are pleasing to view and easy to navigate (Henkia, 1990). Few people want to dig through confusing pages of information, and designing a site that is

easily navigated can complement communications by keeping viewers coming back (Henkia, 1990).

Users are looking for simplicity and usability as they enter sites (Nielsen, 2000). Swenson, Constantinides, and Gurak (2002) described a need to use logical design choices and define the audience members of the site in order to better reach them. Websites are a visual media, in which factors such as layout, design, and graphics can either add credibility to an organization and aid in information intake, or hinder individuals' ability to process information (Amant, 2005).

Recent studies in the area of Internet media have focused on the effect of non-linear based information (Lowrey, 2002; Dimitrova, Connolly-Ahern, Williams, Kaid, & Reid, 2003; Tremayne, 2004). In one such study, Lowrey (2002) found that non-linearity did not affect perceived credibility or knowledge acquisition. Tewksbury and Althaus (2000) compared the non-linear reality of online news to print editions of the same newspaper. Findings showed that online readers were less likely to recall events of national, international, and political importance than those reading traditional print-based publications.

In agriculture, the research has been less extensive in this area; the look and feel of sites hosted by communication organizations has been under-researched (Williams & Woods, 2002). In a research synthesis of the Journal of Applied Communications from 1992-2001, Williams and Woods (2002) noted that a large portion of published research analyzed the readership trends of agricultural communication outlets, but has ignored their design or Web presences. Researchers have targeted agricultural communicators through practitioner-oriented articles in the Journal of Applied Communications, the

leading journal in this applied field, written to help them design effective Websites for their audiences, but little research has been presented on designing effective sites using features such as interactivity (Emery, 1999; Kelleher, Henley, Gennarelli, & Hon, 1997; Melgares, 2005).

Uses and Gratifications

Researchers have described communication behavior as being goal-directed, purposive, and motivated (Rubin, 1994). The Web has been described by several scholars as being a medium that requires active users (Bouwman & Wijngaert, 2002; Kaye & Johnson, 2002; Papacharissi & Rubin, 2000). Users of the Web are challenged with finding the information that brought them to that site.

Uses and gratifications, as a theoretical perspective, describes users' psychological and social environmental needs, their needs and motivations to communicate, the media they choose, their attitudes toward that media, the alternatives to that media, their communication behavior, and their outcomes are all important elements in the communication process (Rubin, 1994). By initiating the selection of and use of a specific media vehicle, users are actively seeking out information in order to fulfill a need (Rubin, 1994). The most salient use of the Web seen by researchers has been the information-seeking function (Papacharissi & Rubin, 2000). This theory can play a role in assessing Web use as a function of sociability, prurience, curiosity, and information-seeking (Ruggiero, 2000).

Uses and gratifications discusses the cognitive processes that take place between the complexities of needs felt by individuals, such as solving problems or making decisions and how users gratify those needs through media (Blumler, 1979). Graber (1984) argues that those who are drawn to media information to receive gratification are

more likely to be able to learn that information. In order to discover what aids people in recall when using a specific media, it is imperative that researchers keep in mind the motives that bring users to that media and how they perceive it. Recall has shown to differ as a result of media consumed (Davis et al, 2005; Tewksbury & Althaus, 2000; Eveland & Dunwoody, 2001), and by understanding what brings users to media, it can aid in encouraging users to go to the right kind of media that will help them recall information.

Uses and gratifications scholars have examined many motives for using the Internet, and found in general that the Internet tended to satisfy entertainment, information, and interaction needs (Papacharissi &Rubin, 2000; Ko, 2002). Kaye and Johnson (1998) found that 40% of respondents used the Web primarily for information and education research. Kaye and Johnson (2002) concluded that respondents were active users who sought out specific information via searches and interacted with others through chat rooms and listserves. Previous Uses and Gratifications studies found, political attitudes were strongly linked to measures of information seeking and surveillance (Kaye & Johnson, 2002).

Thus, through the advent of the Internet, Uses and Gratifications researchers have begun retesting items found to be salient with respect to other media (Ruggiero, 2000). Ruggiero argued that the advent of the Internet would only increase the theoretical potency of Uses and Gratifications by allowing researchers to explore the theoretical linkages with respect to this new communications medium.

Previous Usage with Media

According to the Uses and Gratifications theory, previous experience and gratifications met can give users a respective image of that medium and what they can

expect from it (Katz, Blumler, & Gurevitch, 1974). Peled and Katz (1974) found in a study of media during wartime and crisis that people came to a specific medium with expectations of what that medium will be and what it will gratify for them. While a large percentage of usage and gratifications research has explained previous usage in the context of traditional media channels, much new research is being conducted with the Internet (Ruggiero, 2000; Baran & Davis, 2003). Many recent studies have utilized Uses and Gratifications as part of the theoretical framework when studying the Internet because of the interactivity, demassification, and asynchronicity it allows that other media outlets do not (Baran & Davis, 2003). With 135-plus million users actively using the Internet in 2004 (ClickZ.com, 2005), it could be the case that they are all coming to the medium with preconceived ideas of the qualities of that media source.

Attitude

Within the Uses and Gratifications paradigm, attitudes are formed based on the experience and the gratifications met as a function of choosing a particular medium to serve a specific need or information-seeking function. Attitude has been shown to be an important predictor of usage and implementation of technology and continued use (Rodgers & Chen, 2002). Attitude research has been done extensively in the area of advertising and attitude toward advertisements and their effectiveness (Chen, 1999; Rodgers & Chen, 2002; Sinclair & Irani, 2005; MacKenzie & Lutz, 1989), and researchers have begun employing these same tasks to look at Internet sites and advertising (Rodgers & Chen, 2002; Chen, 1999). Rodgers and Chen (2002) reported adoption of the Internet by advertising agencies is affected by poor attitudes toward and lack of experience with Internet advertising. Chen (1999) developed a scale to provide researchers the ability to measure the attitudes of users of Websites to help indicate the

value of such sites. For the purposes of this study attitude was defined as: “A psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor” (Eagly & Chaiken, 1993, p. 1).

Information Recall

As discussed earlier, recall can be increased as a function of the enhanced gratification from a medium. Several studies have looked at the Internet and information recall. Lowery (2002) reported that linearity of sites had an effect on degree of perceived control over media, but it did not affect the degree of perceived credibility or recall of knowledge. D’Haenens, Jankowski, and Heuvelman (2004) reiterated this, saying that news category, gender, and interest played more of a role in recall than whether the information was given via online or in print. For the purpose of this study information recall is defined as the learning process and free recall of information, not just aided identification.

Problem Solving

Problem solving has been described as a survival skill in today’s technological world (Wu, Custer, & Dyrenfurth, 1996). Kirton (2003) described problem-solving as the means by which life survives and manages the constant change presented through one’s environment. Problem solving has also been “defined as the tendency to respond in a certain way while addressing problems” (Wu, et al, 1996, p. 55). This linear process of evaluation begins with users recognizing a specific problem, defining it, having the ability to comprehend and develop it, test hypotheses and gather data about it, revise those hypotheses and retest, and then form a conclusion on the problem (Hedges, 1991). Part of the process of problem-solving includes gathering information through channels such as the Internet. As one begins this problem-solving process, it is important to note

that individuals are limited by the way they are built in terms of intelligence, but they also have no instincts to help or hinder them in this (Kirton, 2003, p. 33). However, individuals are intelligent within different styles that allow them to problem solve given the opportunity or motivation (Kirton, 2003). As they work through this linear process of problem-solving they are driven by our individual problem-solving style (Kirton, 2003). Style is something that is unique to individuals as a psychometric quality while process is the structure in which all individuals go about solving problems.

A great deal of research has been done on the cognitive and decision-making processes that bring people to specific media. One aspect of this approach has been to look at the concepts of information richness and equivicality. Information richness theory claims that individuals choose media they perceive to be most efficient in helping them to complete a communication task or problem (Kelleher, 2001). People cognitively choose which medium will help them as they work to solve problems or gratify other needs. A rich medium can be described as containing more face-to-face type interactions, while leaner media are seen as being formal and numerical, such as telephones versus fliers or fact sheets (Trevino, Daft, & Lengel, 1990). Those in a high equivocality condition will tend to choose a richer Website more often than leaner communications media, such as a pamphlet or a lean Website (Irani & Kelleher, 1997). People will choose rich media based on equivocality, which can be assumed to be related to the innate differences in which people solve problems. Trevino, Daft, and Lengel (1990) further described equivocality by comparing an equivocal message to a Rorschach ink-blot—multiple users may read it differently than others depending on their unique backgrounds and perspectives. This theory relates to many of the current components of interactivity that

are seen on Websites. As a Website has more interactivity, it will be richer and have more equivicality, as opposed to a leaner site with more ambiguity.

Another way researchers look at the phenomenon of how individuals choose media to solve problems is through cognitive styles. “Cognitive activity refers to the degree of mental activation invoked in paying attention to a medium” (Gunter, 2000, p. 164). Cognitive style has been described by researchers as also referring to “a person’s consistent pattern of processing information and organizing it into a system of thought which influences behavior” (Foxall & Haskins, 1986, p. 65) when they are working to solve problems or make decisions. The cognitive framework allows us to explore the levels of involvement with media (Gunter, 2000).

Much research has been conducted in this area examining the visual representation of broadcast news; however, some researchers have begun to use these same methods to analyze online information (Fox et al., 2004; Lang, Borse, Wise, & David, 2002; Diao & Saunder, 2004; Gunter, 2000). Gunter (2000) stated that to fully understand the use of media, one must assess the nature of the exposure in terms of the cognitive effort put into the processing of the content. Once this is known, one can assess and measure the media influence on awareness and knowledge gained by the audience (Gunter, 2000).

Researchers have tested specific media outputs to determine the amount of information recalled and the cognitive effort placed into viewing. Consideration has been given to how information is cognitively processed and recalled based on the effects of how that information is presented (Gunter, 2000). Sicilia, Ruiz, and Munuera (2005) looked at the effects of Internet non-linearity with respect to need for cognition, or an individual’s tendency to engage in and enjoy cognitive activity (Petty & Cacioppo, 1979).

Sicilia and colleagues (2005) found that individuals who were exposed to interactive Websites processed information more thoroughly than those exposed to non-interactive sites. For example, people looking at a site that was non-linear and required interaction would process the information presented more thoroughly than those presented with a linear site.

One researcher who has focused on problem-solving styles based on cognitive processing is Michael J. Kirton. Kirton (2003) states that people can be placed on a continuous scale, with individuals who are adaptive in their problem-solving style at one end and those who are innovative in their problem-solving style at the other end. This theory defines and measures the thinking style that influences one's decision-making process (Kirton, 1999). According to Kirton, the adaptor will solve problems within his or her existing perceptual frame of reference, while innovators will change those frameworks and do things differently as they seek solutions outside of the context of the given problem (Goldsmith, 1984; Foxall & Haskins, 1986). Researchers measure the adaptive-innovative dimension of cognitive style with the Kirton Adaption-Innovation Inventory (KAI) (Foxall & Bhate, 1993).

Purpose of the Study

Problem solving has been discussed in various contexts; however, limited research has been conducted on how problem-solving style aids in the decision-making process with respect to processing media that may provide information, especially information that can be used to solve problems from the standpoint of recall of information and attitude toward the value and appropriateness of the information and media utilized.

The study postulates problem-solving style, as conceptualized by Kirton's KAI inventory, will influence the way information seekers go about fulfilling their information

needs based on previous knowledge/use of media, and in turn will influence their attitudes toward the type of media that users prefer and gain knowledge from.

One such area where problem-solving is in demand is the area of agriculture. As Extension services and communicators move to designing information online to reach audiences and inform them about topics that will help solve problems, it is important that this information be presented in a form that will be usable, valuable, appropriate, and easy to recall.

By understanding how problem-solving styles affect users' perceptions of Websites, with respect to such attributes as attitude and information recall, Extension, agricultural communicators, and commodity groups who are utilizing the Internet to reach audiences will be better able to develop communications processes that match audience needs in order to inform them, educate them, and affect productive change. If users vary due to their problem-solving style, it may be the case that communicators need to provide information that appeal specifically to these diverse styles.

Key Terms

Information-Driven Website: "The objective of information-driven Websites is to provide the user with desired information. The objective of these sites is to guide the user to the desired content pages. Navigation pages support the user in his search" (Stolz, Viermetz, Skubacz, & Neuneier, 2005, p. 1).

Interactivity: "A process involving users, media, and messages, with an emphasis on how messages relate to one another" (Sundar, Kalyanaraman,, & Brown, 2003, p. 34).

Organization

Chapter 1 has introduced the problem to be examined, as well as the purpose of the study. Chapter 2 will discuss in detail the relevant literature and theoretical framework to be used in the study. These will include the Adoption Innovation model, Uses and

Gratifications, Website interactivity and usage, attitude, perceptions of the Internet, and information recall. Chapter 3 will outline the research design and methods of the study, including hypotheses, independent and dependent variables, description of participants, instruments and reliability of scales, procedures, and statistical analysis used. Chapter 4 gives the results of data analysis performed to test stated hypotheses. Chapter 5 will describe the limitations of the study, the results, and provide conclusions and recommendations.

CHAPTER 2
LITRATURE REVIEW

Overview

The purpose of this investigation was to examine the effects of individuals' problem-solving style, level of Website interactivity, and level of Internet usage on subjects' attitude and amount of information recall with respect to an information-driven Extension Website. By understanding how problem-solving styles affect users' perceptions of a Website with respect to such attributes as attitude and information recall, Extension, agricultural communicators, and commodity groups who are utilizing the Internet to reach audiences will be better able to utilize communications processes to inform audiences, educate them, and affect productive change.

The following literature review explores the various components of cognitive problem-solving style as it relates to the study, as well as what drives individuals to choose specific media in certain situations, what design factors can be manipulated in an online environment by the organizations posting the information, and what influences an individual's attitudes and level of information recall.

Interactivity and Linearity

A significant amount of research in the advertising, communication, and marketing literature has focused on Website aesthetics, usability, and design. Within these domains, many researchers have addressed the question as to how to make Websites more appealing to audiences. Resnick and Montania (2003) used the effects of semiotics, the study of signs and visuals, in Web design features to explore the expectations of

performance criteria in a purchase situation. The authors found that some design features have a strong effect on expectations of consumers. Cho (2003) found in a study of online banner advertisements that peripheral cues such as advertisement size and animation had an effect on those likely to click-through when they had high involvement with a product, while Thompson and Wassmuth (1999) cautioned that the use of trick banners on sites might lead to possible negative reactions.

By ensuring good usability, design, and easy navigation through a site, communicators and Web developers can attend to their audiences. As users feel more comfortable with a site and are successful in gratifying their needs, they will like that site more, and they will return to the site again for information (Spool et al, 1999). While a site may be designed to effectively reach audiences with information, it is still up to the user as to how they use that information. As Nielson (2000) described, users have been shown to scan information online as opposed to engaging in deep cognitive processing. It has also been noted by authors in the field of Website design that no two users will have the same experience with a site (Krug, 2000).

Interactivity

Interactivity is something that has been defined by various scholars in many disciplines to mean different things. Heeter (1989) entered the discussion early on commenting on how mass media has changed with the onslaught of new media like the Web. He discussed how the idea of mass has changed as those who look at a Website may not see the same thing as someone else looking at the same site, due to what he describes as interactivity and hypertext. Heeter (1989) set up several components of what he determined was a multidimensional concept, the first being *complexity of choices available to the user*, which is defined by how many opportunities there are for users to

make decisions and to be in control and active. Along that same line is what he described as *the effort exerted by the user*. He also described that interactivity takes into account information *relative to user's needs* and *the feasibility to have interpersonal communication.* Heeter said that the *measuring the users interactions while online* also comes into play. And lastly, the ease *of adding information* is also to be considered. Beyond those steps Heeter went on to describe how this new component of media changes the role of sender and receiver by making them interchangeable.

Downes and McMillan (2000) added to this definition of interactivity. While they too expressed the importance of the changing role of sender and receiver and the importance of choice and effort exerted, they went further with this thought. They looked at interactivity in terms of its impacts, its nature, and its participants. The authors described how the new ideal of interactivity was having a large impact on how media and business operated, and would change industries. Downes and McMillan discussed the nature of the message included in interactivity in terms of its time needed and whether it was synchronous or asynchronous, how conducive it was to two-way communication between sender and receiver, and in terms of its place and whether it created a sense of place. They considered the amount of control the participant had (which is similar to that described by Heeter in 1989), the responsiveness to the needs of the user, and the goal of the interactivity. The authors stated that interactivity could be seen as being a continuum for these components, such that, when sense of place or sense of control increased, so did amount of interactivity. Researcher stated that even the simplest Website contains some interactivity as the user has control of what they see through the use of hypertext and links.

Jensen (1998) also added to the discussion as he described how interactivity should be looked at in several ways including through psychology, informatics, and mass communication. He described that interactivity could be a criterion in which something must be present, or a form of communication offering users the ability to get closer to interpersonal communication. He also described it as a technology. While this scholar also discussed the amount of control and effort exerted by the users he agreed with Downes and McMillan (2000) that interactivity should be looked at as a continuum or as dimensions. Jensen described four dimensions that range from one-way communication to n-way communication, which is similar to interpersonal communication and is continuous. He described four types of communication in interactivity, which includes registration (two-way with feedback based on what the user inputs), continuous (two way communication), consultation (pre-defined content a user seeks out with a feedback loop), and allocution (one-way communication with no feedback). He stated that for something to be interactive, it must be described by how much effort the user gives (Jensen, 1998).

McMillan and Hwang (2002) went on to look at interactivity more closely, focusing specifically on four components. Similar to Jensen, McMillan and Hwang said that one should look at interactivity through mass communication and consider the message and the four types of communication (registration, continuous, consultation, and allocution). As researchers look at this multidimensional concept, McMillan and Hwang argued that they should consider organizational communication and theorists Gruning and Gruning's (1989) four-part model. McMillan and Hwang (2002) stated that one must look at the direction and components of the communication as described by the theorists.

He went on to say that researchers must also look at it in terms of interpersonal communication and how people look at and use technology, and lastly in terms of media components and what technology is actually involved.

Liu (2003) attempted to develop a scale to measure the interactivity of Websites. Three studies conducted resulted in three correlated dimensions of interactivity, including active control, two-way communication, and synchronicity which comprised a scale to be applied to marketing and scholarly research.

Researchers have taken the previously discussed descriptions of interactivity to look further into how interactivity on Websites affects users. Sundar, Kalyanaraman, and Brown (2003) examined interactivity as a contingency view. They defined interactivity as a "process involving users, media, and messages, with an emphasis on how messages relate to one another" (Sundar et al., 2003, p. 35). They conducted an experiment in which they broke interactivity into three levels: low interactive which contained no links, medium interactivity which was a single layer of related links, and high interactive which had two hierarchal layers of links. Results showed that participants viewing the three conditions did not differ in their ability to recall and recognize content from a site (Sundar et al., 2003). They did find that the level of interactivity of the site had an influence on the impression of the political candidate featured on the site. They concluded that users' perceptions of interactivity were positively associated with the number of hyperlinks present on the site and the linking actions initiated (Sundar et al., 2003). Bezjian-Avery, Calder, and Iacobucci (1998) also concluded that interactivity may not always help users. They found in a study of advertising that in certain conditions, interactivity actually interrupted persuasion as users could move right through the

interactive media without attending to the advertising message. Their study concluded that the linear traditional advertisements yielded more positive or in some cases similar results with respect to decisions to purchase. Liu (2003) found that different consumers may want different levels of interactivity in different situations. Individuals who are “low interaction-ready” consumers will prefer lower levels of interactivity than those individuals who are “high interaction-ready” (Liu, 2003).

Sicilia, Ruiz, and Munuera (2005) examined the effect of interactivity on information processing and favorability toward a product and found contradicting results. In this study, interactivity was conceptualized as a Website containing six pages connected through hyperlinks and email, and a non-interactive site set up as a print advertisement with the message on one page and no hyperlinks (Sicilia et al., 2005). They concluded that individuals viewing the interactive site processed information more thoroughly than those viewing the non-interactive site. It was found that motivation to process the information increased under the interactive condition.

Teo, Oh, Liu, and Wei (2003) investigated the effect of interactivity on attitudes toward commercial Websites. Results showed that interactivity on a site had a positive effect on a user’s perceived satisfaction and attitude toward a site. They also noted that interactivity levels significantly influenced the site’s effectiveness in helping users in a decision-making process (Teo et al., 2003). Chung and Zhao (2004) echoed these results in an experiment testing three levels of site hyperlinking and interactivity. They found that perceived interactivity had a positive influence on attitude toward the advertisement and memory of the information on the advertisement. Wu (1999) also looked at interactivity in advertisements online and concluded that perceived interactivity had a

positive effect on attitude. Wu defined interactivity in terms of responsiveness and navigability. Chen and Yen (2004) discovered that interactivity on a site is related to viewers' perceptions of the quality of site design. They suggested that successful sites should include interactive features that add playfulness, connectedness, and reciprocal communication.

Linearity

Based on some definitions of interactivity, levels of site hyperlinking can be considered interactive, thus making it important to look at the literature on linearity. Several researchers have researched linearity and hyperlinking in Websites (Tremayne, 2004; Lowrey, 2002; Dimitrova, Connolly-Ahern, Williams, Kaid, & Reid, 2003; Eveland & Dunwoody, 2001; Berger, 2001; Massey, 2004). Dimitrova and colleagues (2003) found in a study of newspaper Websites focusing on the coverage of Timothy McVeigh's execution that online papers may use hyperlinks as a gatekeeping device. Other researchers have looked at linearity and its effects on users. Eveland, Cortese, Park, and Dunwoody (2004) found through an experiment with college students and adults that the non-linear structure of the Web has both strengths and weaknesses in terms of learning when compared to print media or more linear Websites. Researchers also found that linear site designs encouraged more factual learning while non-linear sites increased knowledge structure density (Eveland et al, 2004). In contrast, Lowrey (2002) showed that user recall had no significant difference based on viewing a linear or non-linear site. Lowrey also explained that linear structure had an effect on the degree of perceived control over the media, but did not affect the perceived credibility.

Sicilia, Ruiz, and Munuera (2005) studied how consumers processed information and their experiences with interactive and non-interactive Websites (which they described

as non-linear and linear, respectively). Experimental findings showed that interactive (non-linear) sites lead to more processing of the information and more favorability toward the site. Berger (2001) discovered, in an experiment looking at hypertext, that a significant positive correlation existed between hypertext comfort and user satisfaction. However, the researcher also reported that hypertext did not correlate with users' information recall or accuracy in recall. Eveland and Dunwoody (2001) found similar results in that no significant differences across linear and non-linear Websites were shown in terms of cued recall.

Adaption/Innovation Theory

One way to look at interactivity and linearity that could explain the differences in findings could be focusing on how individuals look at the information based on specific psychometrics like cognitive style. Cognitive style as a theoretical construct is used to describe and explain an individual's processing of information when solving problems (Foxall & Bhate, 1993).

Problem Solving

Problem solving has been described as a skill needed for continued existence in today's technological world (Wu, Custer, & Dyrenfurth, 1996), the means by which life survives and manages the constant change presented in everyday life (Kirton, 2003). Problem solving can be seen as the inclination to respond in a certain way when faced with a problem (Wu et al, 1996). A problem has been defined by Goldsmith and Matherly (1986) as a situation where standard or customary procedures can not cope with the task due to unfamiliar elements that encroach. Hedges (1991) described it as a linear process that begins with users recognizing a specific problem, defining it, having the ability to comprehend and develop it, test hypotheses and gather data about it, revise those

hypotheses and retest, and then form a conclusion on the problem. The data-gathering portion of the process is deeply embedded into the usage of communication tools.

As one begins this process, individuals are limited by the way they are built, in terms of intelligence (Kirton, 2003). Wu and colleagues (1996) found evidence that differences between technological problem-solving and personal problem-solving style may exist. Personal problem-solving was defined as problems dealing with depression, conflict, and life decisions (Wu et al, 1996). The researchers claimed that problem-solving style is an important difference between individual college students that must be looked at in terms of students' study of technology.

Kirton's Theory

Researchers have described that all people are bound by their makeup as to how they define and solve the problems with which they are faced (Kirton, 1999). This cognitive problem-solving style refers to the characteristic manner of how an individual will behave over situations and time. This consistent pattern of processing information influences behavior by organizing it into a system (Foxall & Haskins, 1986).

One way to measure this cognitive style is through the Kirton Adaption-Innovation Inventory (KAI) (Foxall & Bhate, 1993). This inventory requires respondents to assess the degree of ease or difficulty they encounter in sustaining adaptive or innovative behaviors over periods of time. Responses are computed into overall scores ranging from 32 to 160 (Foxall & Haskins, 1986). Respondents who score below the 96 midpoint are considered "adaptors" while those above 96 are "innovators" (Foxall & Haskins, 1986).

Kirton (2003) states that people can be placed on a continuous scale between being adaptive and innovative in their problem-solving style. Cognitive style is a trait that can be expected to be stable over time and across situations (Kirton, 2003) People, however,

may adapt their style through coping behaviors when they find themselves in a particular situation (Kirton, 1999). For example, one may be seen as being more adaptive at work and more innovative with friends. Those who are further apart on the KAI scale are more likely to have problems working together due to these differences; however, when this happens, people begin to employ coping behaviors so that they are able to avoid these problems in some situations (Kirton, 2003).

The adoption-innovation theory suggests that adaptors' and innovators' voluntary styles of cognition differ in three respects: rule conformity, efficiency, and preference for sufficiency versus proliferation of solutions to problems (Foxall & Hackett, 1992). Adaptors will solve problems within their existing perceptual frame of reference, while innovators will change those frameworks and do things differently as they seek solutions outside of the context of the given problem (Goldsmith, 1984; Foxall & Haskins, 1986).

The KAI can be broken into three sub-scales: sufficiency of originality (SO), efficiency (E), and rule/group conformity (R) (Kirton, 1999). When looking at the three subsets of KAI, adaptors and innovators can be described more in-depth. On the originality scale, adaptors tend to present only a few solutions to problems while the more innovative person may propose many, possibly impractical, solutions (Bagozzi & Foxall, 1995). The more adaptive individual will prefer to progress incrementally toward a goal and an innovator will avoid attention to detail when dealing with efficiency. Lastly, when comparing the rule governance subset, more innovative individuals ignore rules or invent their own rules as they go while more adaptive types will prefer to restrict their behavior to be socially acceptable (Bagozzi & Foxall, 1995). While these subscores

add further insight into how people solve problems, they have been found to be less reliable with younger populations who are less mature (Kirton, 1999).

Kirton (2003) has described adapters as those who like to have structure in place when they are attempting to solve a problem. Adaptors may appear cautious as they prefer to work within an established paradigm of rules (Foxall & Bhate, 1993). They foresee problem-solving and decision making as a sound, thorough process (Foxall & Bhate, 1993).

Adaptors are satisfied with devising a small number of sufficient solutions, and pursue efficiency in problem-solving by making steady progress toward a solution. Their cognitive behavior tends to be rule-governed in that they prefer to conform as opposed to break rules (Foxall & Bhate, 1993). Adaptors more readily accept the status quo and will not challenge the accepted, or try to change, way of traditionally doing things (Kwang, Ang, Ooi, Shin, Oei, & Leng, 2005). Kirton (1999) also discusses this, saying that they will work within the established theories, policies and practices. Innovators, in contrast, are more likely to enjoy a looser structure as they go about solving problems (Kirton, 2003). The innovator will tend to offer more discontinuous solutions to problems while being seen as adventurous or as a risk taker (Foxall & Bhate, 1993). Innovators have a tendency to strive for novelty, exploration, trial and error, and risk-taking. Innovators will promote new understanding through profound procedural changes (Foxall & Bhate, 1993). Innovators are less likely to accept the status quo and do not like to follow the accepted way of doing things (Kwang et al., 2005). Kwang and colleagues (2005) found that adaptors and innovators will also prescribe to different values when taking tasks into

consideration. With respect to demographics, KAI scores for females tend to be more adaptive than males (Foxall & Haskins, 1986).

Foxall and Haskins (1986) suggested that the KAI is a viable marketing tool for identification of consumer choices. In the area of marketing, researchers have found that adaptors are attracted to products they know, are less tolerant of change, and are unwilling to explore (Foxall & Bhate, 1993). They prefer a reasoned argument in advertising as compared to persuasion (Foxall & Bhate, 1993). Adaptors tend to prefer the products they currently use and would solve problems that arise from changes in that product. When searching for information, adaptors will seek and use information conservatively as they slowly work to a decision (Foxall & Bhate, 1993). Marketing and business researchers have found that innovators will use more sources of information to find solutions to a problem, and will trust discrepant advertising, as well as personalized advertising that encourages them to act impulsively (Foxall & Bhate, 1993). Innovators will seek information about more innovations than adaptors, even when this information conflicts with current product use. Adaptors are content with products they currently use and will not necessarily go looking for new products (Foxall & Bhate, 1993).

Research shows that Adaption-Innovation theory correlates with many personality traits that are related to consumers, but it also describes relationships between decision-making and problem-solving in consumers (Foxall & Bhate, 1993). Foxall (1996) found that the KAI is not a predictor of early adoption of new products. It was also concluded that innovators would require little personal communication from marketers to adopt a new product. While adaptors want a lot of reassurance from marketers, it does not matter

if marketers went out of their way to provide this information, as adaptors would eventually buy the new item either way (Foxall, 1996).

Pershyn (1994), in a study of the KAI on natural creative processes, asked participants to recall a problem they faced and to draw the process in which they went about solving the problem successfully. It was found that high adaptors tended to draw a linear process in which they were orderly working through the process in fewer stages. High innovators, in contrast, showed a non-linear process in which they had random, complex approaches with more stages and in some cases no true end point.

The KAI has been utilized in several studies to describe the psychology of computer usage. Foxall and Bhate (1991) found in a study of graduate business students that the number of computer applications utilized and duration of computer use were correlated with KAI scores. The researchers found that for home computer use, those who were highly innovative tended to use more than four package-based computer applications and show high personal involvement with computing. Foxall and Bhate (1991) stated that there is a need for investigations of the relationships with KAI and computer use. Foxall and Hackett (1992) found in an investigation with managers that use of software applications was positively related to adaptive-innovative problem-solving style. They noted that the sufficiency of originality and rule conformity subscales were positively related to computer use, while efficiency was negatively related to computer use. This implies that in terms of computer use, sufficiency of originality and rule conformity are relevant to innovative traits while efficiency is relevant to adaptive traits (Foxall & Hackett, 1992).

Bhate (1999) used the KAI to examine cognitive styles and different message sources on attitude change. Through a study of 15- to 73-year-olds, it was concluded that it was too simplistic for advertisers to use one universal appeal (whether it is positive or negative) for all individuals. The decision-making process for adaptives was source-oriented and was influenced by both positive and negative sources. However, innovators tended to rely more on negative sources as they felt positive sources were more time consuming. This implies that for information-driven Websites designers need to consider more than just one type of design for a site.

While the KAI was initially developed for use with adults with work experience, it has been found to be reliable with younger populations who are also affected similarly by style (Tefft, 1994; Kirton, 1999). Many university students have had experiences working that they can pull from when taking the inventory (Kirton, 1999). Dependable KAI scores have been achieved with people as young as 15 years old; however, due to maturity levels it has been indicted that the sub scores of SO, E, and R should be ignored (Tefft, 1994). Taylor (1993) used the KAI for a group of 17- to 18-year olds and noted that the theory worked with this younger audience in a similar way as it does for adult populations. Taylor did discuss the need for explanation of a few words in the KAI that were confusing to this youthful audience. Fisher, Macrosson, and Wong (1998) reported successfully using the KAI with undergraduate students in engineering and business to test relationships between cognitive style and team role preference. Foxall (1992) also reported successfully utilizing the KAI with a group of students enrolled in masters of business administration programs in the United Kingdom, Australia, and the United States.

Information Richness

The concept of information richness comes into play as people cognitively choose which media will help them as they work to solve problems. Individuals choose media they perceive to be most efficient in helping them to complete a communication task (Kelleher, 2001). Based on equivocality or the ambiguity, the lack of clarity of information, users who are seeking information will choose either a “rich” or “lean” medium (Irani & Kelleher, 1997). Equivocality can be described as the existence of multiple interpretations and an organizational situation (Trevino, Daft, & Lengel, 1990). Trevino and colleagues further described equivocality by comparing an equivocal message to a Rorschach ink-blot—multiple users may read it differently than others depending on their unique backgrounds and perspectives. Information tasks that are seen as unambiguous will be considered low in equivocality, while tasks that are based on processing of multiple interpretations may cause higher equivocality. The theory of information richness describes that users use rational media choices to deal with these equivocalities (Irani & Kelleher, 1997). Equviocality and ambiguity of a site can be tied back to many of the same underpinnings that drive adaptors and innovators. This idea of something being equivocal or ambiguous or rich or lean is similar to the way the KAI discusses structure. While more adaptive problem-solvers will like structure, it could be argued that they too may like equivocal messages that are “lean,” and more innovative problem-solvers who work outside structure will want more ambiguity in their messages that are “rich.”

Media richness refers to a medium’s tendency to present information in either a “rich” or “lean” manner. The richest communication medium is face-to-face, followed by the telephone and e-mail because these media allow immediate feedback and can be

highly personal (Trevino, Daft, & Lengel, 1990). The leanest communication is formal documents such as fliers, bulletins, and quantitative reports. Irani and Kelleher (1997) found in a study of equivocality that those in a high equivocality condition will choose a richer Website more often than a pamphlet or a lean Website. Based on this perspective, it could be assumed that as people work through the cognitive processing of their information-seeking tasks, not only their preferred style will come into play, but also the complexity of the task will influence the media choice.

Uses and Gratifications Theory

Uses and gratifications theory also addresses cognitive style as a motivator to fulfill a specific need (Stone, Singletary, & Richmond 1999, p. 200) based on an individual's choice of media. The theory emerged in the late 1950s and early 1960s as researchers looked to understand audience involvement in mass communication (Blumler, 1979). The Uses and Gratifications theory provided a replacement of the ideal that the audience member was a passive victim, and that one could actively look at media for their own purpose (Blumler, 1979).

As one of the theories most associated with usage of media, Uses and Gratifications researchers define communication needs that shape why people use media and the behaviors that gratify those needs (Rubin, 1994). One such use that is noted in the literature is to find information or solve a problem (Katz, Blumler, & Gurevitch, 1974). Uses and gratifications theorists assume that communication needs interact with social and psychological factors to produce motivation to communicate (Rosengren, 1974). Katz, Blumler, and Gurevitch explain that the logical steps the theory is concerned with include "(1) the social and psychological origins of (2) needs, which generate (3) expectations of (4) the mass media or other sources, which lead to (5) differential patterns

of media exposure (or engagement in other activities, resulting in (6) need gratifications and (7) other consequences, perhaps mostly unintended ones" (1974, p. 20). Five elements that have been described as assumptions to Uses and Gratifications research include 1) active audience, 2) audience member links need of gratification and media choice, 3) media compete with other sources for need satisfaction, 4) goals of mass media use can be derived from data provided by individual audience members, and 5) value judgments about mass communication need to be suspended when audience orientations are explored (Katz, Blumler, & Gurevitch, 1974). Other assumptions associated with Uses and Gratifications approaches include a) media use is goal directed, b) media consumption can fill a wide range of needs, c) people have enough self-awareness to know and articulate their reasons for using the media, and d) gratifications have their origins in media content (McLeod & Becker, 1974).

From a Uses and Gratifications standpoint the first assumption is that media users are active in their attempts to seek out and find information from the media channel of their choice (Rubin, 1994). The approach assumes that users are active participants because they are active communicators who select which communication channel to use (Blumler, 1979). Theorists suggest that users will have some form of need, such as solving a problem, which they will try to gratify with the use of a specific media (Baran & Davis, 2002). These motives and needs can be based on psychological characteristics, attitudes, and perceptions (Rubin, 1994).

As seen in the second assumption put forth by Katz, Blumler, and Gurevitch (1974), media fulfills one of four functions for individuals: it entertains them, serves as a mechanism for surveillance, correlates with what people know about society; or transmits

society across generations (Baran & Davis, 2003). Based on these functions, media users will feel a need (needing to solve a problem, needing love or acceptance, or needing to be informed or entertained) that they will be motivated to gratify through a specific media outlet (Blumler, 1979). These needs lead someone to actively seek out and use a specific medium that will in turn gratify that perceived need (Bran & Davis, 2003). The medium individuals chose would be based on their expectations of that medium and their perceptions of how well it will gratify that need (Blumer, 1979). This theory assumes that communication behavior is sought out to fulfill these cognitive needs by an individual user (Katz et al., 1974).

The third assumption calls for researchers to realize that media compete for the ability to fulfill user needs (Katz, Blumler, & Gurevitch, 1974). Those needs served through the media and communication is only a small segment of the human needs that need fulfillment, and the degree to which those can be fulfilled through media varies (Katz, Blumler, & Gurevitch, 1974). Bouwman and Wijngaert (2002) called for researchers to take into account the personal factors and situations that affect media choice, as was traditionally called for in this Uses and Gratifications approach.

Uses and Gratifications and the Internet

The Uses and Gratifications paradigm has been described as the best model in which to study new communication methods such as the Internet (Ruggiero, 2000). Many recent studies have utilized Uses and Gratifications as part of the theoretical framework when studying the Internet because of the interactivity, demassification, and asynchronicity it allows that other media do not (Baran & Davis, 2003). Such studies have shown that Internet use is motivated by the need to escape, the need for entertainment, the need for interaction, and the need for learning and socialization (Baran

& Davis, 2003). Papacharissi and Rubin (2000) examined audience uses of the Internet and identified five motives for using the Internet including: information seeking, interpersonal utility, pass time, convenience, entertainment. Their findings also suggested that those who like to look around the Internet felt it allowed them to save money and obtain information (Papacharissi & Rubin, 2000). Through several case studies Bouwman and Wijngaert (2002) concluded that due to the fact that the receiver of information on the Internet has to seek it out, the assumption of an active audience in the Uses and Gratifications approach is greatly supported.

Ko (2002) investigated whether motivations to use the Internet could explain key aspects of usage. Information, escape, time passage, and interactivity were the four primary motivations to using the Internet discovered by the researcher. Ko (2001) found that those who use the Internet for information are more likely to satisfy their needs by using the Internet over other media. Web users are active information seekers, as they must click on links and use hypertext to navigate online. Lin and Jeffers (1998) suggested that, in turn, Web use is goal directed as the users must be aware of the needs they attempt to satisfy. Ko, Cho, and Roberts (2005) looked at the Internet use of college students in the United States and Korea through an experimental design. Researchers concluded that consumers who possessed high information motives were more likely to engage in human-message interaction on a Website; while those with higher social interaction motives were more likely to engage in human-human interaction.

The Uses and Gratifications approach has also been utilized to study political information posted online. Kaye and Johnson (2002) found that the four primary motivations for locating political information online included guidance, information

seeking/surveillance, entertainment, and social utility. It was found that guidance and information seeking/surveillance is linked to more purposeful uses of the Web than for just surfing.

Previous Experience and Expectations

As individuals choose the media that they will utilize to gratify their needs, they draw on memories of past media use to aid them in that action (Katz, Blumler, & Gurevitch, 1974). The third step in the model, expectations, has been has been thoroughly researched through the Uses and Gratifications paradigm (Rayburn, 1996). Katz and colleagues (1974) allude to the expectations from media by the audience when selecting content to fulfill certain needs. The medium that is used depends on a variety of factors, including the characteristics of the information needed, the characteristics of the person asking the question, and the context in which they have access to specific media (Bouwman & Van De Wijngaert, 2002).

Peled and Katz (1974) found in a study of media during wartime and crisis that people came to a specific medium with expectations of what that medium will be and what it will gratify for them. Bouwman and Wijngaert (2002) found in a study of characteristics of basic needs that certain thresholds of accessibility must be met before deciding to use a medium. One such threshold they describe is that of suitability, where the medium can provide them the information they are searching for (Bouwman & Wijngaert, 2002). For the user to know if that medium has that information, they must have some previous experience with it.

Several theories have attempted to deal with theses expectations, such as Fishbein and Ajzen’s (1975) expectancy-value theory. This theory states that there are three kinds of beliefs: descriptive which is a result of direct observation; information which is formed

by accepting information from outside sources; and internal which include characteristics of the object that are not directly observed (Rayburn, 1996). This model has shown to be of great use to the study of Uses and Gratifications where feedback loops are prevalent (Rayburn, 1996).

Information Recall

The Internet may not always be the best medium to reach audiences; Bogart (2000) reported that an experiment done at The Ohio State University showed that when readers were given an article in both print and Web versions, they reported that the printed version was more understandable. “A strength of the Web is its ability to present individual readers with a selection of tailored contents. This is also a weakness, if it means that they are no longer exposed to what they have not expected and did not know they wanted,” (Bogart, 2000, p. 1).

In contrast, D’Haenens, Jankowski, and Heuvelman (2004) found in their study of two online and print versions of Netherlands newspapers that there was no evidence that online readers consume and retain news differently than those reading print versions. They found that online readers recalled international news better than print readers. It was concluded that no evidence in the study supported claims that online readers consume news differently from print readers. Moore (2004) found in an experimental study of magazine and online advertisements that higher selective exposure was found for information online over the print version, and moderate recall differences were seen between the two media. Based on these findings, Moore called for future research of new media to examine memory and media comparisons.

Eveland and Dunwoody (2002) found that when compared to print media, the Web increases learning through an increased elaboration, but may decrease it through

increased selective scanning. Tewksbury and Althaus (2000) found similar results with people reading online newspapers versus print additions. It was found that the online versions of the papers presented fewer clues to the importance of events compared to print editions, and in turn people were more willing to use their own interest to guide what they focused on and were able to recall. Danaher and Mullarkey (2003) found that length of exposure to a site containing a banner advertisement affected how likely viewers were to be able to recall the information. It was suggested by the researchers that designers should include interactive features that encourage users to stay on a page longer. It was also noted that those in a "goal-directed mode" were less likely to remember information than those who were just surfing the Internet. While Till and Baack (2005) did not look at recall in terms of information online, they did add to the discussion by looking at the creativity of advertisements in terms of recall. It was discovered that in an unaided basis, creativity generates significantly more recall.

Eveland and Dunwoody (2001) compared learning in print versus linear, nonlinear, and advisement Web designs. It was found that learning was better for print than nonlinear and linear; however, no difference was found between print and an advertisement design (which included cues to work through the site such as "back," "next," and "story map" buttons). It was also noted that Web experts learned more than Web novices on all mediums.

Wicks (1995) used an experiment looking at free recall, or recall not prompted, and extended recall, or recall after time has passed, to see the effects of medium on news recall. Wicks found that individuals acquire "common knowledge" from the news and that time is needed in the recall process.

Several studies compared different forms of online media and other media to discover more about recall of information. Berger (2001) ascertained that those comfortable with hypertext did not have a significant difference in recall than those with low comfort levels, concluding that presenting information linearly or nonlinearly would not offer users an advantage. Lowery (2002), however, found that linearity has an effect on perceived control over the media experience, but did not lead to any increased knowledge. Fox and colleagues (2004) found in a study of television news that recall was greater for younger and older viewers when graphics were present. Multimedia, such as video and imagery, has also been found to not increase comprehension or recall scores above those of a static, text-based site (Berry, 2001). Berry (2001) felt that multimedia may enhance a user's recall of textual information if it was reinforcing the textual information on the page.

Eveland and colleagues (2004) utilized an experimental design to discover how Web site organization influenced free recall of information. The researchers concluded that a nonlinear compared to a linear site had mixed results on learning. It was found that a linear site design increased factual learning in participants, but the nonlinear design increased the knowledge structure density. The learning of factual knowledge was hindered by the nonlinear structure.

Attitude

Attitude has been shown to be an important predictor of usage and implementation of technology (Rodgers & Chen, 2002). Eagly and Chaiken (1993) described attitudes as being derived to motivate behavior in order to exert effects at various stages of information processing. It is further conceptually defined by the authors as "a psychological tendency that is expressed by evaluating a particular entity with some

degree of favor or disfavor" (Eagly & Chaiken, 1993, p 1). An attitude is not formed until people are presented with a situation in which they must evaluate it on an effective, cognitive, or behavioral basis (Eagly & Chaiken, 1993). While attitudes are not directly observable, they can be inferred from responses given that show some state or disposition that has been engaged (Eagly & Chaiken, 1993).

Researchers have assumed that attitudes should be divided into three classes – cognitive, affective, and behavioral (Eagly & Chaiken, 1993). The cognitive category contains all of the thoughts an individual has about the attitude object, while the affective category is the feelings and emotions one has in relation to the attitude object (Eagly & Chaiken, 1993). The behavioral category contains one's actions with respect to the attitude object. In congruence with the idea of three categories of attitudinal responses, is the idea that there are three antecedents to attitude – cognitive processes, affective processes, and behavioral processes (Eagly & Chaiken, 1993).

The cognitive process in which attitudes draw from is one in which much research derives (Eagly & Chaiken, 1993). The assumption by researchers is that attitude is derived from a cognitive learning process in which one gains information about the attitude object and then forms beliefs. The information is gained via direct and indirect experiences with the attitude object (Eagly & Chaiken, 1993).

While research on attitudes has been more defined in the social psychology literature, it has been found in other social science literature as well (Eagly & Chaiken, 1993). Attitude research has been done extensively in the area of advertising and attitude toward ads and their effectiveness (Chen, 1999; Rodgers & Chen, 2002; Sinclair & Irani, 2005; MacKenzie & Lutz, 1989). Rodgers and Chen (2002) found adoption of the

Internet by advertising agencies is affected by poor attitudes toward and lack of experience with Internet advertising. In 1999, Chen developed a scale, based on other evaluative scales, to provide researchers the ability to measure the attitudes of users about Websites to help indicate the value of such sites.

Cho (1999) found in a study of advertising on the Web that people who had more favorable attitudes toward the Web were more likely to click on advertising on a site. Rodgers and Chen (2002) looked at advertising in terms of the organization, and found that poor attitudes toward the Internet after adoption for advertising was due to the agencies' lack of experience and expertise with that form of advertising. Teo and colleagues (2003) found that attitude toward a commercial Website can be positively influenced with increased interactivity on the site.

Conceptual Framework

Based on the literature presented in this chapter, the conceptual framework seeks to explain a model in which: An individuals' cognitive problem-solving style, when influenced by their level of previous usage of the media will affect their levels of attitude and information recall after being presented with an interactive or non-interactive Website (Figure 2-1.).

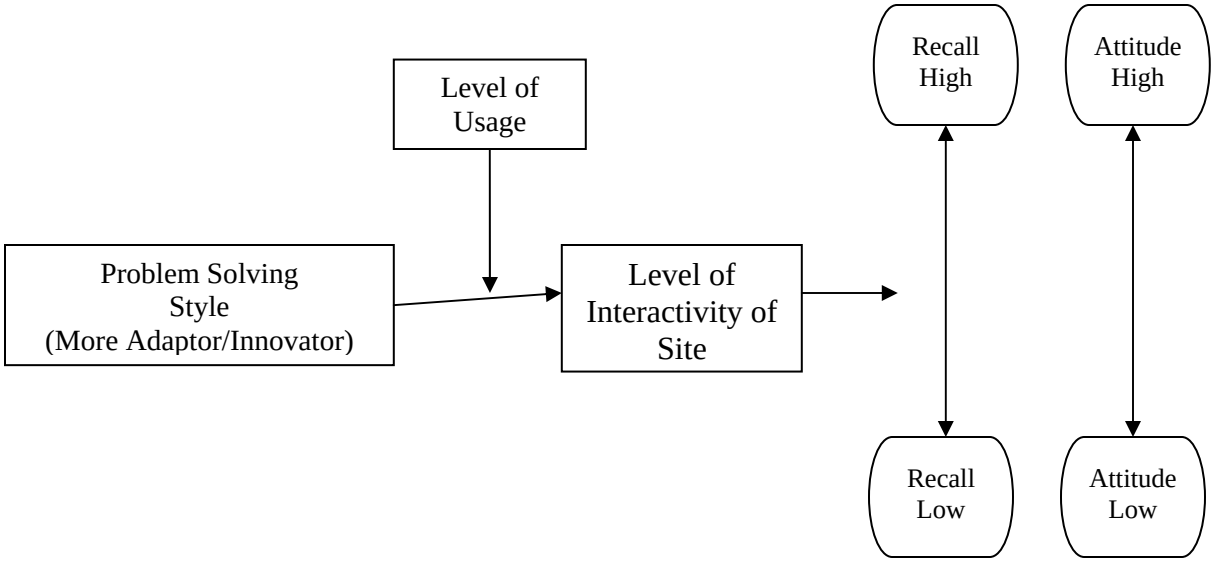

Figure 2-1. Conceptual framework for this study.

Research Questions

Based on the conceptual framework, this study will examine the relationship of cognitive problem-solving styles and level of Internet usage on perceived attitudes toward and information recall of sites that vary in their level of interactivity.

This study will attempt to answer the following questions:

1. To what extent does problem-solving style and Internet usage have in influencing perceptions of attitude and recall toward Websites that vary in level of interactivity?

2. To what extent is problem-solving style alone a factor in influencing perceptions of attitude toward and information recall toward such a site?

3. To what extent is Internet usage alone a factor in influencing perceptions of attitude and level of information recall toward such a site?

CHAPTER 3
METHODOLOGY

Overview

As Extension professionals continue to embrace online technologies to reach audiences and inform them about topics that will help solve problems with which they are faced, it is important that this information be presented in a form that will be usable, valuable, appropriate, and easy to recall. This method of disseminating Extension information is providing new challenges, as it is attempting to reach audiences in a new format that is usable and valuable.

Thus, the purpose of this investigation was to examine the effects of individuals' problem-solving style, level of Website interactivity, and level of Internet usage on attitude and level of recall with respect to an information-driven Extension Website. Although usage has been looked at extensively in the literature, it has never been tied to problem-solving style. By understanding how problem-solving styles in particular affect users' perceptions of a Website with respect to such attributes as attitude and information recall, Extension, agricultural communicators, and commodity groups who are utilizing the Internet to reach audiences will be better able to utilize communications processes to inform audiences, educate them, and affect productive change.

Hypotheses

Based on the literature presented, the following hypotheses were developed:

H1: Unaided information recall and level of attitude toward an information-driven Extension Website will differ significantly as a function of site interactivity, problem-solving style, and level of Internet usage.

For Subjects Who Receive the Interactive Site:

H2: Attitude toward an information-driven Extension Website will differ significantly as a function of Internet usage and problem-solving style.

H3: Unaided information recall will differ as a function of Internet usage and problem-solving style.

For Subjects Who Receive the Non-Interactive Site:

H4: Attitude toward an information-driven Extension Website will differ significantly as a function of Internet usage and problem-solving style.

H5: Unaided information recall will differ as a function of Internet usage and problem-solving style.

Research Design

The research design for this study was experimental in nature. The design was a 2 (more adaptive/more innovative problem-solving styles) x 2 (interactive/non-interactive information-driven Extension Website) x 2 (high/low levels of Internet usage) between-subjects, factorial design focused on assessing whether the problem-solving style of an individual, coupled with exposure to an interactive or non-interactive information-driven Extension Website and level of Internet usage, will influence information recall and attitude.

Factorial designs allow for a more significant test of hypothesis (Ary, Jacobs, & Razavieh, 2002) by determining the influence of an individual independent variable on another independent variable (Christenson, 2001). Factorial designs not only offer the ability to test more than one independent variable, but they also allow for the testing of more than one hypothesis in one experiment (Christenson, 2001). Beyond testing just the independent influence of a specific variable, factorial design allows for tests of interaction to be performed (Christenson, 2001). In order to generate a large enough sample to effectively test the hypotheses, a minimum sample size of 180 (2 x 2 x 2 x 30=

240) is needed to ensure at least 30 subjects for each condition (Christensen, 2001). The group design appears as follows (Gall, Borg, & Gall, 1996):

R	X_1	O_1
R	X_2	O_1

In this posttest-only, randomized subject design: R= random assignment, O_1= posttest measures, X_1= interactive version of the site, X_2= non-interactive version of the site.

The basic threats to internal validity were considered in the design of the study. As identified by Campbell and Stanley (1963), threats to be cognizant of include history, maturation, testing, instrumentation, regression, subject selection, mortality, and interaction effects. The post-test only design of this study was expected to address regression, history, and maturation (Campbell & Stanley, 1963). Mortality was a concern in this study as students were asked to give data on two different occasions, once in the classroom and once online. Time between these two administrations was less than a day. To address this concern, data was examined post collection, and showed that this was not an issue since only 10 participants did not complete both sections. Interaction of extraneous variables was also a possibility. To address this concern factorial design was utilized. A factorial design allows for the confounding variables to be built into the design. Confounding variables that were controlled for included gender (Kirton, 2003), time, content (Saunder, 2000), and previous experiance. To address instrumentation validity, a panel of experts was utilized to look at the face validity of the items, and a pilot test was run to ensure construct validity. The pilot study included testing of the instrument as well as the message stimulus. Threats due to testing are described as the

effects of taking a first test upon the scores of a second test (Campbell & Stanley, 1963). This could be a concern as the participants took two different instruments at different times. However, the instruments were on different topics and were not in a pre-test/post-test situation where they would affect one another.

While the undergraduate courses, in which the sample was derived, were selected through availability, to counteract any validity threats posed by the selection of participants, the version of the sites were randomly assigned to the participants and data was collected on each individual student and not the course as a whole. Manipulation checks were conducted on the version of the sites to ensure no differences were found. These manipulation checks will be described in more detail later in this chapter.

Threats to external validity were also taken into consideration during the design of the experiment. Threats which need to be addressed, as outlined by Ary and colleagues (2002), include population validity, ecological validity, and experimenter validity operation.

The threat of population validity must be taken into account as the population consisted of students in three undergraduate courses at a large Southeastern land-grant university. While this sample is not generalizable to the whole population, the majority of Internet users are in the 18- to 30-year age range (CyberStats, 2005) and are a viable population to study in terms of Internet modality. Students' familiarity with the Internet aids in assuring differences between exposure groups is unlikely due to the novelty inexperience of the Internet (Tewksbury & Althaus, 2000). Bull and colleagues in 2004, called for Extension to pay specific attention to underserved audiences who have typically not been an original stakeholder in the program.

Ecological validity describes how generalizable the experimental environment is to other environments by taking into account pretest and post-test sensations, multi treatments, Hawthorne effects, novelty effects, and experimenter effects (Ary et al., 2002). To address these threats, students were given science-generated content that is viable and interesting to them. Questions were asked to ensure this topic was of interest during the study. To help ensure a more natural environment when taking the instrument, students were asked to take the second portion of the study at home on their own computers. By doing this, subjects were in a familiar setting and will be looking at a topic in which they might research on their own time. This also helped to curb any novelty effects that could occur during the treatment.

Subjects

Participants were recruited out of two service courses taught in the College of Agricultural and Life Sciences at a large Southeastern land-grant University. The courses serve as part of a general education requirement for students across the university and are thus taken to be largely representative student population with a variety of majors and backgrounds. A total of 314 students completed the initial usage and problem-solving instruments through direct administration. Those students who were enrolled in more than one of the courses utilized in the study were instructed to participate in the study only once. Their names were noted during the first data collection to insure that they did only participate once. In order to manipulate the treatment version of the site, subjects were randomly assigned to either an interactive or non-interactive version of the same Extension Website. Manipulation checks were completed during the pilot study to insure that there were no significant differences among the two courses or those receiving one version of the site over the other (Table 3-1).

Table 3-1. Independent Sample T-test for Significant Differences Between Courses and Version of the Site Based on Age or Gender.

	T	df	Sig.	Mean Diff.
Courses				
Gender	.80	253	.43	.26
Age	-.79	254	.43	-.06
Version of the site				
Gender	1.27	253	.20	.41
Age	1.1	254	.28	.08

Pilot Study

To establish reliability and validity of the final instrument, a pilot study was conducted with 29 undergraduate students in an agricultural leadership course at a large Southeastern university. Care was taken to ensure no students who participated in the pilot were a part of the final sample. The same procedures were utilized in the pilot study as they were for the full study, as outlined below. Prior to the pilot test, a panel of experts assessed the face and content validity of the instrument. To assess construct validity, item analysis was run on the pilot instrument. An overall Cronbach's alpha reliability of .72 was computed. A few adjustments were made to refine and finalize the instrument. Message testing was also completed during the pilot study. Participants in the pilot section were cross-referenced with participants in the full study via the reported emails to ensure no subject participated in both data collections.

Manipulation checks were conducted during the pilot study to assess whether respondents could distinguish between the treatment and control version of the Websites. Subjects in the treatment and control version of the sites were asked to identify if the version of the Website they were presented with was interactive. An independent-sample t-test was conducted using version of the site as the independent variable. Results show that participants receiving the interactive version of the Website were successfully able to

identify that the version of the site they viewed was interactive. Those receiving the non-interactive version of the site were also able to identify that their version of the site was non-interactive. A significant difference was found in the response between the condition groups. Their response is presented in Table 3-2 and Table 3-3.

Table 3-2. Means Table for Website Interactivity Identification (N=19*).

Page is Interactive	N	Mean	SD
Interactive Version	10	3.00	1.50
Non-interactive Version	9	1.44	.73

*19 out of 29 pilot study participants completed the manipulation check. Using a 1-5 Likert Scale (1= Strongly Disagree and 5= Strongly Agree)

Table 3-3. Independent Sample T-test for Significant Differences Between Less and Interactive Version of the sites.

	T	df	Sig.	Mean Diff.
Non-interactive/interactive Version	-2.84	17	.011	-1.56

Procedure

The instruments for both the pilot and full studies were administered in two parts due to the length of instruments and the use of a standardized instrument (KAI), which could only be administered on paper. The first part of the instrumentation was administered in the classroom. During this time a certified KAI representative administered the KAI to the students.[1] Participants were also given questions on basic Web and media use, attitudinal scales on perceptions of the Internet, and demographics. Upon completing the first part of the instrumentation, participants were asked to report a university email. Students were informed that they would be contacted later that day via email with the second part of the instrumentation. They were informed that the course

[1] Dr. M.J. Kirton, director and founder of the Occupational Research Center, developed this psychometric inventory. KAI administrators must complete an intensive weeklong course given by Dr. Kirton on the KAI instrument and the underlying theory in order to be certified to administer the instrument.

title would serve as the subject to the email, to ensure students did not pass the email off as spam.

Once students were randomly assigned to either the treatment or control, part two containing a link to the appropriate version of the site was emailed (Appendix B). Participants could only view one of the two versions based on the random assignment. Once at the appropriate version of the site, participants viewed a consent screen and were directed to click on a link to open a new browser window containing the information page of the site (Figure 3-1). Participants were instructed to spend as much time as needed to review the content before completing the final instrument.

Figure 3-1. A screen capture of the consent information and instructions sent to participants.

After exposure to the version of the site, participants were instructed to close the browser window containing the information page and not to return to it. They were then directed to click on a link which took them to a new page containing part two of the instrument in which they were asked their attitudes toward the treatment or control version of the site to which they were exposed, were asked to recall information and report knowledge on the topic presented, and were asked about their current and past

usage of Extension information through an online form. After data collection was completed, the data from the part one instrument and part two instrument were matched based on an email identifier, which was included in both sets of instruments.

The final subjects were solicited out of two large service courses taught at a large Southeastern university (N=314). A total of 314 students completed part one of the instrumentation in the class. A total of N=305 individuals completed both parts of the study. One of the instruments was then thrown out for being incomplete. Another 48 instruments were thrown out due to the sensitivity of the KAI instrument, leaving 256 total participants for the full study.[2]

Instrumentation

Instruments for the first part of the study consisted of the Kirton Adaption-Innovation Inventory (32 items), a 49-item instrument measuring media usage, (7 items) Internet experience (17 items), attitude scales toward the Internet (11 items), a scale on the value of the Internet (8 items), and demographics (6 items). (See Appendix A.) The instrument in the second part consisted of 34 items measuring attitudes toward the interactive or non-interactive version of the site to which they were exposed (11 items), information recall (4 items), Extension usage (2 items), and knowledge and interest in the car-buying information (10 items). (See Appendix B.)

[2] The KAI is a very sensitive instrument in which participants who respond that everything is easy or hard for them or those who select down the middle of the scale must be rejected as it is suspected that they are being reluctant to respond truthfully or are trying to deliberately score in an “acceptable” way (Kirton, 1999, pp.19). It is noted by KAI researchers (Tefft, 1994; Kirton, 1999) that younger populations will have lower maturity levels, affecting the rejection rate of such a population. However many university students have enough work experience to understand the items without problems (Kirton, 1999). A 10%-20% wastage rate can be expected under favorable conditions with university students (Kirton, 1999).

Independent Variables

Treatment

The only independent variable that was manipulated in this study was the level of Webpage interactivity to which the subjects were exposed. The other independent variables were measured on the basis of data collected via instrumentation.

For the purposes of this study, two versions of a Webpage were created: an interactive version and a non-interactive version (Appendix C.). The versions were created using the same information; only the ability to interact with the message was manipulated (Sicilia, Ruiz, & Munuera, 2005). The non-interactive version was set up like a traditional Extension fact sheet, that are typically made available in PDF or basic HTML formats online, where the entire message was on one Webpage with no interactive elements (Figure 3-2). The Extension logo was visible, and bolded headlines broke up the text.

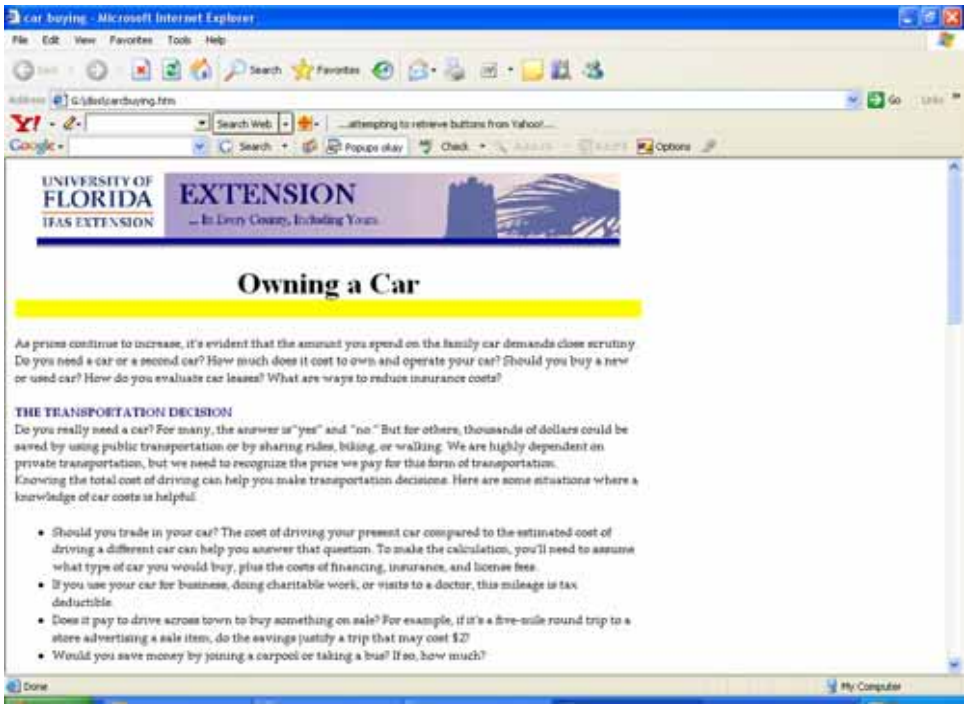

Figure 3-2. A screen capture of the non-interactive control page sent to participants.

The interactive version contained the same information and Extension logo presented in a Macromedia Flash format (Figure 3-3). After the Extension logo an animated car could be seen moving across the screen. An introduction and instructions to click along the “car-buying path” followed. Users could then click on the icons along the “car-buying path” and a pop-up window would appear with information that could be moved around the screen or closed.

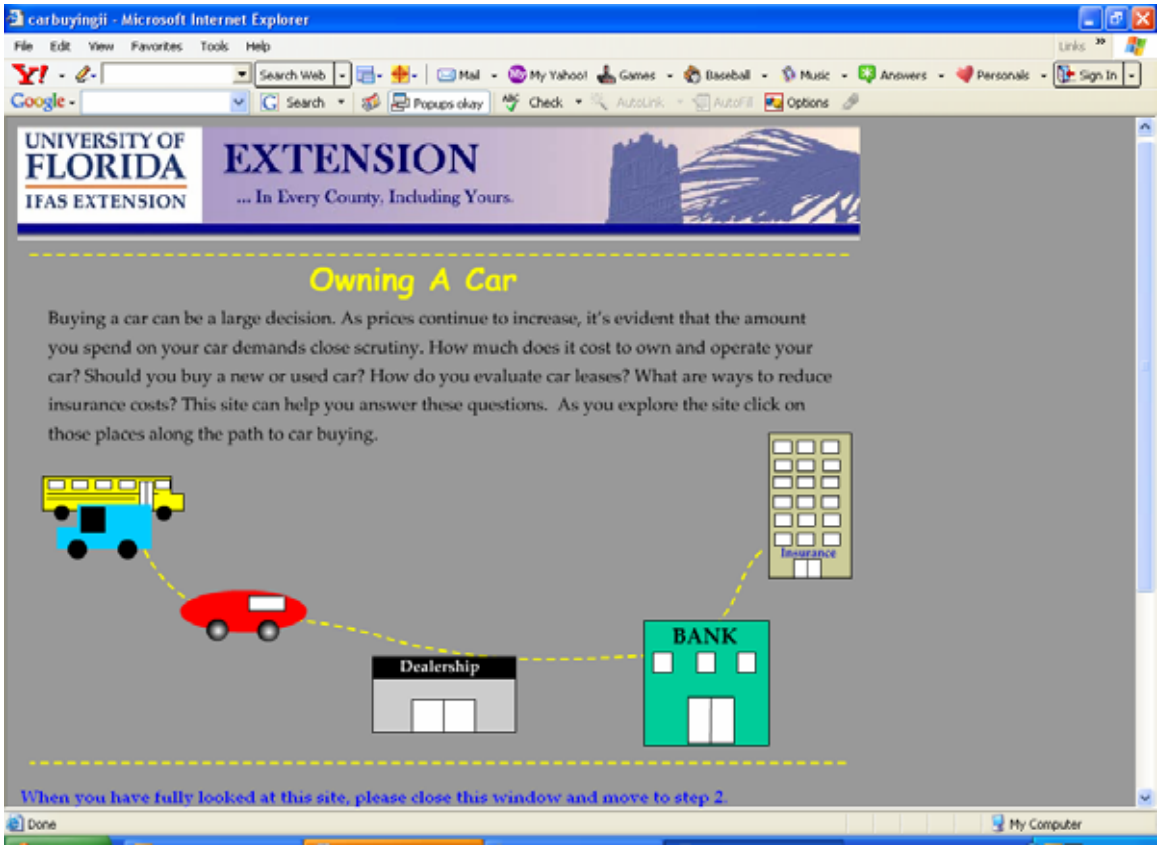

Figure 3-3. A screen capture of the interactive version of the site page sent to participants.

The information content of the page was consistent across both stimuli conditions. The information used was adapted from an Extension fact sheet produced by the University of Iowa (1998). To make it relevant and salient to the subjects, the topic of car purchasing was chosen as the focus of the information presented on the page used for the

treatment and control version of the sites. This was due to expectation that the information would be salient to this audience. College students are in a unique situation in that they are becoming more important to automakers as a demographic which will soon be making car purchases (Clemens, 2005; Collier, 2006). These “echo boomers” are at the prime age to buy their first car and are said to spend more of their income on products, such as automobiles, than others (Clemens, 2005). Market research has shown that these young, first-time buyers are turning to the Internet as a main source when making car-buying decisions (Associated Press, 2006). As individuals begin looking at buying large items like a car they will move into a problem-solving mentality of trying to decide what type of car is best for their needs.

Problem-solving style

As described in Chapter 2, all people are bound by their makeup as to how they define and solve the problems with which they are faced (Kirton, 1999). In this study, the Kirton Adaption-Innovation Inventory (KAI) was utilized to place individuals on a continuous scale between being adaptive and innovative in their problem-solving style. This cognitive style is a trait that can be expected to be stable over time and across situations (Kirton, 2003). It was assumed problem-solving style would influence preference for and recall of information needed to solve a problem, such as how to purchase a car.

The KAI inventory requires respondents to assess the degree of ease or difficulty they encounter in sustaining their adaptive and innovative behaviors over periods of time by drawing an “x” where they fit in a series of 32 five-point scaled items ranging from “very easy” to “very hard” (Foxall & Bhate, 1993) (See Table 3-4). Individual scores are composed of three independent sub-scales which measure originality (13 items),

efficiency (seven items), and rule-conformity (12 items) (Goldsmith, 1984). Responses are computed into overall scores ranging from 32 to 160 (Foxall & Haskins, 1986). Respondents scoring below the 96 mid-point are considered “adaptors,” while those above 96 are “innovators” (Foxall & Haskins, 1986). The KAI inventory has been shown to have a high level of internal consistency; Kirton (1999) returned a Kuder-Richardson 20 reliability of .88 and then retested with a similar population a year later to again receive a K-R 20 of .88. In The KAI Manual it is reported that 31 studies from 12 countries have yielded Cronbach’s alpha’s ranging from .79 to .91 (Kirton, 1999). Goldsmith (1984) reported a reliability Cronbach’s alpha of .84 for the KAI while Goldsmith and Matherly (1986) reported a Cronbach’s alpha of .87. Both studies were run with undergraduate populations.

Table 3-4. Example of KAI Instrument Items

How easy or difficult do you find it to present yourself, consistently, over a long period of time as:				
	Very Hard	Hard	Easy	Very Easy
A person who is patient				
A person who conforms				
A person who enjoys the detailed work.				

Internet Usage

As discussed in Chapter 2, communication needs interact with social and psychological factors to produce motivation to communicate (Rosengren, 1974). These factors and previous experiences with a media will influence a user to choose a specific media to gain information. Ko (2001) found that those who use the Internet for information are more likely to satisfy their needs by using the Internet over other media. Web users are active information seekers, as they must click on links and use hypertext to navigate online. College students represent the largest population of Internet users

(Eastin, 2001). Large percentages, 96%, of all 18- to 29-year-old users find the Internet a good way to get information (Fallows, 2004). Level of Internet usage is thus important to understand and gauge. For the purposes of this study, Internet usage was defined by the amount of Internet use each week, the number of sites subjects visit, and the activities they perform while online. In this study level of usage was measured through a 13-item researcher-developed scale (Appendix A).

In order to measure subjects' usage of and experience with the Internet, subjects were asked several researcher-developed questions about how many hours they spend online each day and how many sites they visit in an average session. Respondents were asked to rank on a five-point Likert scale how often they participate in 10 specific online activities such as downloading music and shopping online (Table 3-5).

Table 3-5. Example of Internet Usage Items.

Please indicate how often you do the following each week					
Download music	1 Never	2	3 Sometimes	4	5 Very Often
Read a blog	1 Never	2	3 Sometimes	4	5 Very Often
Instant message	1 Never	2	3 Sometimes	4	5 Very Often
Read Facebook or MySpace	1 Never	2	3 Sometimes	4	5 Very Often
Watch videos	1 Never	2	3 Sometimes	4	5 Very Often
Download RSS (Real Simple Syndication)	1 Never	2	3 Sometimes	4	5 Very Often
Shop online	1 Never	2	3 Sometimes	4	5 Very Often
Shop/sell on EBay	1 Never	2	3 Sometimes	4	5 Very Often
Use a search engine	1 Never	2	3 Sometimes	4	5 Very Often
Work on WebCT or other online course	1 Never	2	3 Sometimes	4	5 Very Often
How often do you use the Internet to find news/information online	1 Never	2	3 Sometimes	4	5 Very Often
How many hours a week do you spend on the Internet	1 or less	2-3	4-5	6-7	8-or more
How many sites do you visit on an average session online	1-2	3-4	5-6	7-8	9 or more

Dependent Variables

Information Recall

Several researchers have looked at how different components and interfaces online affect information recall; however, after a thorough literature review, no studies were found that have examined how this is affected by trait variables such as cognitive problem-solving. Danaher and Mullarkey (2003) have found that length of exposure to a Website containing a banner advertisement affected how likely viewers were able to recall the information. Berger (2001) discovered that those subjects comfortable with hypertext did not differ significantly in recall than those with low comfort levels. Lowery (2002) found that linearity has an effect on perceived control over the media experience, but did not lead to any increased knowledge.

Information recall has been typically measured by asking participants to engage in free or unaided recall followed by a set of aided recall questions (D'Haenens, Jankowski, & Heuvelman, 2004; Davis et al., 2005; Danaher & Mullarkey, 2003). Strong correlations have been reported by researchers utilizing both unaided and aided recall (Davis et al., 2005). Other researchers comparing the differences between free or unaided and cued or aided recall found no significant differences in the findings (Padilla-Walker & Poole, 2002). However, while they are related, it has been noted in psychology literature that they represent different tasks (Padilla-Walker & Poole, 2002). It has been discovered that aided recall can cause more recollection of weaker memories, thus giving less accurate results (Padilla-Walker & Poole, 2002). For the purpose of this study, the learning process and free recall of information is of interest, rather than recognition. Thus, participants were asked, after reviewing the interactive or non-interactive version

of the message structure to which they were exposed, to recall information through an unaided response where they listed all information recalled from the site (Davis et al., 2005; Eveland, Cortese, Park, & Dunwoody, 2004; D'Haenens, Jankowski, & Heuvelman, 2004). All true statements were scored as a +1 while untrue statements were coded as a -1 (Davis, et al, 2005). Points were summed to attain a mean unaided recall for the information contained in the version of the site to which they were exposed.

Attitude

Attitude has been shown to be an important predictor of usage and implementation of technology (Rodgers & Chen, 2002). While attitudes are not directly observable they can be inferred from responses given that show some state or disposition that has been engaged in (Eagly & Chaiken, 1993). The assumption by researchers is that attitudes are formed through a cognitive learning process where one gains information and then forms beliefs. The information is gained through experiences with the object, such as the Internet or a particular Website (Eagly, & Chaiken, 1993).

The most common way to measure attitude is through semantic differentials (Eagly & Chaiken, 1993). During the development of this measure, researchers have found that three factors are usually underlying the scales: evaluation, potency, and activity (Eagly & Chaiken, 1993). The evaluative factor accounted for the most variability among scale ratings analyzed and was identified to represent attitude. The bipolar-adjectives that load in the evaluative dimension, like good/bad and pleasant/unpleasant, are thus used in semantic differentials to measure attitudes (Eagly & Chaiken, 1993). Two researcher-developed semantic differential scales were thus utilized. Attitude toward the treatment or control version of the site to which subjects were exposed (Table 3-6) and the Internet in general (Table 3-7) was tested through two sets of 11 semantic differential scales

(good/bad, pleasant/unpleasant, trustworthy/untrustworthy, effective/ineffective, useful/not useful, and favorable/unfavorable) (Sicilia, Ruiz, & Munuera, 2005). These bi-polar adjectives were placed at each end of a five-point scale. Three out of the eleven attributes were reverse coded to decrease the influence of response layout (Dillman, 2000).

Table 3-6. Example of Scale Used to Measure Attitude toward the Treatment or Control Version of the site to Which Subjects were Exposed

The information presented on this Website is						
Good	1	2	3	4	5	Bad
Not credible	1	2	3	4	5	Credible
Biased	1	2	3	4	5	Unbiased
Difficult to understand	1	2	3	4	5	Easy to understand
Important	1	2	3	4	5	Not important
Not interactive	1	2	3	4	5	Interactive
Easy to find	1	2	3	4	5	Hard to find
Not beneficial	1	2	3	4	5	Beneficial
Believable	1	2	3	4	5	Unbelievable
Not trustworthy	1	2	3	4	5	Trustworthy
Accurate	1	2	3	4	5	Inaccurate

Measure of attitude toward the Internet in general was measured for descriptive purposes only.

Table 3-7. Example of Scale Used to Measure Attitude toward the Internet in General

I feel that many Websites on the Internet are						
Good	1	2	3	4	5	Bad
Credible	1	2	3	4	5	Not credible
Unbiased	1	2	3	4	5	Biased
Difficult to understand	1	2	3	4	5	Easy to understand
Not important	1	2	3	4	5	Important
Not interactive	1	2	3	4	5	Interactive
Easy to find	1	2	3	4	5	Hard to find
Beneficial	1	2	3	4	5	Not beneficial
Believable	1	2	3	4	5	Unbelievable
Trustworthy	1	2	3	4	5	Not trustworthy
Accurate	1	2	3	4	5	Inaccurate

An eight-item scale measuring the importance of the Internet in subjects' lives was also utilized for descriptive purposes (Table 3-8). This index adapted by Ko (2001) from Rubin (1985) and Conway and Rubin (1991) asked subjects to indicate level of agreement with statements that discuss the importance of Internet in their lives. The index has a reported internal reliability Cronbach's alpha of .86 (Ko, 2001).

Table 3-8. Example of Index Used to Measure the Importance of the Internet

Please rank your level of agreement with the following statements					
I would rather surf the Internet than do something else.	1 Strongly Disagree	2	3	4	5 Strongly Agree
My knowledge increases as my Internet usage increases	1 Strongly Disagree	2	3	4	5 Strongly Agree
It would be very difficult for me to survive without the Internet for several days.	1 Strongly Disagree	2	3	4	5 Strongly Agree
Internet users are better educated people.	1 Strongly Disagree	2	3	4	5 Strongly Agree
The Internet opens doors that would otherwise be closed.	1 Strongly Disagree	2	3	4	5 Strongly Agree
Information online should be engaging.	1 Strongly Disagree	2	3	4	5 Strongly Agree
Information online should be interactive.	1 Strongly Disagree	2	3	4	5 Strongly Agree
Information online should be entertaining.	1 Strongly Disagree	2	3	4	5 Strongly Agree

Data Analysis

The data analysis for this study was completed using SPSS 12.0 for Windows PC. Multiple analysis of variance (MANOVA) was utilized to allow for a more sophisticated analysis of multiple independent and dependent variables (Graziano & Raulin, 2000). MANOVA's allow for more complex examinations of the simultaneous relationships of many variables, allowing researchers to create more sophisticated models to explain

social behaviors (Sweet & Grace-Martin, 2003). Several multivariate analyses of variances were then used to compare means and interaction effects. Effect sizes of univariate analyses of variances were calculated to describe the magnitude of treatment effect (Kotrlik & Williams, 2003). Effect size reporting allows for judgment on the magnitude of differences between groups, and allows for better comparison to previous research results (Kotrlik & Williams, 2003).The Chohen's f, which estimates the proportion of variance explained for the sample by the categorical variable was calculated as follows: (Kotrlik& Williams, 2003)

$\omega^2 = SS_{between}/SS_{Total}$ Cohen's f = Square root of $(\omega^2/1-\omega^2)$

CHAPTER 4
RESULTS

The purpose of this study was to examine the effects of problem-solving style, level of Website interactivity, and Internet usage on an individual's attitude toward an information-driven Extension Website and subjects' recall of the information presented on that site. Based on a conceptual framework relating Kirton's Adaption-Innovation (KAI) theory and the theory of Uses and Gratifications, research hypotheses were formed with attitude and information recall as the dependent variables.

The instruments and experimental condition were administered to a sample (N=314) of college undergraduates at a large Southeastern university. A total of 314 instruments were distributed in class. Those 314 participants were then sent either the treatment or control condition and final instrument. A total of 305 participants returned the final instrument for a 96.8% response. Cases were then removed based on the following criteria:

1. The respondent had not fully completed all the instruments (n=1)
2. The respondent indicated on the KAI that nothing was easy or hard for them, indicating their score was suspect (n=48).[1]

[1] The KAI is a very sensitive instrument in which participants who respond that everything is easy or hard for them or those who select down the middle of the scale must be rejected as it is suspected that they are being reluctant to respond truthfully or are trying to deliberately score in an "acceptable" way (Kirton, 1999, p. 19). It is noted by KAI researchers (Tefft, 1994; Kirton, 1999) that younger populations will have lower maturity levels, affecting the rejection rate of such a population. However, many university students have enough work experience to understand the items without problems (Kirton, 1999). A 10%-20% wastage rate can be expected under favorable conditions with university students (Kirton, 1999).

This resulted in a final N of 256 participants.

Demographics

General demographics were calculated from the sample for gender, age, and college rank (Table 4-1). There were 110 males (43.1%) and 145 female (56.9%) respondents. The majority of respondents were 18-20 years old (56.3%), followed by respondents 21-23 years old (37.9%), respondents 24-27 years old (5.1%), and respondents 28 years or older (0.8%). There were 119 (46.9%) who reported being college juniors, 66 (26%) sophomores, 61 (24%) seniors, and 8 (3.1%) freshmen.

Table 4-1. Number of Respondents by Age, Gender, and Class Rank

Characteristic	N	%
Age (n=256)		
18-20	144	56.3
21-23	97	37.9
24-27	13	5.1
28+	2	.8
Gender (n=255)		
Male	110	43.1
Female	145	56.9
Rank (n=254)		
Freshman	8	3.1
Sophomore	66	26.0
Junior	119	46.9
Senior	61	24.0

The majority (73.1%, n=187) of respondents indicated being enrolled in the College of Agricultural and Life Sciences, followed by 9.8% (n=25) in the College of Health and Human Performance, 4.7% (n=12) in the College of Business, 3.7% (n=10) in the College of Liberal Arts and Sciences, 3.5% (n=9) in the College of Public Health and Health Professions, 1.6% (n=4) in the College of Design and Construction Planning, .8%

(n=2) in the College of Pharmacy, and .4 % (n=1) in the College of Engineering and the College of Medicine, respectively (Table 4-2).

Table 4-2. Number of Respondents by College (n=252)

College	N	%
College of Agricultural and Life Sciences	187	73.1
College of Health and Human Performance	25	9.8
College of Business	12	4.7
College of Liberal Arts and Sciences	10	3.7
College of Public Health and Health Professions	9	3.5
College of Design and Construction Planning	4	1.6
College of Pharmacy	2	.8
College of Engineering	1	.4
College of Medicine	1	.4
Undecided	1	.4

Media Selection and Internet Usage

When asked to indicate their preferred choices of media when seeking information/news, 60.9% (n=156) indicated they preferred to use the Internet, while 26.6% (n=68) preferred television, 8.2% (n=21) preferred newspapers, 2.0% (n=5) preferred magazines, 1.2% (n=3) preferred radio, and 1.2% (n=3) preferred information from a book.

Participants were asked to describe their Internet and computer usage. The majority (98.8%, n=253) indicated that they own a personal computer. High speed (55.3%, n=140) and wireless access (37.5%, n=95) were the most indicated methods to access the Internet at home, while at school the majority use a computer lab (49.8%, n=126) (Table 4-3).

Table 4.3. How Participants Access the Internet at Home and at Campus

Access	n	%
At Home (n=252)		
High-speed	140	55.3
Wireless	95	37.1
Dial-up	16	6.3
Computer lab	1	.4
At Campus (n=253)		
Computer lab	126	49.8
High-speed	65	25.7
Wireless	62	24.5

Respondents identified whether they personally had a Web log (blog), Facebook page, MySpace page or a Website. The majority (89.5%, n=229) did not have their own Website, and 89.1% (n=228) did not have a personal blog, while 85.2% (n=218) had a page on Facebook, and 10.5% (n=27) had a page on MySpace. Of respondents, 82.4% (n=210) indicated they had never created a Website.

Participants indicated their level of attitude toward the Internet in general through semantic differentials. The Internet was seen to be moderately good, easy to understand, important, easy to find, beneficial, believable and accurate (Table 4-4.). The grand mean for general attitude toward the Internet was 3.2 (SD= .91) on a 1 to 5 scale (1 being negative and 5 being positive).

Table 4-4. Level of General Attitude Toward the Internet

	n	M	SD
Beneficial	256	3.7	1.0
Easy to Understand	255	3.6	1.0
Easy to Find	255	3.6	1.1
Good	256	3.5	.90
Interactive	254	3.3	.97
Important	254	3.1	1.0
Believable	256	3.1	.75
Accurate	256	3.1	.77
Credible	256	3.0	.80
Trustworthy	255	2.9	.76
Unbiased	255	2.4	.90

Extension Usage

Questions were asked on a 1 to 5 likert scale (strongly disagree to strongly agree) to determine if subjects had experiences with Extension information. A mean of 1.96 (n=254) indicated that the majority of participants have not used Extension information in the past, demonstrating that these participants were not heavy users of Extension services in general. A mean of 2.11 (n=253) indicated that these participants have not visited the University of Florida's Extension Website in the past. (See Table 4-5.)

Table 4-5. Mean Extension Experience of Study Participants*

	n	M	SD
I have used Extension Information	254	1.96	1.21
I have looked at an Extension Website	253	2.11	1.40

*Based on a 1-5 Scale (1= strongly disagree to 5= strongly agree)

Message Relevance

When asked how important the information presented to them was, 160 (62.5%) indicated that this information was moderately important to very important to them. A total of 150 (58.6%) of the respondents indicated that they were moderately interested to very interested in the information on car buying. The majority (50%, n=128) were moderately knowledgeable on the topic of car buying. The majority (74.2%, n=190) have not recently purchased a car, but 56.0% (n=141) have thought of purchasing recently. In general, the majority of participants were interested in and moderately informed about purchasing a car in the near future.

Manipulation Checks

Manipulation checks were conducted to evaluate the independent variables used in the study. Based on the literature and findings from the pilot study, two versions of a Website were developed containing the same information. Both versions contained facts on car buying and an Extension identification image, but differed in the amount of

interactivity offered to the respondent. While car buying is not a traditional agriculture message, the information presented was developed by agricultural economists and presented through Extension. To assess the face and construct validity issues, participants exposed to both versions were asked to identify along a five-point Likert scale if they strongly agreed to strongly disagreed that the site version they viewed was interactive or not. The means for both groups indicated that overall, on a Likert scale ranging between 1 and 5, they correctly identified the version they viewed as being either interactive or non-interactive (Table 4-6). An independent sample t-test was run to test for the significance of the condition manipulation with the version of the site serving as the independent variable. Results showed a significant difference between the treatment and control version of the sites at a .05 alpha level (Table 4-7).

Table 4-6. Means Table for Site Interactivity Identification*

Site is Interactive	N	Mean	SD
Interactive Site	123	3.35	1.22
Non-interactive Site	132	1.96	1.11

*Based on a 1-5 scale (1= strongly disagree to 5= strongly agree)

Table 4-7. Univariate Analysis of Variance for Significant Differences between Non-Interactive and Interactive Version of the Sites.

	df	MSE	F	p
Non-interactive/interactive	1	1.37	86.55	.000

Problem-solving Inventory

The problem-solving instrument (KAI) used in this study, as described in Chapter 3, included 32 items. Respondents were asked to indicate the degree of ease or difficulty they encountered in sustaining their adaptive and innovative behaviors over periods of

time by drawing an x where they fit in a five-point scale ranging from “very easy” to “very hard.” Scores ranged from 50 to 133 with a mean score of 92.6. As with many other variables in psychology (Graziano & Raulin, 2000), the KAI is reported as a continuous score, which are often preferred by statisticians for the ability to run “simpler” calculations (Agresti & Finlay, 1997).

Grouped distributions are generally required when working with a continuous variable such as KAI when reporting demographics (Graziano & Raulin, 2000). When there are many possible scores the data reported in tabular form will be long and difficult to read (Graziano & Raulin, 2000). Thus, a means split was conducted on the continuous variable for descriptive reporting purposes only. The Theory of Adaption-Innovation is deeply based on the idea that cognitive problem-solving style measured by the KAI is based on a continuous scale, and should be treated that way in complex statistical interpretations (Kirton, 1999). In order to formulate the means split, participants with scores over 96 were considered to be more innovative, and those below 96 were deemed more adaptive (Kirton, 2003). The means split resulted in 115 innovative participants (M=105.34, SD= 7.64) and 141 adaptive participants (M=82.18, SD= 12.51) (Table 4-8).

Table 4-8. Means Table for Problem-solving Style Based on the KAI.

	N (N%)	Mean	SD
Adaptive	141 (55.1%)	82.18	12.51
Innovative	115 (44.9%)	105.34	7.64

Descriptive statistics were run on the categorizations of being more adaptive or innovative based on the literature that females tend to be more adaptive than males (Foxall & Haskins, 1986). This study supported the literature with more males (N=58) who were more innovative than females (N=51) and more females (N=93) than males

(N=52) who were more adaptive in their problem-solving style (Table 4-9). The overall mean KAI score for female participants in this study was 89.42 (SD=16.84) and for male participants, 96.57 (SD=13.07).

Table 4-9. Means Table for the Effect of Gender on Problem-solving Style Based on the KAI.

		N	Mean	SD
Adaptive	Male	52	85.94	8.89
	Female	93	80.67	13.86
Innovative	Male	58	106.10	7.78
	Female	51	105.37	7.45

Internet Usage Constructs

As indicated in Chapter 3, a 13-item, researcher-developed construct was developed to assess Internet usage. Respondents were asked to indicate on a five-point Likert scale how many hours they spent online each day, how many sites they visited in each stint online, if they have ever created a Website, and how often each week they downloaded music, read a blog, instant-messaged, read Facebook/MySpace, watched online videos, shopped online, used search engines or WebCT, and accessed news online. Standard deviations for the scale ranged between .9 and 1.5, indicating a satisfactory amount of variability in the scale. Based upon reliability analysis, all 13 items were retained for an overall Cronbach's alpha of .73 (Table 4-10).

Table 4-10. Inter-item Consistency Statistics for the Internet Usage Construct (N=247)

Usage Item	Mean*	SD	Corrected Item total Correlation	Alpha if item deleted
How many hours a week do you spend on the Internet	2.1	.92	.53	.70
How many sites do you visit on an average session online	2.5	.91	.36	.71
Have you ever created a Website	.20	.39	.28	.72
Download music	2.4	1.33	.33	.71
Read a blog	1.9	1.13	.37	.70

Table 4-10 Continued. Inter-item Consistency Statistics for the Internet Usage Construct (N=247)*

Usage Item	Mean*	SD	Corrected Item total Correlation	Alpha if item deleted
Instant message	3.5	1.52	.36	.71
Read Facebook or MySpace	3.9	1.37	.25	.73
Watch videos	2.3	1.20	.44	.70
Shop online	2.4	1.10	.33	.71
Shop/sell on Ebay	1.7	.94	.30	.71
Use a search engine	4.3	.91	.43	.70
Work on WebCT or other online course	4.3	.90	.17	.73
How often do you use the Internet to find news/information online	4.0	1.10	.48	.70

*Five-point response scale where 1=very little to 5= very often.

After the data was summated, respondents were then categorized into a high or low Internet usage based on a means split of 2.71. The median for the group was 2.70 and a mode of 2.38. Based on the means split, 128 participants were considered to be lower in their Internet usage and 119 were considered to be higher in their Internet usage (Table 4-11).

Table 4-11. Means Table for Internet Usage.

	n (n%)	Mean	SD
Low Internet Usage	128 (51.8%)	2.30	.30
High Internet Usage	119 (48.2%)	3.15	.32

Attitude Constructs

Based upon previous research, three attitudinal scales were developed to assess general attitudes toward the Internet and attitudes toward the treatment or control version of the site to which they were exposed. For the hypothesis testing, the scale measuring attitudes toward the treatment or control version of the site to which they were exposed was utilized. As discussed in Chapter 3, the most often used way to test attitude is through semantic differentials (Eagly & Chaiken, 1993). Two 11-item semantic-

differential scales were used with bi-polar adjectives placed at the end of five-point scales.

The scale measuring attitude toward the Internet in general was utilized for descriptive demographic reporting only and showed standard deviations from .8 to 1.1, indicating a satisfactory amount of variability. The coefficient alpha reliability for the index was α=. 70 (Table 4-12). The summated mean for the overall scale was 3.2 (SD= .91). Indicating a moderately positive attitude toward the Internet in general.

Table 4-12. Inter-item Consistency Statistics for the Attitude Toward the Internet in General (N=249)

Usage Item	Mean*	SD	Corrected Item total Correlation	Alpha if item deleted
Good	3.5	.88	.40	.67
Credible	3.0	.80	.43	.67
Unbiased	2.4	.90	.20	.70
Easy to Understand	3.6	1.00	.22	.70
Important	3.1	1.00	.45	.66
Interactive	3.3	.96	.20	.70
Easy to Find	3.6	1.10	.21	.70
Beneficial	3.6	1.00	.47	.66
Believable	3.1	.76	.42	.67
Trustworthy	2.8	.77	.43	.67
Accurate	3.0	.77	.50	.66

*Five-point response scale where 1=very little to 5= very often.

Attitude toward the treatment or control version of the site to which they were exposed was measured after exposure to the version of the site on an 11-item semantic differential scale. Based upon the reliability analysis, 10 of the items were retained. The standard deviations for the scale ranged from .78 to 1.1 (Table 4-13). The coefficient alpha reliability score for the index was α=.80. The summated mean for the overall scale was 3.88 (SD=.94).

Table 4-13. Inter-item Consistency Statistics for the Attitude Toward the Treatment or Control Version of the Site to Which They were Exposed (N=237)

Usage Item	Mean*	SD	Corrected Item total Correlation	Alpha if item deleted
Good	4.0	1.0	.49	.74
Credible	3.7	.94	.45	.75
Unbiased	3.7	.93	.35	.76
Easy to Understand	4.2	.97	.41	.75
Important	3.8	1.0	.47	.74
Interactive	3.9	1.1	.32	.77
Easy to Find	3.9	.96	.54	.74
Beneficial	4.1	.88	.48	.74
Believable	3.8	.78	.56	.74
Trustworthy	3.7	.82	.56	.74

*Five-point response scale where 1=negative to 5= positive.

The last scale which was also utilized for demographic description only was an eight-item index adapted from Rubin (1985) and Conway and Rubin (1991), where participants indicated their level of agreement along a five-point scale of the importance of the Internet in their lives. A reported internal reliability of .86 was reported in previous research (Ko, 2001). The standard deviations for the scale in this study ranged from .77 to 1.51. The coefficient alpha reliability score was α=.72 (Table 4-14). A summated mean for the overall scale was 3.27 (SD= 1.02).

Table 4-14. Inter-item Consistency Statistics for the Importance of the Internet in Subjects' Lives (N=237)

Usage Item	Mean*	SD	Corrected Item total Correlation	Alpha if item deleted
I would rather surf the Internet than do something else.	2.63	1.02	.35	.70
My knowledge increases as my Internet usage increases.	3.02	1.05	.41	.69
It would be very difficult for me to survive without the Internet for several days.	3.10	1.51	.42	.70
Internet users are better educated people.	2.54	1.15	.45	.68
The Internet opens doors that would otherwise be closed.	4.03	.95	.46	.68
Information online should be engaging.	3.70	.77	.50	.68
Information online should be interactive.	3.54	.84	.40	.69
Information online should be entertaining.	3.63	.86	.37	.70

*Five-point response scale where 1=strongly disagree to 5= strongly agree.

Information Recall

For the purpose of hypothesis testing, data on unaided recall was utilized. For the unaided recall portion of the study, participants were asked to list all of the information they could recall from the treatment or control version of the site to which they were exposed. The resulting qualitative data was content analyzed and all true statements were scored as a +1 while untrue statements were coded as a -1 (Davis et al, 2005). Scores ranged from -2 to 16 (n=255). Two individuals indicated items that were not presented on the site, so their statements were coded negatively. A grand mean of 4.27 (SD=2.88) was calculated (Table 4-15).

Table 4-15. Descriptive Report for Unaided Recall (N=255)

	N	Minimum	Maximum	Mean	SD
Information Recall	255	-2.00	16.00	4.27	2.88

Hypotheses Tests

Several hypotheses were made based on the independent and intervening effects of Internet usage, problem-solving style, and site interactivity on subjects' attitude and information recall. An overall means table (Table 4-16) provides insight into the average attitudes toward the treatment/control version of the site split by low/high level of Internet usage, adaptive/innovative problem-solving, and the version of the site given. Problem-solving was grouped by adaptive and innovative rather than showing the variable as continuous to help with readability of the statistics (Graziano & Raulin, 2000).

Table 4-16. Means for Attitude Toward Treatment/Control split by Low/High Level of Internet Usage, Adaptive/Innovative Problem-solving Style, and Experimental Condition Presented (With Cell Sizes)

Experimental Condition	More Adaptive		More Innovative	
	Low Internet Usage	High Internet Usage	Low Internet Usage	High Internet Usage
Interactive	3.45 (36)	3.59 (35)	3.57 (22)	3.39 (16)
Non-Interactive	3.57 (32)	3.54 (30)	3.44 (29)	3.58 (30)
Total	3.50 (68)	3.57 (65)	3.50 (51)	3.51 (46)

An overall means table (Table 4-17) shows the average information recall split by low/high level of Internet usage, adaptive/innovative problem-solving, and the condition presented with.

Table 4-17. Means for Information Recall split by Low/High Level of Internet Usage, Adaptive/Innovative Problem-solving Style, and Experimental Condition Presented (With Cell Sizes)

Experimental Condition	More Adaptive		More Innovative	
	Low Internet Usage	High Internet Usage	Low Internet Usage	High Internet Usage
Interactive	4.74 (38)	4.33 (36)	4.30 (23)	3.78 (18)
Non-Interactive	4.15 (34)	4.12 (33)	4.18 (33)	4.58 (31)
Total	4.46 (72)	4.23 (69)	4.23 (56)	4.29 (49)

H1: Unaided information recall and level of attitude toward an information-driven Extension Website will differ significantly as a function of site interactivity, problem-solving style, and Level of Internet usage.

It was predicted that problem-solving style, level of Internet usage, and site interactivity will affect the attitude toward an information-driven Extension Website and the information recalled from that site. To test this, a multivariate analysis of variance (MANOVA) was run (Table 4-18). MANOVAs offer a more sophisticated analysis of the variables allowing for the exploration of multiple independent and dependent variables (Graziano & Raulin, 2000). Results showed a partial support for this hypothesis. No significant three-way interaction was found between problem-solving style, level of Internet usage, and site interactivity on attitude (F=.67, p=.80) or information recall (F=1.50, p=.13). Results also indicated no two-way interactions between problem-solving style and site interactivity on attitude (F=.81, p=.75), problem-solving style and Internet usage on attitude (F=.65, p=.92), or site interactivity and Internet usage on attitude (F=.26, p=.61). However, significant two-way interactions were found between problem-solving style and site interactivity on information recall (F=1.60, p=.05), problem-solving

style and Internet usage on information recall (F=1.84, p=.01), and site interactivity and Internet usage on information recall (F=9.53, p=.00).

Results indicated no main effects for problem-solving style on attitude (F=.64, p=.97), site interactivity on attitude (F=.05, p=.83) and information recall (F=.40, p= .53), Internet usage on attitude (F=.02, p=.89) and information recall (F=.21, p= .65). However, a significant main effect for problem-solving style on information recall was found (F=2.12, p=.00).

Table 4-18. MANOVA Results for Problem-solving Style, Site Interactivity, and Level of Internet Usage on Attitude and Information Recall (N=229)

Source		Df	F	P
Problem-solving Style (PS)	Recall	61	2.12	.00*
	Attitude	61	.64	.97
Level of Internet Usage (IU)	Recall	1	.21	.65
	Attitude	1	.02	.89
Site Interactivity (SI)	Recall	1	.40	.53
	Attitude	1	.05	.83
PS x SI	Recall	31	1.60	.05*
	Attitude	31	.81	.75
PS x IU	Recall	36	1.85	.01*
	Attitude	36	.65	.92
SI x IU	Recall	1	9.53	.00*
	Attitude	1	.26	.61
PS x SI x IU	Recall	14	1.50	.13
	Attitude	14	.67	.80
Error	Recall	80	(5.55)	
	Attitude	80	(.31)	

Note. Values enclosed in parentheses represent mean square errors.

Across the whole design, significant two-way interactions between problem-solving style and site interactivity were found for information recall, indicating the degree to which one is more adaptive/innovative and the level of site interactivity affected how much information was recalled. A significant two-way interaction was also found for problem-solving style and Internet usage for information recall, indicating that

the degree to which one is more adaptive/innovative and their level of Internet usage may have an effect. Means tables further demonstrates the relationship between problem-solving style and site interactivity (Table 4-19) and problem-solving style and Internet usage (Table 4-20).

Table 4-19. Means for Level of Problem-solving Style and Site Interactivity on Information Recall Overall

Site Interactivity	Problem-solving	Mean	N	Std. Deviation
Non-interactive	Adaptive	4.13	67	2.97
	Innovative	4.38	64	2.60
Interactive	Adaptive	4.47	78	2.77
	Innovative	4.00	46	3.31

Table 4-20. Means for Problem-solving Style and Internet Usage on Information Recall Overall

Usage	Problem-solving	Mean	N	Std. Deviation
Low	Adaptive	4.46	72	3.08
	Innovative	4.23	56	2.96
High	Adaptive	4.23	69	2.65
	Innovative	4.29	49	2.97

The significant two-way interaction between site interactivity and level of Internet usage on information recall suggests that information recall may differ based on level of Internet usage and site interactivity. A means table further demonstrates the relationship between site interactivity and Internet usage (Table 4-21).

Table 4-21. Means for Site Interactivity and Internet Usage on Information Recall

Site Interactivity	Usage	Mean	N	Std. Deviation
Non-interactive	Low	4.16	67	2.74
	High	4.34	64	2.85
Interactive	Low	4.57	61	3.30
	High	4.15	54	2.70

The significant main effect shows that differences may lie in the level of problem-solving style. More adaptive individuals had a mean recall of 4.32 (SD=2.86) and more

innovative individuals had a mean recall of 4.22 (SD=2.91) (Table 4-22), indicating that individuals who were more adaptive recalled information better overall.

Table 4-22 Means for Problem-solving Style on Information Recall

Problem-solving	N	Mean	Std. Deviation
Adaptive	141	4.32	2.86
Innovative	105	4.22	2.91

For Subjects who Received the Interactive Site

H2: Attitude toward an information-driven Extension Website will differ significantly as a function of Internet usage and problem-solving style.

It was expected that when holding site interactivity constant to include only those subjects who were exposed to the interactive version of the site, attitudes would differ as a function of Internet usage and problem-solving style. Results show no support for the hypothesis. The ANOVA results (Table 4-23) show no two-way interaction between problem-solving and Internet usage (F=.68, p=.84). No main effects were found for problem-solving (F=.62, p=.94) or Internet usage (F=.00, p=.97) on attitude toward an information-driven Extension Website.

Table 4-23. ANOVA Results for Those Viewing the Interactive Version, Problem-solving Style, and Internet Usage on Attitude Toward and Information-Driven Extension Website (N=109)

Source	df	F	P
Internet Usage (IU)	1	.00	.97
Problem-solving Style (PS)	47	.62	.94
PS x IU	23	.68	.84
Error	37	(.34)	

Note. Values enclosed in parentheses represent mean square errors.

H3: Unaided information recall will differ as a function of Internet usage and problem-solving style.

It was expected that when holding site interactivity constant to include only those subjects who were exposed to the interactive version of the site information recall would

differ as a function of Internet usage and problem-solving style. Results show support for the hypothesis. The ANOVA results (Table 4-24) show a significant two-way interaction between problem-solving and Internet usage (F=2.04, p=.02, cohen's f = .59). Significant main effects were found for problem-solving (F=2.19, p=.00) and Internet usage (F=9.77, p=.00) on information recall.

Table 4-24. ANOVA Results for Those Viewing the Interactive Version, Problem-solving Style, and Internet Usage on Information Recall (N=115)

Source	Df	F	P
Internet Usage (IU)	1	9.77	.00*
Problem-solving Style (PS)	49	2.19	.00*
PS x IU	23	2.03	.02*
Error	41	(5.25)	

Note. Values enclosed in parentheses represent mean square errors.

For those receiving the interactive site, information recall differed significantly based on problem-solving style and Internet usage. A means table sheds light on the interaction between problem-solving and Internet usage (Table 4-25).

Table 4-25. Means for Problem-solving Style and Internet Usage on Information Recall for Individuals Viewing the Interactive Version of the Site

Usage	Problem-solving	Mean	N	Std. Deviation
Low	Adaptive	4.74	38	3.02
	Innovative	4.30	23	3.78
High	Adaptive	4.33	36	2.53
	Innovative	3.78	18	3.06

A means table further describes the main effects of Internet usage (Table 4-26) and problem-solving styles (Table 4-27). Based on the means table, subjects lower in Internet usage had slightly higher information recall than those higher in Internet usage.

Table 4-26. Means for Internet Usage Main Effects on Information Recall for Those Viewing the Interactive Version of the Site

Source	Level	Mean	N	Std. Deviation
IU	High	4.15	54	2.70
	Low	4.57	61	3.30

Those who are more adaptive had higher information recall than subjects who were more innovative.

Table 4-27. Means for Problem-solving Style Main Effects on Information Recall for Those Viewing the Interactive Version of the Site

Source	Level	Mean	N	Std. Deviation
PS	Adaptive	4.47	78	2.78
	Innovative	4.00	46	3.30

For Subjects Who Received the Non-Interactive Site

H4: Attitude toward an information-driven Extension Website will differ significantly as a function of Internet usage and problem-solving style.

It was expected that when holding site interactivity constant to include only those subjects who were exposed to the non-interactive version of the site, attitude would differ as a function of their level of Internet usage and problem-solving style. Results show no support for the hypothesis. The ANOVA results (Table 4-28) show no two-way interaction between problem-solving and Internet usage (F=.50, p=.97). No main effects were found for problem-solving (F=.93, p=.60) or Internet usage (F=.40, p=.53) on attitude toward an information-driven Extension Website.

Table 4-28. ANOVA Results for Those Viewing the Non-Interactive Version of the Site, Problem-solving Style, and Internet Usage on Attitude Toward and Information-Driven Extension Website (N=121)

Source	Df	F	P
Internet Usage (IU)	1	.40	.53
Problem-solving Style (PS)	48	.93	.60
PS x IU	27	.50	.97
Error	44	(.29)	

Note. Values enclosed in parentheses represent mean square errors.

H5: Unaided information recall will differ significantly as a function of Internet usage and problem-solving style.

It was expected that when holding site interactivity constant to include only those subjects who were exposed to the non-interactive version of the site, unaided information recall would differ as a function of their level of Internet usage and problem-solving style. Results show partial support for the hypothesis. The ANOVA results (Table 4-29) show a significant two-way interaction between problem-solving and Internet usage (F=1.69, p=.05, Cohen's f = .53). Significant main effects were found for problem-solving (F=1.65, p=.04), while no significant main effects were found for Internet usage (F=1.58, p=.22) on information recall.

Table 4-29. ANOVA Results for Those Viewing the Non-Interactive Version, Problem-solving Style, and Internet Usage on Information Recall (N=115).

Source	Df	F	P
Internet Usage (IU)	1	1.58	.22
Problem-solving Style (PS)	49	1.65	.04*
PS x IU	31	1.69	.05*
Error	49	(5.50)	

Note. Values enclosed in parentheses represent mean square errors.

Results indicate that for those receiving the non-interactive site, information recall differs based on problem-solving style and Internet usage. A means table sheds light on the interaction between problem-solving style and Internet usage (Table 4-30). For those viewing the non-interactive site, innovators are higher in their information recall regardless of their level of Internet usage.

Table 4-30. Means for Problem-solving Style and Internet Usage on Information Recall for Individuals Viewing the Non-Interactive Version of the Site.

Usage	Problem-solving	Mean	N	Std. Deviation
Low	Adaptive	4.15	34	3.16
	Innovative	4.18	33	2.28
High	Adaptive	4.12	33	2.80
	Innovative	4.58	31	2.92

A means table further describes the significant main effect for problem-solving style (Table 4-31). Based on the means table, more adaptive subjects who received the non-interactive site were slightly lower in their recall than more innovative subjects.

Table 4-31. Means Problem-solving Main Effects on Information Recall for Those Viewing the Non-Interactive Version of the Site.

Source	Level	Mean	N	Std. Deviation
PS	Adaptive	4.13	67	2.97
	Innovative	4.38	64	2.60

CHAPTER 5
DISCUSSION

Overview

Research suggests that individuals are increasingly turning to the Internet when seeking out information on agricultural topics that have long been the subjects of traditional Extension programming, such as food safety, economics, biotechnology, consumer sciences, and horticulture. Yet little is known about how characteristics of individuals and the online environment itself might interact to affect processing of information within the context of Extension.

This study examined the effects of problem-solving style, level of Website interactivity, and Internet usage on the attitudes of a sample of young adults toward an information-driven Extension Website and recall of the information presented on that site. Extension and other agricultural sources are increasingly using the Internet to disseminate scientific information. However, while this information is important to audience members' lives, its complex nature makes it difficult to present, especially in an online environment, where information-seekers may vary significantly in how they attend to, process, and perceive what is being communicated. Limited research exists as to how traditional and non-traditional users may respond to Extension's efforts to employ more Web-based channels of communication for non-formal education purposes. Further, few studies to date have looked at how young adults, who combine relatively limited experience of Extension with relatively high usage of the Web, process Web-based Extension information when attempting to solve a problem.

Results of this study suggest that for these audiences, the cognitive style with which individuals solve problems, combined with their level of usage of the Internet, do affect the level of information that they recall. Based on the results of this study, which showed significant effects in the area of unaided recall of information, characteristics such as problem-solving style may represent important factors for Extension educators and communicators to take into consideration when developing content and designing effective Web-based information. During the information-seeking process, individuals' problem-solving styles may affect how they look at and experience information online. It is therefore important that researchers take inventory of what methods of information presentation online influence different problem-solving styles. It is also important to take inventory of how young adult audiences view this information. These audiences, while not traditional Extension clientele, represent potential future users of Extension as well as many of the main current users of online information.

To carry out this investigation, a between-subjects factorial design was utilized to conduct a randomized post-test only experiment with a sample of young adults who were directly administered the KAI problem-solving style assessment inventory and then asked to report their level of Internet usage, general attitude toward the Internet and demographic information through a series of questions. Respondents were then randomly assigned to one of two versions of an Extension information-driven Website that focused on the economic aspects of car buying, a problem-solving situation that is salient with young adults. The versions did not differ in message, but in level of interactivity available to the user. The level of interactivity was defined by one site offering no opportunities to vary the experience with the site, and the other version allowing for several paths through

the site and moving objects with which the user could interact. Respondents were then asked through an online survey to report attitudes toward the site version viewed, previous experiences with Extension, and the topic represented on the site, and to indicate information recalled. A panel of experts was utilized to look at validity of the instruments. Afterwards a pilot study was conducted with a similar population to not only test the reliability of the instruments, but also to conduct a manipulation check on the two versions of the site.

Data analysis was conducted and results were presented previously in Chapter 4. A total of 256 students who were enrolled in two College of Agricultural and Life Sciences courses at a large Southeastern university participated in the study. Most respondents were female (n=145, 56.9%), with 110 (43.1%) being male. The majority of respondents were 18-20 years old (56.3%) followed by respondents 21-23 years old (37.9%), respondents 24-27 years old (5.1%), and respondents 28 years or older (0.8%). This chapter will present the key findings, implications, limitations, recommendations for theory and practice, and conclusions to the study.

Key Findings

The demographic results indicated that the majority of participants (98.8%) own a computer. While at home, the majority connect to the Internet using high-speed (55.3%) and wireless access (37.5%). At school, almost half (49.8%) of the respondents indicated using a computer lab to go online. The subjects preferred use of the Internet (60.9%) to any other media to seek out news and information. While many did not have a Webpage or a blog, 85.2% did indicate using Websites like Facebook. These demographic findings support the literature that this age group is a heavy user of the Internet for information and entertainment (Eastin, 2001; Fallows, 2004). Interestingly, while respondents

indicated the Internet was easy to understand, important, beneficial, believable, and accurate, their overall mean for these items was only slightly positive, indicating that while the Internet is a tool used in their everyday lives, these subjects were still cognizant that not everything presented to them is necessarily accurate or unbiased.

Subjects were also asked to describe their usage of Extension. Previous Extension research has indicated a need to seek out new audiences (Bull et al., 2004). This study has attempted to look at one such audience, young adults. Subjects reported being fairly low users of Extension services and information, implying that this is an audience that has not been traditionally reached with current Extension programs and messages.

A total of five major hypotheses were tested in this study. Hypothesis 1 postulated that: *Unaided information recall and level of attitude toward an information-driven Extension Website will differ significantly as a function of site interactivity, problem-solving style, and level of Internet usage*. Hypothesis 1 was partially supported. Findings indicated no significant three-way interaction between problem-solving style, Internet usage, and site interactivity on attitude and recall. No two-way interactions were found between problem-solving style and site interactivity, problem-solving style and Internet usage, and Internet usage and site interactivity on attitude. However, findings indicated there were three significant two-way interactions: 1) between problem-solving style and site interactivity; 2) between problem-solving style and Internet usage; and 3) between site interactivity and Internet usage, all on information recall. While no main effects were found for site interactivity or Internet usage, main effects were found for problem-solving style on information recall. Findings from means tables suggested that subjects who were more adaptive in their problem-solving style and who received the interactive version of

the site were better able to recall information than those who were more innovative, while those who were more innovative in their problem-solving style recalled information better if they received the non-interactive version of the site.

In hypotheses 2-5, site interactivity was held constant in order to explore the influences of the other major independent variables. Research indicates that interactivity may or may not have an influence on individuals' attitudes and information recall (Sundar et al., 2003; Sicilia et al., 2005; Teo et al., 2003; Liu, 2003). Results of this study supported one side of the literature base, in that differing levels of interactivity, in and of themselves, did not have an influence on attitude and information recall.

Hypothesis 2 focused only on subjects receiving the interactive version of the site. It was postulated that *attitude toward an information-driven Extension Website will differ significantly as a function of Internet usage and problem-solving style.* Hypothesis 2 was not supported. Problem solving style and level of Internet usage did not have a significant two-way interaction on attitude. Furthermore, no main effects were found for Internet usage or problem-solving style on attitude.

Hypothesis 3 also focused on subjects receiving the interactive version. According to hypothesis 3, unaided *information recall will differ as a function of Internet usage and problem-solving style*. Hypothesis 3 was supported. A significant two-way interaction was found between problem-solving style and Internet usage on information recall. Based on means tables, it is suggested that those subjects who were more adaptive and higher in their level of Internet usage also tended to be higher in their information recall. Those who were more adaptive and lower in their Internet usage also tended to be higher in information recall than those who were more innovative. Significant main effects were

also found for problem-solving style and Internet usage on information recall. Individuals viewing the interactive site who were low in Internet usage had higher mean recall.

Hypothesis 4 focused only on subjects receiving the non-interactive version of the site. It was postulated that *attitude toward an information-driven Extension Website will differ as a function of Internet usage and problem-solving style.* Based on the findings, hypothesis 4 was not supported. For individuals who viewed the non-interactive site, problem-solving style and level of Internet usage did not have a significant two-way interaction on attitude. Furthermore, no main effects were found for Internet usage or problem-solving style for attitude.

Hypothesis 5 focused only on subjects receiving the non-interactive version of the site. It was suggested that *unaided information recall will differ as a function of Internet usage and problem-solving style.* Hypothesis 5 was partially supported. A significant two-way interaction was found between problem-solving style and Internet usage on information recall. Means tables suggested that those subjects who were more innovative and higher in their level of Internet usage tended to be higher in their information recall. Those who were more innovative and lower in their Internet usage also tended to be higher in information recall than those who were more innovative. While no main effect was found for Internet usage, a main effect for problem-solving style on information recall was found. It appears that for individuals viewing the non-interactive site, individuals who were more innovative in their problem-solving style recalled more information than those who were more adaptive.

While findings for hypotheses 2-5 were similar, it is interesting to note that for the non-interactive version of the website, Internet usage influenced recall as a main effect, while there was not a main effect for users who viewed the interactive version of the site.

Implications of the Study

The findings from this study suggest several significant theoretical and practical implications. While researchers looking at other cognitive process attributes, like need for cognition, have found that individuals exposed to interactive sites processed information more thoroughly than those exposed to non-interactive sites (Sicilia, Ruiz, & Munuera, 2005), this study found that when problem-solving and level of Internet usage are added to the equation, differences in terms of information recall emerge. These findings not only support previous findings in the usage and gratifications literature, but they also add to the literature base in agricultural communications by introducing this new component of problem-solving in the context of Extension information as disseminated via the Web.

The next section presents implications of the study according to problem-solving style and Internet usage based on site interactivity.

Problem-Solving Style

Results of the study suggest on initial inspection that individuals who are more adaptive in their problem-solving style may be better able to attend to information regardless of the level of site interactivity, as opposed to those who are more innovative. However, in this study, individuals who are more innovative in their problem-solving style but were exposed to the non-interactive version of the site had a higher recall of information than those who were adaptive in their problem-solving style. These findings are supported by the literature in Adaption/Innovation theory, which states that more adaptive types tend to think linearly and work through existing structure, while more

innovative types may be more adventurous and will work non-linearly, using trial and error to work through problems (Pershyn, 1994; Foxall & Bhate, 1993). Based on the above, it may be that more innovative types tend to work through an interactive Website in a more non-linear way than those who are more adaptively inclined, and may, therefore, attend to many different things, not just focusing on the main components. Consequently, they may be less likely to recall the message presented. While research has shown that interactivity is useful in drawing audiences to a site and keeping them there (Chen and Yen, 2004; Cho, 2003), the findings of this study indicate that interactivity may sometimes impede the recall of information presented on a site for specific problem-solving styles. For information-oriented sites, high levels of interactivity may therefore not be as beneficial as varying the level of interactivity, if the objective is recall of information. Based on the results of this study, if designers are in a position where they can vary site interactivity, they should consider doing so, by possibly offering an interactive entry page or interactive pages that do not contain the important information. Pages containing important or complex information should be placed on less interactive pages to accommodate differing problem-solving styles.

It could also be the case, based on the findings of the study that innovative types may be more difficult to reach with messages. The Adaption-Innovation theory discusses the fact that individuals who are presented with a situation in which they cannot utilize their preferred problem solving style will revert to a “coping behavior” in which they adjust themselves to the situation (Kirton, 1989). In this process they will need to bridge the gap between what they prefer and what they perceive as necessary in the situation. Individuals will do this as long as is deemed necessary or as long as they can tolerate it

(Kirton, 1989). This coping behavior will not change ones' problem solving style, but may cause an individual to want to leave the situation sooner. In this study, the innovators who entered the situation in which they were forced to work linearly through the site may have been working through a coping behavior in which they wanted to complete the task quickly. Thus, they could have attended to the message more because they got into the site, found what they needed and left, whereas those who were presented with the interactive version did not go into a coping behavior and stayed on the site playing and not focusing on the task. Adaption/Innovation theory states that innovators, when allowed to work within their preferred style, will generate many ideas, but may not find themselves at a conclusion or end to a problem (Pershyn, 1994). Those who were allowed to work in the interactive site may therefore have been able to work within their style and not come to a conclusion on the topic.

Based on this study's results, it may be the case that recall is not only affected by an individual's problem-solving style, but also may be a product of level of Internet usage. While Internet usage is considered to be generally high for this population, even for young adults, usage does vary. It was found in this study that individuals who are lower in Internet usage and who are more adaptive in problem-solving style recalled more information than individuals who are more innovative and lower in their Internet usage. Even for this young adult audience, those who are adaptive and lower users of the Internet may be better able to recall the information presented online than innovators who happen to be lower in their Internet usage. Other venues may be better for reaching those innovative lower users; this study points to the fact that other technologies like ipods or more traditional methods like radio, print, or television need to be taken into account as

well. No one medium will be as effective as a mix of relevant media when attempting to reach an audience via mass media channels.

It was also found that those receiving the interactive version of the site who were also more adaptive in their problem-solving style had higher recall than those who were more innovative. As stated earlier, this finding could be because more adaptive types were possibly coping with the interactivity and low structure of the page and were working quickly to understand the information, while those who were more innovative may have been more comfortable and were not as attentive to the information presented on the site. Information recall literature contends that the Internet is helpful in the increased elaboration of information, but it also decreases information learning due to selective scanning by participants (Eveland & Dunwoody, 2002). Based on the definition of innovators as being more reckless in their information seeking, it could be concluded that subjects in this study were more likely to participate in this selective scanning and thus recall less. It could be inferred that Extension communicators trying to appeal to more adaptive types would be safe in presenting information in an interactive format, as these users will be able to push through the interactivity to get to the context. However, if they are attempting to appeal to more innovative types, communicators must be cognizant of the level of interactivity on the site, as it could impede information recall. When trying to reach a variety of problem solving styles, one site that takes both ends of the continuum into account is needed.

Based on Kirton's work , by understanding the make-up of an audience, such as their gender or profession, a designer can have a good idea of what problem-solving style may prevail in that audience. For example, Kirton has reported that people in the teaching

profession have shown KAI means of 95.0-97.0, and marketing managers in the United States had a mean of 102.2 (Kirton, 1999), indicating that by understanding the demographics and occupations of your audience you could be able to infer the most prevalent problem-solving style of the group. By taking such information into consideration, a site can be designed with more structure that leads users through the site, rather than allowing them many disparate paths through the important information. Designs for more innovative audiences could also include the information of most value on one page so they are exposed to the whole message and do not miss things as they would if the information was broken out through hyperlinking or interactivity. However, care must be taken as to keep the attention of these innovative audiences who may prefer to work in the non-structured environment.

Internet Usage

Results of this study also indicated that for individuals exposed to the non-interactive version of the site, those who were higher in Internet usage recalled more than those who were lower in their usage. This could be because those who are higher in usage are used to gathering information online from information-laden sites than less frequent users and thus may be better able to process information and recall it more. The theory of Uses and Gratifications states that individuals choose a medium to gratify their information needs based on memories of past media usage (Katz, Blumler, & Gurevitch, 1974). This previous knowledge of the media will drive their future usage and experiences with the medium in question (Katz, Blumler, & Gurevitch, 1974). Thus, those who have used the Internet more will have previous expectations and experiences that will tend to drive their processing, causing them to possibly gratify their need of finding information more successfully than users not as familiar with the medium.

For Extension communicators who are designing sites with interactivity, it is crucially important that they have a basic understanding of the level of Internet usage for the target audience to ensure effectiveness. While this would be a daunting task, by understanding the demographics of an audience through basic audience analysis techniques, designers can then develop sites to match their users' level of usage. While the adoption of the Internet by users and Extension communicators continues to increase, new technologies and advancements will continue to emerge, indicating that there will always be differing levels of usage of technology that will affect users' viewing of sites. Thus, level of usage is something that must be continuously monitored for each new Website. Based on Uses and Gratifications theory, initial experiences with a Website must be gratifying and successful for users, if they are to return. With each new technology experience users are faced with a different way to gratify needs. Thus young adult users who are experiencing the Extension sites for the first time will need to have good first experiences.

Interestingly, in this study, attitude was not a factor. Problem-solving style, Internet usage, and level of site interactivity did not influence the attitude of individuals on the site presented in this instance. While past research has shown that interactivity can influence positive attitudes toward political candidates and advertisements (Teo et al., 2003; Sundar et al., 2003; Chung & Zhao, 2004), this study presented the same information on both versions of the site, varying only site interactivity. The non-effect on attitude could be explained by the fact that younger audiences, like the one being studied, also tend to be higher users of the Internet and have been engaged with the medium longer than adult users (Eastin, 2001; Fallows, 2004). It could be assumed that due to

their high use of the medium, subjects' attitudes were not affected by the level of the interactivity, due to expectations from previous usage.

Studies show that there are a variety of sites that provide information in highly interactive formats while others provide similar information using non-interactive methods (Henkia, 1990; Amant, 2005). Young adults are exposed to the Internet on a daily basis, thus possibly erasing its novelty in their minds. This audience is accustomed to looking at a variety of sites that contain both interactive and non-interactive information, which could mean that some of these users may screen out the varying interactivity levels and focus only on the information consciously.

In contrast, it was implied through the findings that those receiving the interactive version of the site but who were lower in usage had higher recall. One explanation of this could tie back to the uses and gratification literature base. Lower users who do not have previous expectations of the media (Katz, Blumler, & Gurevitch, 1974) may thus have been more attentive to the interactivity and the information presented on the site. The novelty of this new technology for these users could make them attend to the message more. The attention getting and keeping nature of this interactive format may engage these audiences and keep them moving through the information in a more efficient manner.

Limitations

This study was exploratory in nature, and can shed light on future research in the areas of problem-solving style, information processing, and usage of the Internet by Extension audiences. However, some limitations do exist that should be noted.

As discussed in the literature review, interactivity is defined and described differently by different theorists, and even users have different ideas of what interactivity

is (Liu, 2003). This study used two different levels of interactivity as the treatment and control conditions, based on the definition of interactivity given by Sundar and colleagues (2003) in which the number of hyperlinks or paths through the information were equated with increased levels of interactivity. For this study the interactive version of the site allowed for individuals to click through the information in any order, to move and close boxes which popped-up, and interact with a car graphic that moved across the screen. The non-interactive version was a page containing only text and one static graphic. Other definitions of interactivity have included the idea that interactivity is on a continuum that differs based on the amount of control the user has and his or her increased sense of place (Downes & McMillan, 2000). Jensen (1998) described four types of communication in interactivity, which includes registration (two-way with feedback based on what the user inputs), continuous (two-way communication), consultation (pre-defined content a user seeks out with a feedback loop), and allocution (one-way communication with no feedback). This study is thus limited in the fact that only one definition of interactivity was utilized. Explorations of these different types of interactivity represent a direction for future research. Varying levels of interactivity could also be utilized. This is an area in which further research is warranted.

Another potential limitation to the study was the 48 subjects who were excluded from the sample due to the KAI‘s suspect scoring considerations. The KAI was originally developed to be used with working adults in a business setting, but it has been deemed acceptable for use with populations as young as 13 (Kirton, 1999). While the KAI is a robust and reliable instrument, it has most often been administered in small groups where the participants are comfortable and do not feel rushed (Kirton, 1999). In this study, the

instrument was directly administered to the entire sample of students in their course with the instructor and administrator walking around the room, a condition which could have led to interruptions in thought, time pressure, and surroundings that have been found to possibly affect the wastage rate of the instrument (Kirton, 1999). Kirton has stated that for a young population, such as the one used in this study, it is not uncommon to report wastage rates between 10% and 20% due to maturity levels, and the students' need to deliberately score in an "acceptable" way (Kirton, 1999, p.19). While care was taken by the administrator of the KAI to address these concerns, a 15% wastage rate was found in the responses. Based on the theoretical literature, this was deemed acceptable.

Another limitation to this study is that it only measured immediate unaided recall and did not address recall over time. Some research has indicated that time is needed after exposure to information to increase recall as people must process the information (Wicks, 1995). Based on the anonymity of the participants in the study, it was impossible to contact them for further recall testing and so only immediate unaided recall was measured.

Another limitation to consider is that while the instrumentation included an established psychometric test of problem-solving style, it also included several researcher-developed items. This study was exploratory in nature and all items were created based on the literature. To address this potential issue a panel of experts was utilized to look at the validity of the instruments, and data analysis was run to confirm the reliability. The resulting statistics showed reliabilities for the scaled items ranging from .70 to .80. Although these reliabilities were deemed acceptable for the purpose of this exploratory study, further testing on these items is warranted.

A fifth limitation to account for is the use of a college student sample. Since young adults were of specific consideration in this study as an audience, an audience which is considered to be both active in their usage of the Internet and underserved by traditional Extension communications, college students were viewed as an appropriate population to study.

A final limitation to this study is the administration of the site conditions and final instrument online. This method of testing is still relatively new in comparison to traditional experimental techniques. However, research has indicated that using the Internet to collect data is reliable and efficient. Dillman (2000) discussed the usage of Internet-based surveys as having the potential to bring great efficiencies in design and administration to traditional surveying methods. Lander, Wingenbach, and Raven (2002) found that Web-based survey methods were as reliable for collecting social science data as were paper methods. By running this experiment online, participants were able to look at the condition in a more natural setting, thus minimizing some of the internal reliability issues seen in many experimental conditions. Online administration is common for audiences of college students when studying Websites and interactivity (Sundar, Kalyanaraman, & Brown, 2003).

Recommendations for Theory and Practice

Recommendations for Practitioners

By understanding how problem-solving styles affect users' perceptions of information-driven Websites with respect to such attributes as attitude and recall of information, Extension, agricultural communicators, and commodity groups who are utilizing the Internet to reach audiences with science-based information will be better able to make use of communications processes to inform audiences, educate them, and

affect productive change. If Extension utilizes techniques to understand not only the demographic make-up of their target audiences, but also the psychological make-up of these constituents, they can better develop sites geared to successful communication and education.

The findings of this study offer new challenges to designers of online information. The push to have interactivity to draw in audiences and keep them on a site must be balanced with the best method in providing information. As shown through the results of this study, it may be the case that communicators attempting to provide information to help users solve a problem may need to provide content and design elements that appeal to a diverse range of problem-solving styles in one package. For audiences that tend to be more innovative in their problem-solving styles, less-interactive forms of media may help in recall of information as they will possibly work through the information more efficiently, while more adaptive types will be able to recall information regardless of level.

Communicators wishing to keep audiences on their site through interactivity and yet elicit comprehension and recall of that information may have to find a way to design a single Website in a fashion that forces more innovative problem-solving types of users to work with more structure, yet keeps their attention. A site developed to provide car buying or financial information, such as the one used in this study, must contain features that are attractive and draw attention, but as the user gets into the important parts of the information, it needs to be presented in a way that allows for more structure and linearity. This could be done not only through basic pages, but through direct feedback loops or online self-practice quizzes that direct the user in a linear fashion through the important

information. Extension communicators who are trying to reach broad audiences containing both innovative and adaptive types will have to work carefully to ensure sites include successful components for both groups. This study's findings suggest that the structure of the site is as important as the individual elements, based on the individual problem-solving styles of the target audience, and communicators must thus gauge what level of structure is needed in each situation.

This outcome adds more challenges to designers, who may have learned that interactivity brings people into the site and keeps them there longer. It can be inferred as a result of this study's findings that while interactivity can be beneficial; it may not always be beneficial in mass quantities. Designers cannot just add static elements to a site without any interactivity, because while users may attend to the message better, more innovative types might not enter the site or stay if it is not appealing to them. If they are forced to work in a coping behavior too long they may be more likely to not return to the site. By utilizing splash entry pages and interactive home pages, and then having inner pages with minimal interactivity, designers may be able to reach both groups successfully.

While it may be hard for designers and practitioners to clearly define their audience in terms of problem solving style, it can be inferred for specific audiences based on the theoretical research that has been completed. For example, a study of bankers showed a mean KAI score of 91.3, managers had means ranging from 95 to 102.2, teachers ranged from 95 to 101.4 in studies done in the United states, advertising professionals and designers showed a mean of 101, and police had a mean score of 98.4 (Kirton, 1999).

These professional breakdowns could help guide designers when designing for specific audiences.

It is important that we not only understand who we are communicating to, but also, who is doing the communicating. Today, many Website designers are not just educated in graphic design, as print designers of the past often were. More Website designers today are versed in information technology and the many high levels of structure involved in technology. Past research by Kirton shows that in technical professions, like Website design, individuals tend to be more adaptive (Kirton, 1999). Thus, this difference also makes it important for designers to be aware of their own problem-solving styles when designing sites. Designers will tend not only to design to client specifications, but will also design things that are appealing to them; thus, designers' own problem-solving styles may affect what they believe to be an effective site. Individuals will want to avoid coping behavior if possible and work within their preferred style, and as they design a site this could possibly carry over into what the site looks like. By being aware of their own problem-solving style and that of their audience, designers will better be able to match the design to be effective for all.

As Extension moves to develop more online communities, it is important that communicators take inventory of those audiences which they are trying to reach. Designers and developers need to keep in mind that when developing information for young adults, the Web may not be the only method that should be utilized. Based on individuals' problem-solving styles, other communication technologies such as television, print, DVDs, or cellular phones may be better suited. It is also important to understand that designers cannot just solve this issue by providing plain text sites with no

attention-getting draw. There are many ways to design structure, even through the more complex programs like Flash, that draw a user in a fairly linear fashion through a site without them getting distracted, such as videos, quizzes, or feedback loops.

As younger audiences who are accustomed to using the Internet mature and become more of a focus for Extension, communicators need to consider that their previous experiences with the medium may be fueling their current expectations and attitudes. It was found in this study that while such users may have neutral attitudes toward information online, they do not have highly positive attitudes toward the credibility and believability of specific information, such as that presented in the site stimulus. As shown by the findings of this study, these attitudes did not significantly change based on the level of interactivity present on the site. The Uses and Gratifications literature adds to this discussion in explaining that users will make choices as to which information to look at based on past experiences. These past experiences have formed users' attitudes toward the Internet.

For audiences who are less experienced online interactivity diffused in a site may impede individuals who are more innovative in their problem-solving style, causing them to take in less of the information presented. As communicators attempt to provide information to low Internet-using audiences, it may be necessary to provide low levels of interactivity until the audience is more versed in the medium. Extension and agricultural communicators must be concerned and cognizant of the level of Internet usage by their audiences when planning a new site. Again, while interactivity attracts audiences, designers may overdo it by letting the interactivity get in the way of users' ability to use the information.

Educators attempting to teach future communicators must address these issues, as well, in the classroom. Students must be made aware of the different types of psychological factors affecting the way individuals look at the communication they produce. They need to be aware of the influence audience attributes beyond simple demographics can have, and will need to learn how to assess that information in order to better communicate. It is important that individuals who will be working in agricultural communications are aware that the way they present information-driven content may affect the amount the user retains.

Students who are in agricultural communication programs are among the population who is most well-versed in the Internet. As shown through the literature and this study, their experiences online will form their attitudes. Students must not let their attitudes form their opinion on whether to use interactivity; this decision must be based on information as to the many positive and negative aspects of including interactivity in information-driven sites.

While the findings of this study could offer new challenges to designers and communicators of Extension and agricultural information, it offers insight into how we can better reach audiences. As shown it is important that communicators truly understand the audiences they are trying to reach. Audience analysis should be conducted by communicators that not only include demographics, but also psychographics. Communicators can be more efficient in their profession if they take into consideration the effects of psychological factors like problem solving style as well as factors like medium usage. Assumptions cannot be made on what is best for an audience based on

past experiences. Technology is changing and people's individual preferences are in constant flux, so communicators must continue to monitor these items.

Future Research

The findings of this study have the potential to inform research in the area of problem-solving and site interactivity. As science continues to make headlines, people will continue to seek out information from sources like Extension and agricultural communicators. Researchers should ensure that audiences continue to be assessed to discover the best ways to present information in ways that address various psychological differences, including problem-solving style. Repetition of this study is recommended to validate the findings.

Much communication research has focused on the implications of the convergence of new technologies like radio and television into society. As new communication venues emerge, such as the Internet, new studies must be conducted to describe the new nuances and characteristics of that medium. This study offers new implications on how researchers can look at these emerging technologies. This study indicated that by combining the usage of the new medium with a psychological factor, like problem solving style, new patterns of how users use the medium can be discovered. Future studies of new technologies like RSS, ipods, and cellular phones should be conducted to see if these same factors make a difference in the usage of the medium, attitudes toward the medium and information presented, and information recall.

Due to the continuing argument for and against the impacts of interactivity on a site, further research should replicate this study with various levels of interactivity. By including more structure like: two-way interactions such as quizzes, discussions, and input fields, actions which allow the user to form the path in which they move through

the information by links, or multimedia, further analysis could further define what types of interactivity are best suited for different levels of problem-solving style and level of Internet usage. Future studies could compare interactivity based on animations, multimedia components like video or audio, or hyperlinking to look at the linearity structure used and preferred by different types of problem solvers. It would also be beneficial to look at how these preferences differ based on different ages of audiences. More levels of interactivity could be employed in future studies to see if audiences would be better able to decipher between non-interactivity and interactivity.

It would be beneficial to take a deeper inventory of what types of Web design elements, and the balance of content and interactivity being utilized by Extension and agricultural communicators, affects user attitude and recall. Do audiences react better when certain levels of interactivity are included? Do they recall information or have different attitudes based on the balance of content and interactivity? Or, are they affected by basic graphic design elements utilized, or not utilized, by Extension?

This study only assessed one component of Website design. It is important that when communicators are working with information-rich sites for agriculture, that can also be tied to rich visuals, that they assess other components of Website design with younger as well as more traditional Extension audiences. Do certain layouts, navigational schemes, colors, multimedia components, or feedback features help in the use of these sites? Do individuals feel more satisfaction with any of these sites based on the navigation, colors, technology components, or feedback features? Do any of these design elements affect credibility of agricultural information for agriculture and non-agriculture audiences? Does the level of structure come into play with audiences looking at these

sites? What are agriculture and Extension using to reach these audiences in terms of the various design components? Are they following design principles, and does that have an affect on the recall of information on these information-rich sites?

This study only assessed the attitude toward the site version viewed in general. It is recommended that future studies look at attitude toward the information presented and attitude toward the technology after being exposed to the experimental version. This could be the missing link in which attitude would differ based on usage and problem-solving style.

The topic used in this study was shown to be of interest and relevance to this audience. Respondents indicated minimal experience with the topic of car purchasing. Future studies might look at a more complex, novel, or controversial topic in agricultural science to see if processing patterns differ from what was seen in this study. It could be argued that car buying by nature has a structured path in which to move through the information, and another topic like biotechnology or food security may offer new insight into these findings.

While connections were found between problem solving style, Internet usage, and information recall it may be beneficial to delve deeper into the problem solving style of individuals to see what components of that style truly made a difference. KAI is broken into three subscales: sufficiency of originality, efficiency, and rule group conformity (Kirton, 1989). Sufficiency of originality, which deals with the idea generation, research suggests that innovators may suggest ideas that are both adaptive and innovative until they are sure of the boundaries of the structures they are working in (Kirton, 1999). While it has been noted that these scales may not be as reliable with younger audiences,

further analysis should explore the influences of these areas on information recall and attitudes. This further analysis may add more explanation to the findings of this study.

While young adult populations are an audience considered underserved by Extension, it is suggested to continue to research other individual populations to see if the findings of this study are similar for other audiences. The mission of Extension is to bring research and information from the land grant university to the mass public. To reach this audience researchers must continue to monitor the best ways to present this information to help facilitate the learning and recall of important agricultural and scientific information. It may also be beneficial to follow through by comparing these different audiences to look for trends and similarities among generations.

Based on the findings of Extension use by this population, it is recommended that future studies look more closely at younger audiences' use and knowledge of Extension. If young adults are an audience that may be future consumers of Extension information, researchers and communicators need to understand where they are getting information on topics like the one used in this study. It is also important to discover new ways to reach these audiences with this information. While this study looked at what method helped them in terms of recall, researchers could also assess what method these constituents prefer.

Other data collected in this study, including qualitative data about individual definitions of interactivity, and motivations with the topic presented, should be analyzed for further understanding of the subjects' experiences with the site's information and its impact on their information recall and attitudes.

Designers of this information play an important role in the final component that is published online. It would be helpful for researchers to take inventory of what agricultural and Extension communicators think their audiences need in an information-driven site, and how that compares to what the audience actually needs. By understanding where knowledge gaps may exist, instructors can further the academic curriculum of these individuals. It may also be beneficial to do further testing with the designers of these sites to determine just how much their individual problem-solving styles affect the structure of the sites they design and/or the levels of creativity they employ on the sites they develop. This research could also extend into more traditional outlets of communication, such as how print design and exhibits are developed and received.

Further testing should also address the issue of extended recall. While it is important to understand what helps individuals recall information directly after exposure, it is also helpful to see if one method over another will help in the remembrance of that information over extended periods of time.

This audience of young adults may also just be a difficult audience to reach with technology. They are savvy and experienced in their usage, and due to that fact, other factors may be coming into play that affect their level of information recall and attitudes. Further research needs to further explore this age of users to discover what could also be affecting the way they use and recall information presented through newer technologies.

Researchers may want to continue to look at the relationship between problem-solving style and Uses and Gratifications theory. Examination further into gratifications

received through various media by psychological factors, such as problem-solving style, may add to the deeper literature base.

Conclusions

As Extension moves to designing information online to reach audiences with information-rich topics, such as becoming more informed on scientific news, it is beneficial that this information be presented in a form that will be usable, valuable, appropriate, and easy to recall.

The findings of this study add to the theory base by tying together two very well researched theoretical concepts. The Uses and Gratifications theory has been rejuvenated in current research circles due to the Internet. This study shows that problem-solving styles, coupled with an individual's usage of the Internet, do have an effect on variables like information recall. This study is thus opening doors to new exploration and findings in communications and agricultural communications research.

This study also demonstrates the need for continued monitoring of information technologies and presentation of Extension information. While researchers continue to debate whether interactivity affects attitude and recall of information, these findings show no individual effects of interactivity on attitude and information recall when presenting information-driven content to a young adult population. While interactivity is being included on many emerging sites in Extension (e-Xtension, 2005), there are populations, such as innovators, who may retain information better from the non-interactive earlier versions of online Extension information. It is also noted that for low users of the Internet, the novelty of interactivity attracts and keeps the interest of users to increase their retention of information, as supported by the literature. These findings encourage designers of information-driven sites to take inventory of how they are presenting their

information to specific audiences. While these findings imply many new challenges in the battle to get Extension information out successfully to a variety of audiences, they also shed light on how communicators can better provide information that will be retained.

While it may be assumed that more innovative people will want to see high levels of interactivity online, this study has shown that that may actually hinder their retention of information presented. The more adaptive individuals will actually do better with less structure and ambiguity when working online. Extension professionals must be cognizant of how they are addressing these problems on a site. Young adult audiences must have a good first experience with Extension information in order to ensure they will become lifetime consumers of the information and services provided.

Based on these results, there is a definite need to communicate Extension and agricultural messages online in a variety of formats. The Web is not a one-size-fit all type of environment. Individual needs and psychological make-up must be brought into consideration when developing content and the methods with which it is presented.

APPENDIX A
INSTRUMENTS

INFORMED CONSENT
Protocol Title: The Effect of Cognitive Problem Solving Style and Level of Interactivity on Attitudes toward and Recall of Web-based Information

Please read this consent document carefully before you decide to participate in this study.

My name is Emily Rhoades; I am a doctoral student in the Department of Agricultural Education and Communication at the University of Florida. Thank you for taking the time to participate in this study. Your participation is completely voluntary and will help to evaluate the effectiveness of online materials based on your personal problem-solving style. There is no penalty for not participating. If you choose to participate, you will answer items on a confidential survey that will take about 10 minutes to complete and will be emailed a link to a Website to look at. You can stop any time without penalty and you do not have to answer any question you do not wish to answer.

All answers are confidential to the extent provided by law. There are no known risks associated with this study and there is no compensation, other than extra credit, or other direct benefit to you for participation. *By turning in the survey you agree that you have read this statement and are aware of your rights.*

If you have any questions about this research please contact the study supervisor, Dr. Tracy Irani or myself. The campus address is 305 Rolf's Hall, PO Box 110540, Gainesville, and Fl 32611-0540. The phone number is (352) 392-0502. Questions about your concerns or rights can be directed to the UFIRB office, PO Box 112250, University of Florida, Gainesville, and Fl 32611-2250. IRB #2006-U-0087

Please take a few minutes to complete the following questions to the best of your ability. It is very important for the success of this study that all questions be completed. Responding will only take approximately 10 minutes, and your responses to the study will stay confidential. Your cooperation is greatly appreciated.

1. How many hours a day do you spend on the Internet (not including e-mail)?
   a. 1 or less
   b. 2-3
   c. 4-5
   d. 6-7
   e. 8 or more

2. How many different Websites do you visit in an average session online?
   a. 1-2
   b. 3-4
   c. 5-6
   d. 7-8
   e. 9 or more

3. Have you ever created a complete Website?
   a. Yes
   b. No

4. On a scale of 1-5, how would you rate your ability to design and post Websites? *(1 being low to 5 being high)*

1	2	3	4	5	None
Low		Moderate		High	

5. Please indicate how often you do the following each <u>week</u>:

Download music	1 Never	2	3 Sometimes	4	5 Very Often
Read a Blog	1 Never	2	3 Sometimes	4	5 Very Often
Instant message	1 Never	2	3 Sometimes	4	5 Very Often
Read Facebook or Myspace	1 Never	2	3 Sometimes	4	5 Very Often
Watch videos	1 Never	2	3 Sometimes	4	5 Very Often
Shop online	1 Never	2	3 Sometimes	4	5 Very Often
Shop/sell on Ebay	1 Never	2	3 Sometimes	4	5 Very Often
Use a search engine	1 Never	2	3 Sometimes	4	5 Very Often
Work on WebCT or other online course	1 Never	2	3 Sometimes	4	5 Very Often

6. When presented with multimedia on a Website (such as pictures, video, audio, Flash), I like to click on it to gain extra information.

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

7. Do you have your own _____?
   a. Blog Yes No
   b. Facebook page Yes No
   c. Myspace page Yes No
   d. Website Yes No
   e. other Yes No
      (please list:_____)

8. Do you own a computer?
   a. Yes
   b. No

9. Please indicate the way in which you access the Internet most often: (circle only one each for school and home)

When at **school**:	When at **home/apartment**:
a. Dial-up	a. Dial-up
b. High-speed access	b. High-speed access
c. Wireless access	c. Wireless access
d. Computer lab	d. Computer lab

10. Please circle approximately how many times a <u>week</u> you use the following methods to get news/information:

Newspaper	1	2	3	4	5
	Never		Sometimes		Very Often
Radio	1	2	3	4	5
	Never		Sometimes		Very Often
Television	1	2	3	4	5
	Never		Sometimes		Very Often
Internet	1	2	3	4	5
	Never		Sometimes		Very Often
Books	1	2	3	4	5
	Never		Sometimes		Very Often
Magazines	1	2	3	4	5
	Never		Sometimes		Very Often

11. What is your preferred method to find information: *(please only choose one)*
   a. Newspaper
   b. Radio
   c. Television
   d. Internet
   e. Book
   f. Magazines

Please circle one number on each line below that best describes how you feel about Websites on the Internet. Numbers "1" and "5" indicate strong feelings; "2" and "3" indicated weaker feelings; and "3" indicated you are undecided.

12. I feel that many Websites on the Internet are:

Good	1	2	3	4	5	***Bad***
Credible	1	2	3	4	5	***Not Credible***
Unbiased	1	2	3	4	5	***Biased***
Difficult to understand	1	2	3	4	5	***Easy to understand***
Not Important	1	2	3	4	5	***Important***
Not Interactive	1	2	3	4	5	***Interactive***
Easy to find	1	2	3	4	5	***Hard to find***
Beneficial	1	2	3	4	5	***Not Beneficial***
Believable	1	2	3	4	5	***Unbelievable***
Trustworthy	1	2	3	4	5	***Not Trustworthy***
Accurate	1	2	3	4	5	***Inaccurate***

13. Please rank your level of agreement with the following statements:

I would rather surf the Internet than do something else.	1 Strongly Disagree	2	3	4	*5 Strongly Agree*
My knowledge increases as my Internet usage increases	1 Strongly Disagree	2	3	4	*5 Strongly Agree*
It would be very difficult for me to survive without the Internet for several days.	1 Strongly Disagree	2	3	4	*5 Strongly Agree*
Internet users are better-educated people.	1 Strongly Disagree	2	3	4	*5 Strongly Agree*
The Internet opens doors that would otherwise be closed.	1 Strongly Disagree	2	3	4	*5 Strongly Agree*
Information online should be engaging.	1 Strongly Disagree	2	3	4	*5 Strongly Agree*
Information online should be interactive.	1 Strongly Disagree	2	3	4	*5 Strongly Agree*
Information online should be entertaining.	1 Strongly Disagree	2	3	4	*5 Strongly Agree*

14. Gender

a. Male
b. Female

15. Age
    a. 18-20
    b. 21-23
    c. 24-27
    d. 28 or older

16. Major _____

17. College_____

18. Rank in school
    a. Freshmen
    b. Sophomore
    c. Junior
    d. Senior
    e. Graduate student

This study is a two part study. The second part of this study will be emailed to your gatorlink email if you wish to continue.

Please indicate your gatorlink username to continue with this study:
_____

After you have looked through the site, please take a few minutes to complete the following questions to the best of your ability. **Please do not return to the previous site.** It is very important for the success of this study that all questions be completed. Responding will only take approximately 10 minutes, and your responses to the study will stay confidential. Your cooperation is greatly appreciated.

Section 1: Introduction

1. Approximately how much time did you spend looking at the Website?

   - ☐ 1-3 minutes
   - ☐ 4- 6minutes
   - ☐ 7-9 minutes
   - ☐ 10-12 minutes
   - ☐ 13 or more minutes

2.

Please rate your previous knowledge of the topic presented on the Website.	☐ 1 Not Knowledgeable	☐ 2	☐ 3 Somewhat Knowledgeable	☐ 4	☐ 5 Very Knowledgeable
How important was the information for you personally?	☐ 1 Not Important	☐ 2	☐ 3 Somewhat Important	☐ 4	☐ 5 Very Important
How motivated were you to read the information?	☐ 1 Not Motivated	☐ 2	☐ 3 Somewhat Motivated	☐ 4	☐ 5 Very Motivated
How interested were you in the information presented?	☐ 1 Very Interested	☐ 2	☐ 3 Somewhat Interested	☐ 4	☐ 5 Not Interested

3.
4. *Indicate the number below that best describes how you feel about the term below. Boxes closer to the word indicate strong feelings and the middle box indicates that you are undecided.*

   The information presented <u>on the previously viewed Website</u> is

Good	☐	☐	☐	☐	☐	**Bad**
Not credible	☐	☐	☐	☐	☐	**Credible**
Biased	☐	☐	☐	☐	☐	**Unbiased**
Difficult to understand	☐	☐	☐	☐	☐	**Easy to understand**
Important	☐	☐	☐	☐	☐	**Not Important**
Not interactive	☐	☐	☐	☐	☐	**Interactive**
Easy to find	☐	☐	☐	☐	☐	**Hard to find**
Not beneficial	☐	☐	☐	☐	☐	**Beneficial**
Believable	☐	☐	☐	☐	☐	**Unbelievable**
Not trustworthy	☐	☐	☐	☐	☐	**Trustworthy**
Accurate	☐	☐	☐	☐	☐	**Inaccurate**

5.
6. *Please indicate your level of agreement with the following:*

Content on this Website was interactive.	☐ 1 Strongly Disagree	☐ 2	☐ 3	☐ 4	☐ 5 Strongly Agree
The content on this site kept me engaged.	☐ 1 Strongly Disagree	☐ 2	☐ 3	☐ 4	☐ 5 Strongly Agree
I have used information presented by the University of Florida Extension service.	☐ 1 Strongly Disagree	☐ 2	☐ 3	☐ 4	☐ 5 Strongly Agree
I have looked at the University of Florida Extension Website.	☐ 1 Strongly Disagree	☐ 2	☐ 3	☐ 4	☐ 5 Strongly Agree

7.
8. I define *interactivity* online as:

9. The site I saw included:

	Yes	No
a. Animated images	☐	☐
b. Text	☐	☐
c. Images	☐	☐
d. Pop-up window	☐	☐

Section 2: Car Buying

e.

10. If given the opportunity to purchase a car in the near future, the likelihood of me doing so would be:

Unlikely	☐	☐	☐	☐	☐	**Likely**
Probable	☐	☐	☐	☐	☐	**Improbable**
Definitely would not	☐	☐	☐	☐	☐	**Definitely would**

11.

12. Have you: Yes No

a. Recently purchased a car	☐	☐
b. Thought of purchasing a car	☐	☐
c. Researched purchasing a car	☐	☐

13. Please list all facts you remember from the information you read previously:

14. Please describe what features you saw on this Website:

15. **Based on what you read on the previous Website:** Which of these basic decisions **doesn'**t need to be made when buying a car?
    - ☐ Size of vehicle
    - ☐ Safety features needed
    - ☐ Fuel efficiency needed
    - ☐ Color wanted

16. **Based on what you read on the previous Website:** Which of these is **not** a way to cut car insurance costs?
    - ☐ Increasing the deductible amount for collision coverage
    - ☐ Purchasing a newer car
    - ☐ Paying annually or semiannually
    - ☐ Dropping collision coverage

17. **Based on what you read on the previous Website:** When making the transportation decisions, which of these questions do you **not** need to ask?
    - ☐ Should you trade in your car?
    - ☐ Would you save money by taking a bus?
    - ☐ Do you really need a car?
    - ☐ How much gasoline would you need to buy?

18. Did you experience any problems while looking at the site?
    - ☐ Yes -- please explain
    - ☐ No

19. Which course are you currently enrolled in?
    - ☐ AEE 3030 Public Speaking
    - ☐ AEE 3033 Technical Writing

20. * Please list your gatorlink username to ensure your extra credit points:

    *Required

    Thank you for your time!

    Submit

APPENDIX B
EXPERIMENTAL CONDITION

Directions:
Below you will find two links. The first link will open up a new window containing a website about purchasing a car. Please take a few minutes to explore the information presented on the site. When you feel you have fully looked at the information please close that window and click on the second link, which will direct you to a brief survey. At the end of the survey you will be prompted to enter your email and course to ensure you recieve the extra points promised in class.
Thank you again for your assistance with this project.

Step 1: View the site	Once you enter the survey, please do not return to the site.	Step 2: Complete the survey

If you encounter any problems while vieiwng the site or survey please contact Emily Rhoades at bisdorf2@ufl.edu or 352-870-3168

Your participation in this study will help to evaluate the effectiveness of this online materials based on your personal problem solving style. All answers are confidential to the extent provided by law. There are no known risks associated with this study and there is no compensation or other direct benefit to you for participation. By hitting the submit button you agree that you have read this statement and are aware of your rights.

If you have any questions about this research please contact the study supervisor Emily Rhoades, Department of Agricultural Education and Communication, University of Florida, 308B Rolfs Hall / PO Box 110540, Gainesville, FL 32611-0540, (352) 392-0502 ext. 238. For questions regarding your rights as a research participant, please contact the UFIRB at 352.392.0433. IRB # 2005-U-197

Non-Interactive Website Condition

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Owning a Car

As prices continue to increase, it's evident that the amount you spend on the family car demands close scrutiny. Do you need a car or a second car? How much does it cost to own and operate your car? Should you buy a new or used car? How do you evaluate car leases? What are ways to reduce insurance costs?

THE TRANSPORTATION DECISION

Do you really need a car? For many, the answer is "yes" and "no." But for others, thousands of dollars could be saved by using public transportation or by sharing rides, biking, or walking. We are highly dependent on private transportation, but we need to recognize the price we pay for this form of transportation.
Knowing the total cost of driving can help you make transportation decisions. Here are some situations where a knowledge of car costs is helpful:

- Should you trade in your car? The cost of driving your present car compared to the estimated cost of driving a different car can help you answer that question. To make the calculation, you'll need to assume what type of car you would buy, plus the costs of financing, insurance, and license fees.
- If you use your car for business, doing charitable work, or visits to a doctor, this mileage is tax deductible.
- Does it pay to drive across town to buy something on sale? For example, if it's a five-mile round trip to a store advertising a sale item, do the savings justify a trip that may cost $2?
- Would you save money by joining a carpool or taking a bus? If so, how much?

BASIC CHOICES

If you are in the market for a car, some basic decisions need to be made.

- **What size and type of vehicle do you need?** Smaller cars tend to get better gas mileage and are less costly to operate. Larger vehicles tend to have more riding comfort and may protect passengers better in the event of an accident.
- **Safety features may be important in your decision.** One source of information on crashworthiness is the National Highway Traffic Safety Administration (NHTSA) tests. Results often appear in newspapers and consumer magazines.
- **Fuel efficiency also should be a consideration.** If you drive 15,000 miles per year and gasoline is $2.25 a gallon, fuel costs for a car averaging only 15 miles to the gallon would be $2,250. A car averaging 30 miles per gallon would have fuel costs of $1,125. The Environmental Protection Agency (EPA) estimates fuel economy for both city and highway driving by laboratory tests. Their estimates appear on the window stickers of all new cars.
- **Decide what options you would use.** What are the advantages and disadvantages of such features as automatic transmission, power steering, anti-lock brakes, air conditioning, audio equipment, or a central locking system? Make your choices based on your needs and don't be talked into options you won't use.

NEW OR USED?

Finally, you must decide whether to shop for a new car or a used one. There are many unknowns in buying a used car. You can't always find out how and when it was serviced or under what conditions it was driven. Although odometer tampering is illegal, it does occur, so you can't be absolutely certain how many miles the car has been driven. Law requires sellers of used cars (10 years old or newer) to reveal if the car has sustained damages of $3,000 or more in an accident; nevertheless, you may not be told the truth.

In spite of these uncertainties, the vast majority of consumers buy used rather than new cars. The reason is simple. Used cars are considerably cheaper to own and operate than new ones.

When shopping for a used car, check the repair histories of particular models in consumer and automotive magazines. When you've narrowed your search to a specific vehicle, try to find out its history of ownership and maintenance. Also, it's a good idea to have an independent mechanic check out a used car before making an offer. To determine what a used car is worth, consult the National Association of Auto Dealers (NADA) Official Used Car Guide or Kelley's Blue Book Market

NEW CARS: BUY OR LEASE?

Buying a new car involves identifying several makes and models of cars that meet your criteria such as size, safety, and options, then visiting several dealerships to negotiate price. Although a few car dealerships have instigated a "fixed price" policy, most dealers expect consumers to negotiate a fair price. Make an offer that is a minimum, but fair markup over the invoice price, plus destination charges. Rarely will a dealer actually show you the invoice price, but there are ways to get that information.

Leasing a car is much like renting an apartment. You make an initial security down payment, then make monthly payments for the term of the lease. When the lease expires, you may or may not be allowed to buy the car for a previously agreed on price. You may be required to pay a penalty if you have driven the car more miles than the mileage agreed to in the lease.You also may incur penalties if you want to terminate the lease early.

Monthly payments are less than they would be for buying and the only down payment is typically the first month's payment and a refundable security deposit. This is because you are paying for only the portion of the car that you are using. At the end of the lease, you have no equity.

INSURANCE TIPS

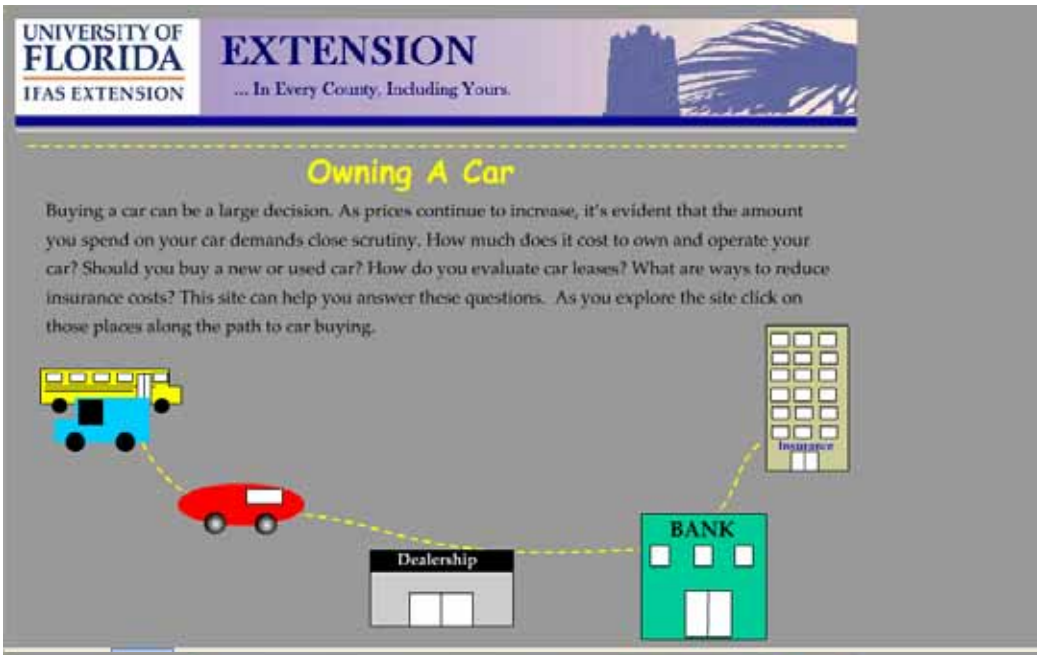
A close look at your auto insurance coverage may turn up ways to cut costs. Increasing the deductible amount for both collision and comprehensive physical damage coverage will reduce premiums.

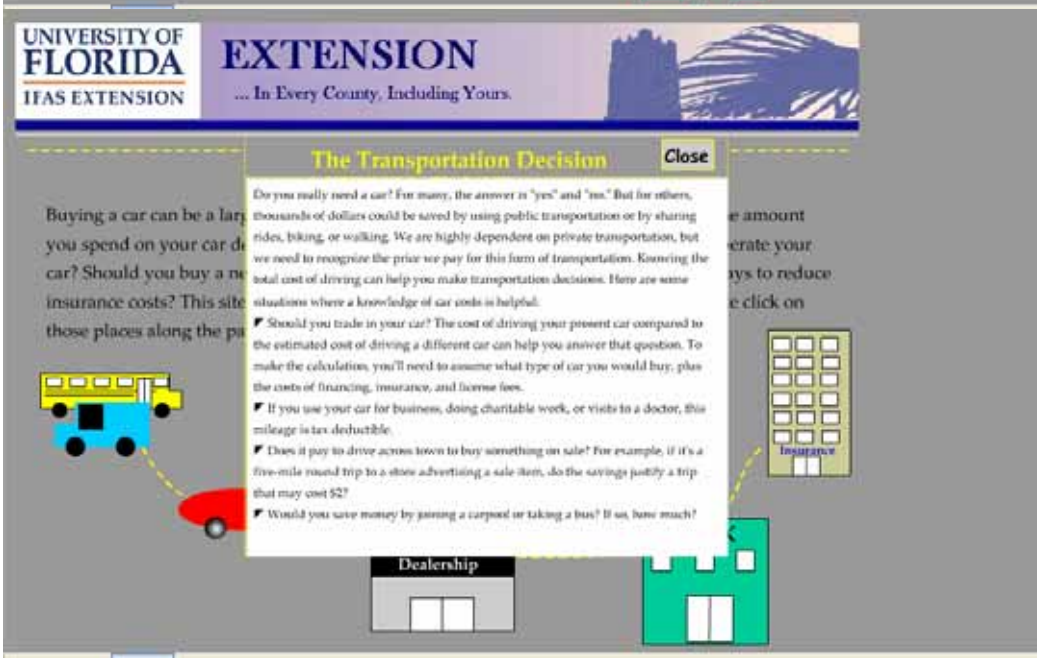
Consider dropping collision coverage when the car's value is so low you could handle the loss yourself. The company will not pay any more than the car is worth. That amount may be close to the cost of collision coverage. Liability insurance is important for cars of all ages because laws require motorists to show proof of liability responsibility.

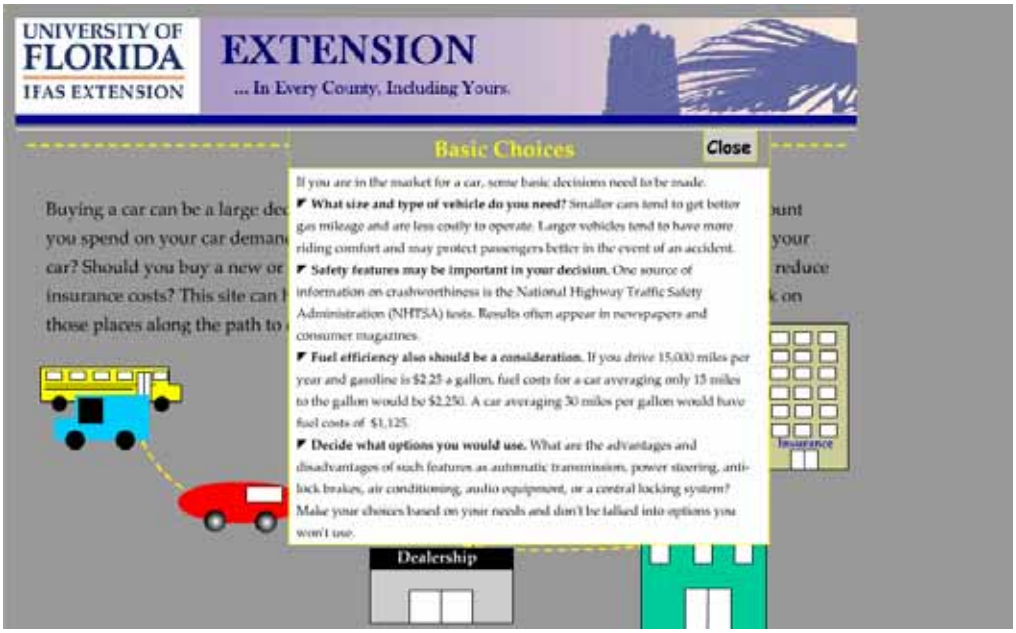
Compare coverage and cost for auto insurance sold by several companies. Ask about special rates for which you may be eligible, such as ones for an accident-free driving record. Paying premiums annually or semiannually will be cheaper than monthly payments. Do not let cost be your only consideration in selecting a company. Ask other consumers about their satisfaction with claims service before making a decision.

When you have fully looked at this site, please close this window and move to step 2.

Interactive Website Condition



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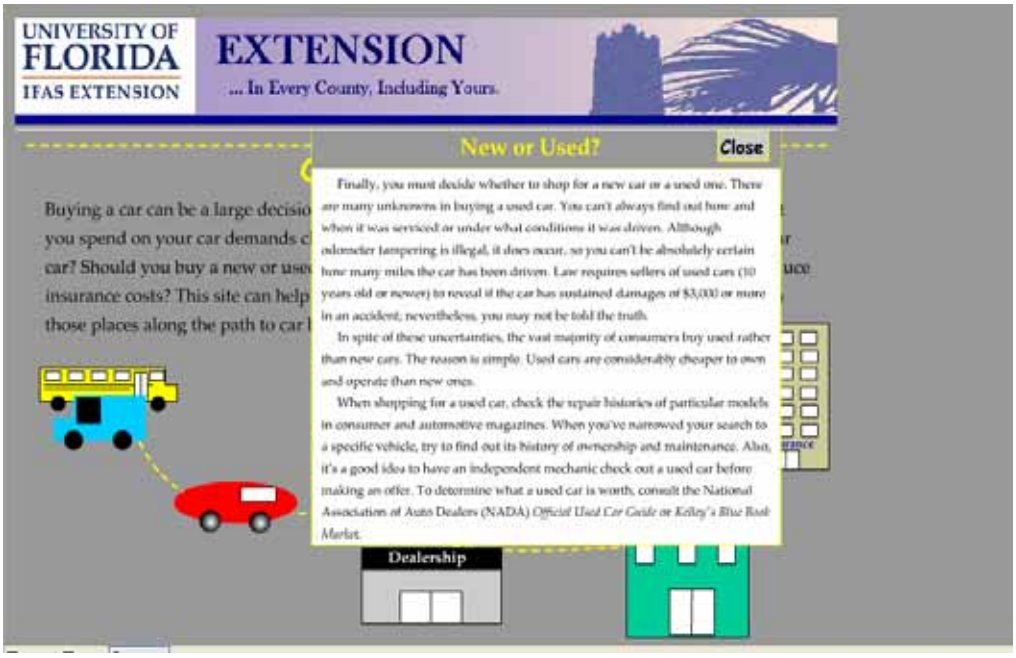
Dealership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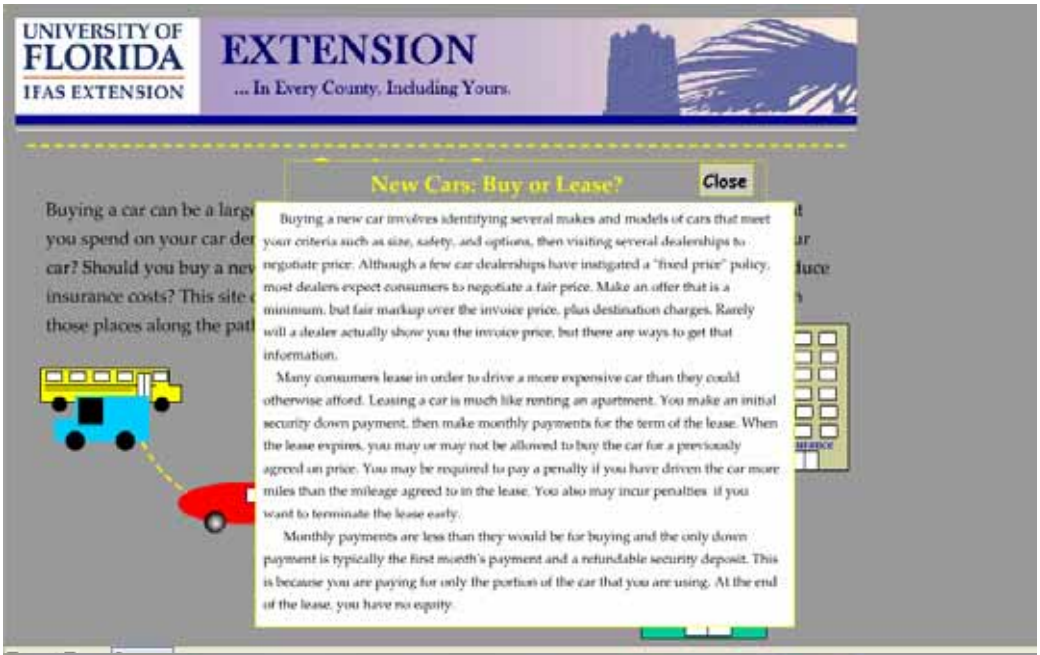
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Many consumers lease in order to drive a more expensive car than they could otherwise afford. Leasing a car is much like renting an apartment. You make an initial security down payment, then make monthly payments for the term of the lease. When the lease expires, you may or may not be allowed to buy the car for a previously agreed on price. You may be required to pay a penalty if you have driven the car more miles than the mileage agreed to in the lease. You also may incur penalties if you want to terminate the lease early.
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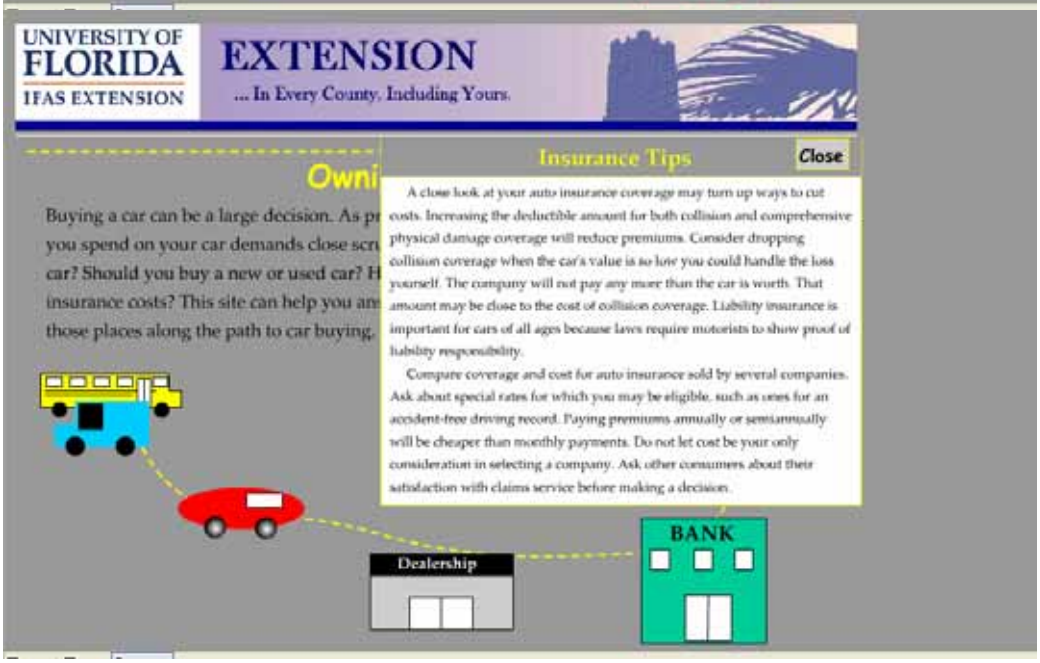
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Dealership
BANK

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BIOGRAPHICAL SKETCH

The author was born Emily Brin Bisdorf on October 1, 1980, in Columbus, Ohio. She grew up in Centerburg, Ohio, a small rural town in central Ohio, where she graduated from Centerburg High School in 1998. Her love for livestock and agriculture stemmed from many years exhibiting sheep through 4-H and FFA.

Emily's college career began in August of 1998 at The Ohio State University while serving as the Ohio FFA State Treasurer. While pursing her Bachelors of Science degree in agricultural communications, she spent a summer studying abroad at the Prague College of Agriculture in the Czech Republic. Emily spent her time working as an editorial and exhibit design intern while pursuing on her undergraduate degree. She graduated in March 2002, as a top ten senior in the College of Food, Agriculture, and Environmental Sciences at The Ohio State University.

After completing her bachelor's degree, Emily married her husband Aaron Rhoades and moved to Gainesville, Florida, to pursue her Masters of Science in agricultural communications.

Upon completion of her master's, Emily entered her doctoral program in agricultural communication at the University of Florida with an emphasis in new media communications. During her degree program Emily taught courses in technical communication, Web and print design, and public relations. She conducted research in new media, distance education, Web material evaluation, and critical thinking. She served as the student board member for the Agricultural Institute in 2005-2006.

Emily is a member of the Agricultural Education and Communication Graduate Student Association, Agricultural Communicators of Tomorrow, Alpha Tau Alpha, Gamma Sigma Delta Honorary, Association for Communication Excellence, North American College Teachers of Agriculture, and the American Horse Publications Council.