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This paper describes a usability study conducted on the Web site of the Agricultural Resources Center, a nonprofit environmental advocacy organization, to determine if the site effectively communicates the mission and goals of the organization. Through surveys, interviews, and the observation of eight participants interacting with the site, this study found that participants perceived the content on the site to be valuable, trustworthy, and of high quality. However, the presentation and navigation of the site interfered with participants' ability to successfully experience or learn from the content. Participants requested more opportunities to take action, a clearer, stronger message about the objectives and services of the organization, and a more appealing layout and design. Participants' perceptions guided a number of recommendations to improve the presentation, navigation, and quality of the Agricultural Resources Center Web site, and thus, improve its ability to effectively communicate its mission and goals.

Headings:

Web Sites—Evaluation

Web Sites—Aims & Objectives

Use Studies—Internet

Nonprofit Organizations

Advocacy Organizations

ADVOCACY ON THE WEB: AN EVALUATION OF A NONPROFIT ADVOCACY ORGANIZATION'S USE OF THE WEB TO SUPPORT ITS MISSION AND GOALS

by
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Table of Contents

Introduction

Effective communication is essential to all nonprofit, advocacy organizations that endeavor to effect social change. Only by raising awareness of an issue or cause in both the general public and interested parties—which then facilitates education, action, participation, fundraising, and the building of a community of members—can an advocacy group successfully achieve its mission and goals. In fact, these activities constitute the very reasons advocacy groups exist.

A Web site can provide a nonprofit, advocacy-based organization with a highly effective device for communicating to a wide audience if, as is true for educational, government, and for-profit organizations, the site is both usable and useful to visitors. Any organization that uses the Internet must pay close and ongoing attention to the presentation, navigation, and quality of its site in order to stand out among the wealth of competing information accessible on the Web and to capture, retain, and encourage the return of users.

This paper presents an evaluation of the Web site of the Agricultural Resources Center (ARC), located at http://www.ibiblio.org/arc. ARC is a North Carolina-based, private, nonprofit, public-interest organization dedicated to preventing the use of toxic pesticides in farming and food production, in the home, and in urban and rural environments. The organization seeks to accomplish its goals through public outreach and education and by monitoring and lobbying state farming and environmental agencies. The ARC Web site is used to provide information on agricultural issues, local

environmental advocacy events, state regulations, and the organization's efforts to change policies.

A usability study, driven by four research questions, was conducted on ARC's site. The primary research question sought to determine if the site effectively communicates ARC's mission and goals. Because successful communication via the Internet is achievable only through a Web's site presentation, navigation, and quality of information, these three constructs were used to guide the remaining research questions. Does the presentation of the site attract visitors, allow them to quickly understand the content, and entice them to remain on the site? Does the navigation of the site facilitate information finding, ease of use, and ease of movement? Does the site exhibit high quality in the areas of currency, accuracy, purposefulness, and understandability? The data collected will be used to help redesign the ARC site and to provide guidance and heuristics for other public interest nonprofit organizations in the development of effective, mission-supportive Web sites.

Background and Relevant Literature

The literature and background related to this study focuses in three areas: 1) the use of the Internet by nonprofit organizations; 2) Web site usability and its effect on successful communication; and 3) information quality and its effect on successful communication via the Web.

Nonprofit Organizations and the Internet

There has been little data collected about nonprofit organizations' use of the Internet. Much of the research that does exist focuses on donor recruitment, fundraising, and community building but few studies have analyzed nonprofit Web sites from a usability perspective. Some of the more significant studies will be described here to present what can be generalized about the Internet tools and strategies used by nonprofits.

It can be safely concluded that there is significant room for improvement in the nonprofit sector's use of the Internet. Nonprofits have only recently begun to utilize Internet tools and strategies in their organizational efforts (Clohesy & Reis, 2000; Spencer, 2002). Though Web site development in the nonprofit sector has increased in recent years, the growth has been slow (Clohesy & Reis, 2000). During the early years of the Internet, most nonprofits' Web sites were little more than informational or "brochure" sites, existing to establish a Web presence and provide a few details about an organization's mission and work. (Spencer, 2002). "Although many nonprofits and foundations had informational sites operating on the web and some organizations had

created online news and information services, there was virtually no marketing of nonprofit sites and almost no links among sites. Most sites were used for posting information" (Clohesy & Reis, 2000, p. 4). Information published on the Web was static and nearly identical to the organization's printed literature.

Today, although the number, interactivity, visibility, and importance of nonprofits' Internet activities have noticeably increased, most nonprofits still fail to take full advantage of the Internet's potential for effective communication, which remains a crucial "next step" for many nonprofit organizations looking to successfully promote their mission and goals to the largest possible audience. "A strong case can be made that as information-driven organizations, the advantages of the Internet as a strategic tool for non-profits can be tremendous" (Boeder, 2002, p. 14). Civille (1997) notes that one of the strongest features of the Internet for non-profits is "affordable, direct, interactive access to the public at large" (para. 4). The Internet allows organizations to share ideas with constituents, network with peers, and initiate cooperative ventures with for-profit corporations. A number of other opportunities have been identified, including publicity, public education, fundraising, volunteer recruitment, service delivery, advocacy, research, communication, opinion sampling, training, media relations, community building, knowledge sharing, inducing action, and promoting participatory decision-making (Landesmann, 1999; Sehmel, 2001; Spencer, 2002).

However, nonprofit organizations face a number of challenges that inhibit their adoption of Internet tools and strategies. Suffering from an overall lack of resources, nonprofits may not have the money or the qualified staff required to build a strong Web campaign. An organization's staff may be so small that members are required to focus their time on other, more urgent, projects. It is possible nonprofit organizations do not

have knowledge of or access to new technologies—the result of an ever-widening technology gap. Many nonprofits, due to political or funding issues, are too slow in their decision making process to keep up with the growth of technology and the Internet (Clohesy & Reis, 2000). Boeder (2002) suggests that open source software, the XML-based standard, and application service provision will provide nonprofits with low cost technology and sharing of resources. Actively recruiting more volunteers on the Web can also provide relief from some of the challenges inherent to these organizations.

As previously mentioned, few studies have focused on the usability of nonprofit Web sites, although two studies, reviewed here, did investigate the use of Internet tools, strategies, and design features that can be especially useful for environmental advocacy groups seeking to educate, influence behavior and values, encourage cooperation, and induce action. Sehmel (2001) explored the Web site of the Texas-based environmental advocacy organization, the Sustainable Energy and Economic Development (SEED) coalition, located at http://www.seedcoalition.org. The author identified two important benefits of Web use by nonprofits—that the Internet allows such organizations to save money by providing a large audience access to more information than is economically possible through other media, and that the Internet can also remove some of the barriers that prevent activism, such as the time required to find and organize other people interested in an issue. Sehmel also pointed out that not enough is known about advocacy Web site users to determine the best way to reach them and meet their needs.

Explored in Sehmel's study, SEED's Web site uses a variety of techniques to promote the organization's goals. The site allows users to receive information at the exact level of detail they prefer. It offers a number of opportunities for users to take political action, such as sending pre-written e-mails to Congress and, by suggesting changes

individuals can make in their daily lives, the site offers opportunities for visitors to take personal action. SEED also offers ways for visitors to stay informed through e-mail updates and newsletters.

The SEED Web site fails to take advantage of other Internet tools and strategies that could promote the organization in other ways. The site's lack of a search function or a site map significantly restricts the users' control over their experience and access to desired content. There are no opportunities for visitors to engage in a dialogue about energy issues, which limits participatory communication and community-building efforts. "The site seems likely to effectively educate and induce action, but could do more to induce deliberation and encourage interpersonal communication and discussion about issues, which might better support the group's long term goals" (Sehmel, 2001, p. 1).

Spencer (2002) conducted a study on the Internet strategy for the Wildlife Rescue group (WIRES), a nonprofit environmental organization operating in Australia. While developing a new strategy for their Web site, located at http://www.wires.au.com, the organization considered myriad possibilities. In order to obtain sponsorship and donations, WIRES wanted to appear professional and credible, and thus created a site with professional graphic design, rich content, and interactive features. The organization implemented an expanded email strategy to save money and allow visitors to take political action directly on the site. They established a community of practice for animal caregivers to share knowledge and skills. Spencer concludes by recommending that nonprofits "draw on the experiences of other organizations and consider online volunteer management, discussion forums, information-rich Web sites, innovative fund-raising, online advocacy and tailored information distribution, to develop an Internet strategy that reflects their needs and resources" (2002, para. 43).

In summary, nonprofit organizations should develop an online presence that speaks to and meets the needs of their audience, that clearly communicates the services and mission of the organization, and that expresses why the site exists. Nonprofit organizations are slowly adopting online resources, but remain far behind commercial, educational, and governmental organizations. A search conducted on the National Environmental Directory (http://www.environmentaldirectory.net) for environmental nonprofit organizations with Web sites retrieved 3,175 results, only a quarter of the 13,000 organizations listed on the site. As more people go online for their information, nonprofits must have an online presence to reach the individuals they want to educate and influence.

Web Usability

For many nonprofits that do have a Web presence, usability is problematic. Npadvisors.com, an Internet marketing resource for nonprofits, mentions that successful Internet strategies are rooted in what users need and want, rather than based on what the organizations want to tell them. “Nonprofits who focus on meeting the needs of their supporters, answering their questions and giving them value will be far more likely to build a vibrant, expanding Web site central to their overall community” (“Your mission online,” n.d., para. 3).

“An organization's Web site is a gateway to its information, products and services. As such, it should ideally be a reflection of the needs of the clients it serves” (Murray & Costanzo, 1999). To successfully capture the interests and support of its Web site users, organizations must pay attention to user needs and goals and apply Web usability principles, ensuring that products are useful, usable, and facilitate the

completion of user tasks—the foundation of Web usability. What constitutes a usable Web site is largely dependent on the purpose of the site and its intended audience (Murray & Costanzo, 1999). However, usability professionals agree that usable Web sites should be accessible, appealing, consistent, clear, simple, navigable, safe to use, easy to learn, easy to remember how to use, and forgiving of user errors (Murray & Costanzo, 1999; Preece, 2002).

Nielsen and Norman (2000) stressed the necessity of usable Web sites when they aptly stated, “Usability isn’t a luxury on the Internet; it’s essential to survival” (p. 3). In his book *Designing Web Usability* (2000), Nielsen, a usability expert, names four criteria that are the foundation of effective Web design and that will cause users to return to a Web site: 1) high-quality content; 2) often updated; 3) minimal download time; and 4) ease of use. To have an exceptional site, he adds the following three criteria: 1) relevant to users’ needs; 2) unique to the online medium; and 3) net-centric corporate culture.

Nielsen describes in detail some of the most important considerations in Web development. Because the visual appearance of a Web site is the first element the user sees, page design is crucial. Nielsen recommends that Web pages be compatible with multiple platforms, browsers, and screen resolutions; pages should load quickly, have a consistent style, and be dominated by the content users came to see. Next, easy access to content must be provided, because, “Ultimately, users visit your website for its content” (Nielsen, 2000, p. 99). Nielsen suggests that Web content be succinct, scannable, meaningfully chunked and labeled, and of adequate amount per page. Unity of design as a whole is another important consideration for Web developers. Even though users see only one page at a time, they need to be able to effectively navigate an entire site and find the pages that contain the information they seek. “Site design must be aimed at simplicity

above all else, with as few distractions as possible and with a very clear information architecture and matching navigation tools" (Nielsen, 2000, p. 164).

Usability testing—used to identify usability problems, confirm or reject suspected problems, and compare design alternatives (Parush, 2001)—is one possible method to ascertain whether a Web site "will help users accomplish their tasks and what may impede them" ("Usability Basics," n.d., para. 6). In a study conducted by Rosenbaum to see how professionals rate usability evaluation techniques, usability testing was rated the best methodology to create greater impact (Rosenbaum, Rohn, & Humburg, 2000). One approach for usability testing of Web sites is to collect empirical data through the observation of users interacting with the site in typical ways. Rubin (1994) outlines the basic elements involved in typical usability tests: development of problem statements or test objectives, use of a representative sample of end users, representation of the actual work environment, observation of end users working with the product, collection of quantitative and qualitative performance and preference measures, and recommendation of improvements to the design of the product.

Usability testing can occur at many different stages of the development cycle. Formative evaluations occur during the design process, likely with prototypes and mockups, to assess the effectiveness of design decisions and to ensure the product meets users' needs (Preece, 2002). Summative evaluations occur on a completed product to ensure the product is successful or that it meets certain standards (Preece, 2002). Some of the basic techniques employed by usability professionals during usability tests to evaluate user interactions with a system include the think aloud protocol, observations, video recordings, automatic logging of cursor movements or keystrokes, guided interaction, interviewing, and questionnaires (Nielsen, Clemmensen, & Yssing, 2002).

In summary, Web usability is a combination of factors that influence a visitor's experience with a site. Usable Web sites begin with a design that meets the needs of the audience, the organization, and the objectives for the site. Web sites should be developed with usability objectives in mind, such as efficiency of use, visitor satisfaction, and learnability. Usability guidelines should guide Web design decisions; the site design, content, and navigation system should facilitate a visitor's use. Web usability is ensured through usability testing by evaluating a visitor's experience with a site.

Information Quality

Quality of information is essential to effective communication, particularly on the Internet, where users do not have the implied authority of a publisher to endorse a resource. With the innumerable Web sites users have to choose from, Web sites should project information quality in order to capture, retain, and encourage the return of visitors. Alexander and Tate (1999) discuss the importance of producing Web sites with quality information to facilitate a positive evaluation by visitors. "Each individual's evaluative criteria will differ somewhat based on various demographic, social and psychological factors. However, five specific criteria—accuracy, authority, objectivity, currency, and coverage—play an essential role in the evaluation process" (Alexander & Tate, 1999, p. 2). A number of additional criteria can be added to this list, including ease of access to specific information, navigability, and attractiveness.

Research to evaluate the quality of information in the field has been conducted only in the past decade or so, and few methodologies for assessing and measuring information quality exist (Lee, Strong, Kahn & Wang, 2002). Wang and Strong (1996) developed an information quality framework to provide a means for understanding and

meeting information consumers' information quality (IQ) needs. The framework consists of four areas: 1) intrinsic; 2) contextual; 3) representation; and 4) accessibility:

> Intrinsic IQ implies that information has quality in its own right. Contextual IQ highlights the requirement that IQ must be considered within the context of the task at hand; it must be relevant, timely, complete, and appropriate in terms of amount, so as to add value. Representational and accessibility IQ emphasize the importance of computer systems that store and provide access to information; that is, the system must present information in such a way that it is interpretable, easy to understand, easy to manipulate, and is represented concisely and consistently; also, the system must be accessible but secure. (Lee et al., 2002, p. 135).

Using the Wang and Strong information quality framework as a foundation, Katerattanakul and Siau (1999) developed a research framework and an instrument to measure the information quality of Web sites. The framework consists of the same four categories. Intrinsic quality of Web sites measures the accuracy of the content, navigation, and hyperlinks. Contextual quality of Web sites measures the provision of up-to-date information about the author, such as contact information and a biography, so that a visitor may know more about the author and believe the site to be authoritative. Representational quality of Web sites measures such aspects as color, font, and graphics, as well as the layout of these components on the site. Also measured is whether the site is attractive, easy to read, and has consistent design. Accessibility quality of Web sites measures the navigation of the site and the ease with which users can find the information they seek.

Lee, Strong, Kahn, and Wang (2002) also used the Wang and Strong information quality framework to develop the AIM Quality (AIMQ) methodology, which comprises three components. The first component of the methodology is a model of what information quality means to information consumers and managers and is composed of four dimensions: 1) soundness; 2) dependability; 3) usefulness; and 4) usability. Sound

information should be free of errors, complete, and have concise and consistent representation. Dependable information should be current and secure. Useful information should be appropriate in amount, relevant, understandable, interpretable, and objective. Usable information should be believable, accessible, easy to operate, and reputable. The second component is an instrument for measuring the four dimensions of information quality, which comprises 65 survey items to assess information quality along a number of dimensions. The third component is a means for interpreting the results of the instrument.

Another instrument for measuring information quality of Web sites was developed by Zhang, Keeling, and Pavur (2000). Through 18 survey items, the instrument measures how users perceive the presentation, navigation, and quality of Web sites—three factors important in effective Web site design. The authors explain that measuring the presentation of information on a Web site requires an analysis of graphics, color, the amount of the information displayed, how the information is organized, and the overall attractiveness of the site. Measurement of the navigation of a site is based on the ease of finding hyperlinks, moving through the site, and identifying and finding information on the site. Measurement of the quality of a site requires analyzing the credibility and quality of the information presented as well as a user's ability to understand the purpose of the site.

As evident from the literature review, there is a significant amount of overlap between usability and information quality. Both recommend usable, clear, navigable designs that facilitate findability and support user tasks and goals. While usability focuses more on ease of use, information quality focuses on the reliability, currency, accuracy, and purpose of the data. The Zhang et al. evaluation framework, which analyzes

presentation, navigation, and quality of Web sites—three constructs that are important to both usability and information quality—will be the basis for evaluating the ARC site.

Research Questions

To facilitate access to and an understanding of mission-related content, Web content must be navigable, of high quality, and presented effectively. The study of the effectiveness of the Agricultural Resources Center's (ARC) Web site was guided by four research questions:

- Does the presentation of ARC's Web site attract visitors, allow them to quickly understand the content, and entice them to remain on the site?
- Does the navigation of ARC's Web site facilitate information finding, ease of use, and ease of movement?
- Does ARC's Web site exhibit high quality in the areas of currency, accuracy, purposefulness, and understandability?
- Does ARC's Web site effectively communicate the mission and goals of the organization?

Research Methods

Eight individuals participated in a usability study of the ARC site. Participants browsed the site, used the site to complete five information-finding tasks, responded to eight structured interview questions, and completed a post-test questionnaire about their experience using the site. Data was analyzed quantitatively and qualitatively. Details of the research methods are described below.

Participants

Through personal contact, the researcher recruited eight adults who were thought to be interested in or at risk to environmental hazards and pesticide use. The Agricultural Resources Center is an organization targeted at North Carolina residents in general; however, due to the localization of most pesticide use in the state, there are individuals with a greater-than-average risk of exposure who would be more likely to use ARC as a resource, such as farm workers employed by a corporation or family farm owner. Though no farm workers were recruited for the study, an employee with a local farm worker advocacy organization who has direct contact with farm workers participated. Other participants included organic farmers, whose livelihood depends on protection from the health risks posed by exposure to toxic pesticides. Parents with school age children and school educators were recruited in light of the fact that public schools are allowed to use pesticides in school buildings and on school lawns. Two UNC Environmental Studies

Department students participated in the study, as they would be likely to use ARC's resources in their school studies and to be environmental activists.

Participants were required to be English-speaking adults with some Internet experience. Each participant received $15 as an incentive for volunteering. All participants were informed of the study procedure and of their rights as research participants. Each participant read and signed a consent form (Appendix A) prior to any data collection.

Procedures

The usability tests were conducted in the Interaction Design Lab at the School of Information and Library Science of the University of North Carolina at Chapel Hill. The sessions were audio taped; the browser screen and hand movements and facial expressions of the participants were captured on video. Each study session lasted approximately 45 minutes.

Participants were first read an introductory script to the study (Appendix B), prompted for any questions, and asked to sign an informed consent form. Participants then completed a demographic and background questionnaire (Appendix C) to gather data that was relevant to the study, such as age, gender, and education, as well as details of user experience, such as the number of years spent using computers. This questionnaire was based on the 10th WWW User Survey (1999) developed by the Graphic, Visualization, and Usability Center at Georgia Institute of Technology.

Using a high-speed Internet connection and an Internet Explorer 6.0 browser, participants browsed the ARC site for up to twenty minutes. Participants were asked to speak aloud while independently browsing the site. The think-aloud protocol, which

requires users to voice what they are thinking, wondering, and trying to do, as well as any confusion, frustration, or delight they are having, is a popular usability technique that allows researchers to understand and get access to human cognitive processes (Preece, 2002; Rubin, 1994). When participants became quiet, they were prodded, with gentle reminders or non-influential questions, to reveal their thoughts.

Next, after completing the browse portion of the study, five information-finding tasks were given to the participants to complete, representing potential information-gathering uses of the site. By asking users to find this information, the researcher could analyze how easily users are able to navigate the site and understand navigation and link titles. Watching users complete the tasks identified some of the problematic features of the site. The information-gathering tasks included:

1. You have a pesticide related question and think that the Agricultural Resources Center would be able to help you. Find ARC's email, mailing address, and phone number so that you may contact them.
2. Find statistics about the effect of pesticides on children.
3. You read a newspaper article in the *News & Observer* in October 2002 discussing the Agricultural Resources Center's report *Bitter Rains*, which is about aerial pesticide spraying in North Carolina. Where on the site can you download a copy of the report?
4. You have noticed that all the plants along the edge of your front yard have turned brown and died. Two weeks earlier, you saw someone from the power company spraying something along the power lines. Find information on the site that discusses what the power company may have been spraying, whether the

chemicals are toxic, and if it is legal for the power company to spray without notifying you first.

5. You want to send a letter to the state to protest pesticide use in public schools. What state organization should you contact and what is the address?

Participants were notified that all requested information could be found on the ARC site. They had ten minutes to complete each task, but were given the option to move to the next task if they felt unable to complete their present task. They were asked to return to the home page before beginning each new task. Participants were asked to speak aloud while completing the tasks.

After completing the tasks, participants responded to eight structured interview questions (Appendix D) developed by the researcher to ascertain users' perspectives on their experience with and understanding of the site. Two questions dealt with the task activity and asked users how they felt about their performance finding the information requested and whether there were any aspects of the search questions they found extremely difficult or easy. These questions were designed to produce insight into how the participants felt about navigating the site and how easily they were able to find the information, and also to illuminate any problems. Three interview questions asked participants to state what they found to be the best and worst features of the site and if they had any suggestions to improve it. Their responses provided insight into what features of the site should be retained in the Web redesign, and what features should be eliminated. The final three questions asked users to state, in their own words based on what they saw and read on the site, what they understood the Agricultural Resources

Center's mission, services, and intended audience to be in order to determine whether the site is effectively communicating its mission and goals to its Web site visitors.

During the final study component, participants completed a 30-item post-test questionnaire (Appendix E) composed of two parts: 1) an instrument to measure overall user satisfaction with the site; and 2) an instrument to measure users' perceptions of the presentation, navigation, and quality of the site. The Overall User Reactions portion of the Questionnaire for User Interaction Satisfaction (QUIS™) 7.0 was used to measure users' satisfaction with five high level interface factors ("About QUIS 7.0," 1998).

The second part of the post-test questionnaire was designed to measure participants' perceptions of the usability and information quality of the ARC Web site and consisted of three sections. Participants were asked to respond to 25 survey items on a scale of 1 to 7 with endpoints of "strongly disagree" and "strong agree." Seven survey items asked users about their perceptions of the presentation of the site, such as the site logo, text font and size, color usage, graphics, screen layout, and amount of information displayed on a page. Eight items asked users about their perceptions of the navigation of the site. Organization of information, findability, labeling, navigation elements, and links were some of the features users were asked to evaluate. Ten survey items asked users to assess the quality of the site and its content, such as whether the content of the site helped them understand the organization's mission, services, and main issues, and whether the information seemed credible, up-to-date, and appropriate.

Although using previously validated instruments is highly recommended (Boudreau, Gefen, & Straub, 2001), an instrument with survey items entirely relevant to this study could not be found. Therefore, this study used the constructs—navigation, presentation, and quality—of an existing instrument developed by Zhang, Keeling, and

Pavur (2000), discussed above, as the framework for the instrument applied. Although many of the survey items from the Zhang et al. instrument were retained, some were rephrased to be more relevant to the ARC site features being evaluated. Additional survey items, developed from the literature of information quality (Alexander & Tate, 1999; Lee et al., 2002), Web usability (Nielsen, 2000), and the effectiveness of Web sites (Small & Arnone, 2000), were added to the instrument. As the instrument developed for and used in this study was not previously validated, three individuals from the target user group who did not participate in the user study participated in a pilot study of the instrument to ensure the questions were clearly worded and that users interpreted the questions as intended. The pilot study was successful and results indicated the instrument to be appropriate for its purposes.

Data Analysis

Data gathered from this study was analyzed both quantitatively and qualitatively. Qualitative data was assembled from the think-aloud reactions during the browse and task activities to identify positive and negative reactions to the site, common problems participants encountered interacting with the site, and any suggestions participants provided during the browse and task activities. The interview responses were also analyzed qualitatively to capture perceptions about the site and to determine how participants understood ARC from their experience using the site.

Quantitative data included responses from the demographic questionnaire, task performance, and responses to the post-test questionnaire. Demographic and background data was summarized. Task performance was analyzed by averaging the number of hops a participant took to find the information requested, then comparing this average to the

minimum number of hops actually required to complete the task. The success rate, minimum, maximum, and standard deviation of each task were also recorded. For each item in the post-test questionnaire, the maximum, minimum, mean, and standard deviation of the scores were calculated.

Results and Discussion

Demographics of Participants

The participant group included eight English-speaking adults who were interested in or at risk to pesticide and agricultural concerns (see Appendix C). Five females and three males between the ages of 22 and 53 participated; the average age of the participant group was 31 years. Half of the participants were residents of suburban areas and the others were residents of rural areas. Four participants rated their level of computer and Internet use comfort as “very comfortable”; three as “somewhat comfortable”; and one as “neither comfortable nor uncomfortable.” Length of use of the Internet varied considerably; one participant had used the Internet for less than six months, while the majority of participants had used it for seven years or more. Only one participant had previously visited the ARC site and did so once, “just to browse.”

Initial Impressions while Browsing

Participants spent an average of 12 minutes browsing the site; the least amount of time spent browsing was 7 minutes and the greatest amount of time spent browsing was 18 minutes. Participants were asked to speak aloud their thought processes, actions, decisions, opinions, frustrations, suggestions, and compliments. Overall, users had more negative responses than positive. Observing the participants browse the site identified some of the major navigation issues. Participants consistently had difficulty moving through the site, returning to pages they had previously visited, and returning to the home

page. The top navigation bar caused much confusion and frustration among the participants. They noticed that link order on the bar changed often, which disabled their ability to remember which pages they had previously visited. The labels on the navigation bar links also confused participants; either they did not understand what the label meant or they did not think the label clearly reflected the content of the page to which it linked them. Every participant noticed that the site contained a significant amount of out-of-date information, such as invitations to attend an event that had passed and three-year-old articles listed under the "What's New" section.

Some of the more positive reflections were in praise of the content and the introductory tone of the language. With the exception of the "Right of Way" section, participants felt comfortable with the complexity of the information provided. Pictures used on the site were complimented, particularly those of staff members, which "put a real face on the organization." The "Links" page was highly praised by many for providing additional resources on pesticide and other environmental topics.

Presentation/Attractiveness of the Site

As noted in the literature review, measuring Web presentation requires evaluating the graphics, colors, amount of information displayed, the way information is organized on a page, and the aesthetic appeal of the Web site. Data on users' perceptions of the site presentation was collected through responses to interview questions and the post-test questionnaire.

Three interview questions had users explain what they liked best and least about the site and asked them to make suggestions to improve the site. Knowing what participants liked best about the site will help the site designer know what valuable

elements to retain when the site is redesigned. Though one participant mentioned that she liked nothing about the site, a few participants had positive comments about the site presentation. Two participants liked the photos on the site, particularly a map displaying groundwater contamination, which was described as “eye-catching.” The presentation of the “Links” page was highly praised by three participants; they liked the categorization of the links and found the page layout to be well organized and easy to understand.

Participants were asked their least favorite elements of the site to determine those aspects of the site that are ineffective and require improvement in the redesign. The overall presentation of the site was found to be sterile and dull by one participant. She wanted more pictures and style. The same participant also mentioned that the site would be more effective if it had a more social-activist tone. A number of participants thought page lengths were too long and required too much scrolling. One participant pointed out that the home page was not enticing in the least. The text size and font were considered too large and bland by one participant, who also disliked the way the text spanned the entire width of the page.

Participants were also asked if they had any suggestions for the site; most responses corresponded to the problems they noted in the previous question. Three participants suggested improving the design by adding pictures, changing the color scheme, and creating a more polished look. One participant suggested that the navigation bar identify, with highlighting or color changes, where the visitor is within the site.

The post-test questionnaire included a number of items that asked participants to evaluate the presentation of the site. The first five items measured participants’ overall satisfaction with the site using the Questionnaire for User Interaction Satisfaction (QUIS; see Table 1). On the seven-point scale, a mean of 4.5 was set as the target score. Only one

question received a mean score above 4.5, revealing that participants found the ARC site to be slightly more easy than difficult. Three survey items received mean scores below four, which indicates that participants found the site to be more terrible than wonderful, more frustrating than satisfying, and more dull than stimulating. The QUIS results all suggest the ARC site needs improvement in order to satisfy visitors.

Table 1: Post-Test Questionnaire-QUIS Results, Overall reaction to the Web site

Survey Item	Mean	Standard Deviation	Min	Max
Terrible—Wonderful	3.8	1.0	2	5
Frustrating—Satisfying	3.9	1.4	2	6
Dull—Stimulating	3.6	1.3	2	5
Difficult—Easy	4.6	1.5	2	6
Rigid—Flexible	4.2	1.9	2	7

Seven post-test questionnaire items asked users to evaluate elements of the sites' presentation (see Table 2). Again, the target mean score was determined to be 4.5. The highest mean score in the presentation section indicates that participants found the text font and size to be easy to read. Participant comments throughout the study confirmed this finding, though one participant found the text to be too large. Three items received mean scores below three, which indicate that participants didn't find the graphic on the home page to be attractive, were unsatisfied with the amount of information displayed on a page, and found the screen layout to be unattractive. Other survey item results suggest that participants did not find the colors to be entirely pleasant, did not find the graphics and photos to contribute much to their understanding of the site, and found the information to be organized ineffectively.

Table 2: Post-Test Questionnaire-Presentation Results

Survey Item	Mean	Standard Deviation	Min	Max
Overall Presentation	3.2	1.8	1	7
The logo on the site's home page is attractive.	2.4	2.0	1	7
I find the text font and size easy to read.	4.8	2.4	1	7
Colors used in the Web site are pleasant.	3.6	0.9	2	5
The amount of information displayed per page is just right.	2.8	1.8	1	7
Graphics, icons, and photos contribute to my understanding of the content.	3.1	2.0	1	7
The screen layout of this site is attractive.	2.9	1.1	2	5
This site organized its information in a way that is easy for me to understand.	2.9	1.4	1	5

Ease of Navigation

Ease of navigation was measured by looking at how effectively users could move through the site to find hyperlinks and information. The navigation construct was evaluated during the task activity and through participant responses to interview questions.

The task activity measured the navigational efficacy and information-finding ability of the ARC Web site. Task results were analyzed by looking at the success rate of each task and by comparing the mean number of hops taken for each task to the fewest number of hops actually required to complete each task (see Table 3). Task 1 could be completed in zero hops; Tasks 2, 4, and 5 could be completed in one hop; and Task 3 could be completed in two hops. Participants averaged an aggregate success rate of 87.5%. Half of the participants were able to successfully complete all five tasks; three participants were all able to complete four of the five tasks; one participant completed three of the five tasks.

Table 3: Information Finding Task Results

Task	Target Number of Hops	Mean Number of Hops	Standard Deviation	Minimum Number of Hops	Maximum Number of Hops	Success Rate
1	0	0	0	0	0	100%
2	1	3	2.51	1	8	87.5%
3	2	4	1.41	2	6	87.5%
4	1	1.5	1.41	1	5	100%
5	1	2.8	2.48	1	6	62.5%

Participants were very successful in finding ARC's contact information (which was on the home page). They remarked that they expected contact information to be either on the home page or in another obvious location such as an "About" or "Contact Us" page. The task that asked users to find information about power company spraying of pesticides (found on the "Right of Way" page) was completed easily by most participants, which was surprising, as most participants found the "Right of Way" page to be very confusing during the browse activity. Perhaps because this page and topic were new to participants, they spent more time exploring and deciphering this information.

The task that asked users to find statistics about the effects of pesticides on children was difficult for some participants because they did not expect statistical information to be contained on the "About ARC" page. One participant said, "It would make more sense to have this on a different page. Usually the 'About' page would be contact information, who they hire, who works there. Having children statistics and pesticide statistics there doesn't make much sense." Many participants thought the information was important to include on the site, but required its own section. One participant suggested that ARC should have "a section for statistics or facts, about pesticides, children, and farm workers."

The task that asked participants to find the downloadable report *Bitter Rains* (found on the "What's New" page) was completed easily by participants who had noticed the report while browsing the site. Others found the task quite difficult and mentioned that they did not expect publications to be contained on the "What's New" page. Many participants suggested that ARC develop a page solely for publications and press. Participants were particularly frustrated that the report could not be found on the "Aerial Spraying" page, as the report's topic clearly fell under that category.

Because ARC exists, in part, to induce the local community to take initiative and action, one task, which asked participants to find the Pesticide Board contact information, was designed to measure the effectiveness of the Web site in communicating the organization's goal. However, this task proved to be the most difficult, and visitors to the site as it appears now will have trouble finding the appropriate agency to which they can raise their concerns. Many participants went to the "Links" page, expecting to find the appropriate state organization listed under the state organization category, although it is not. One participant mentioned that the information would have been easier to find had the link to the appropriate page been labeled "North Carolina Pesticide Board." He thought that the Pesticide Board was a division of ARC's organization. Other participants would have preferred a direct link to a page that urges them to take action.

Overall, the task activity results, along with participant responses from interview questions regarding the task activity, suggest that site navigation and information organization are ineffective. Finding information proved to be difficult for many participants. When asked during the interview session how the participants felt about their performance with the tasks, one stated, "I don't think the site was very conducive to finding the answers. I had to do a lot more searching than I might have wanted to."

Another mentioned, “I don’t think they did a good job at making it findable. It is kind of scattered around the site.” All participants mentioned that they would have had more trouble completing the tasks had they not first browsed the site. “I felt like I could complete them only because I had done all the browsing earlier. But I don’t think it would have been easy if I had just jumped in to find my one thing.” One participant mentioned that he was able to find the correct information purely by “playing memory.” Another participant mentioned that the browse helped familiarize him with the language of the site. “The earlier browse helped me a lot. I wouldn’t have known what ‘Right of Way’ meant, or that the Pesticide Board was a state agency.”

When asked what elements of the site made completing the tasks particularly easy or difficult, many participants suggested that the navigation bars impeded their ability to find information easily. “The navigation bars don’t make any sense.” The organization of information within the site also proved to be problematic for some participants. One stated, “Information under the topics doesn’t seem to go with the topics.” One participant was satisfied with the site navigation elements. “It was relatively easy to jump between pages because a lot of the links were across the top of the page. The red headings were helpful in finding important information.”

Participant comments about their least favorite elements of the ARC site contributed significant data about the ease of navigation of the ARC site. Corroborating results from the task activity, five participants identified the navigation of the site, in general, and the inconsistent navigation bar, specifically, as their least favorite elements of the site. Participants noticed that the order of the links on the bar changed depending on what page they were on. Additionally, the size of the bar changed from page to page. Two participants mentioned that they utilize Web site navigation bars to ensure they have

seen every page on a site. The inconsistency of the navigation bar prevented this activity. One participant stated, “There is no sense of where you are on the site or what you have already seen.” Also related to the navigation bar, one user wanted better labeling on the bar. “Some of the titles could be more specific, like ‘What’s New’; I don’t find that useful.” As a suggestion for how to improve the site, one participant mentioned adding a site map because he prefers to navigate with a text-only site map rather than from a page with slow-loading graphics.

The navigation section of the post-test questionnaire, shown in Table 4, received the lowest aggregate score of the three constructs. The item that asked if participants always knew where they were within the site received the lowest score in the section. Earlier participant comments noting that page titles and navigation bar labels were not helpful confirmed this finding. Other significantly low scores indicate that navigation bar labels are not understandable and that page titles do not help users understand the page content. The highest score in the section suggests that some participants found it easy to return to the home page, while others found it difficult.

Table 4: Post-Test Questionnaire-Navigation Results

Survey Item	Mean	Standard Deviation	Min	Max
Overall Navigation	3.0	1.6	1	7
The labels on menu items are understandable.	2.6	1.5	1	6
Menus and embedded links are helpful in navigating the site.	3.6	2.1	1	7
I find it easy navigate this site.	3.3	1.5	2	5
I always know where I am within this site.	2.0	0.8	1	3
No matter where I am in this site, I can easily return to the home page.	4.0	1.9	1	7
The internal directional links are consistent on each page.	2.9	1.9	1	6
Page titles help me understand the content of the page.	2.9	1.7	1	6
Information on this site is easy to find.	3.0	1.2	2	5

Information Quality

Information quality is measured by analyzing the credibility, reliability, accuracy, understandability, and currency of the site and its content, as well as a user's ability to understand the overall purpose of the site and the organization that provides it. Information on the ARC site was favorably received by most participants.

Many of the responses to the interview question that asked participants to state their favorite elements of the site referenced the content. Three participants really liked the biographies and photographs on the "Staff" page. One participant stated,

> The Internet is so formal and you don't know who is working on this for their life work. The staff page is cool because, in this case, there are only a couple of staff members and they give pictures. If you really do have a concern, you know where to find these three people. They look friendly and they look like they'll be able to help if you can't find the information on the Web site.

Three participants mentioned the content when asked what they liked best about the site. They considered the information presented to be clear and in-depth, and at a level that is easy to understand. One participant commented that he was just glad someone is presenting the information. "There is a huge black hole in what we know about pesticides. I like that this site exists and that someone is doing it." Another mentioned that the site "really tries to inform you about things and give you more information."

Only three suggestions for improvement involved the quality of the site. One participant asked for more information about ARC's activities. Two participants mentioned that the site needs to be updated more often. Providing the information in Spanish as well as English was also suggested.

The quality section of the questionnaire, Table 5, received the highest aggregate of the three constructs. Four of the survey items received mean scores above the target

mean set at 4.5. The item asking participants if they trusted the information on the site received the highest score in the questionnaire. Three other items also received mean scores above the target. The high scores indicate that although, as revealed in previous results, participants felt more information about ARC and its mission should be provided, what information was there was credible. Also substantiated is that the information presented on the site is appropriate for ARC's mission. The lowest scores received in this section indicate that the home page is ineffective in introducing the content of the site, the intended audience is not clear, and the information is not current.

Table 5: Post-Test Questionnaire-Quality Results

Survey Item	Mean	Standard Deviation	Min	Max
Overall Quality	3.9	1.9	1	7
This site provides enough information about the mission of the Agricultural Resource Center.	4.6	1.9	1	7
This site provides enough information about the main issues of the Agricultural Resource Center.	4.8	1.7	2	7
This site provides enough information about the services the Agricultural Resource Center offers.	3.3	2.1	1	6
The information on the web site is appropriate for the Agricultural Resource Center's mission.	4.7	1.8	2	7
The site's home page helps me understand what the site is about.	2.9	1.9	1	6
This site's menu helps me understand the content in this site.	3.0	1.5	1	5
I understand for whom this site is intended.	3.0	1.5	1	5
Information on this site is current and up-to-date.	2.8	1.7	1	6
The quantity of information provided in this site is sufficient.	4.8	1.9	2	7
I trust the information presented on this site.	5.1	1.2	4	7

Communicating ARC's Mission and Goals

Three interview questions were used to determine how effective the information on the ARC site is at communicating the organization's mission and goals. These

questions asked users to state, in their own words, based on what they saw and read on the Web site, what they understood ARC's mission, main services, and served populations to be. Summaries and significant comments are provided below, compared to responses to the same questions provided by the Executive Director of ARC. Full responses to these questions are provided in Appendix F.

Of the three questions, participants were most accurate in describing ARC's mission. As stated by Fawn Pattison, Executive Director:

> ARC's mission is to prevent human and environmental exposure to toxic pesticides. We do that through two routes. The first is through outreach and education to the public—teaching people about attainable alternatives and helping them work for change in their communities. The other is a policy arm where we watchdog state government and agencies. We make sure they are acting within the law and push them to enact a better policy. Each effort complements the other (F. Pattison, personal communication, January 15, 2003).

Every participant perceived ARC as an educator or information provider on pesticide concerns and issues. Two participants mentioned that ARC's mission is to enact change in public policy and oversee state agencies. One participant seemed to fully understand ARC's mission stating, "Their mission is to be an advocate for the citizens of North Carolina and the world, and to keep their eye on the Pesticide Board. I see them as being an educational advocate of sustainable practices and as an information provider." Another participant requested more mission-related information on the site, saying, "I don't remember just from browsing what it is that ARC does." Overall, the content on the site seems to give visitors an accurate understanding of ARC's mission, though some members of the participant group overlooked ARC's policy activities.

Participants were generally unable to identify specific target groups served by ARC. Pattison explained ARC's target populations.

The main target groups are people who are affected by the toxics, but we are a

> resource for everyone, particularly residents of North Carolina. Folks who are chemically injured, who live in communities where there are pesticide problems, or just folks who are having a problem around their house and want to know what to do about it. Many environmental problems can affect anyone and everyone. Some populations are much more affected. Farm workers, for example, are much more likely than others to have long term, heavy pesticide exposure and suffer long term health problems. We tend to provide support and technical information to farm worker advocacy organization who will in turn provide the direct support. We support folks who have been chemically injured or have sensitivities because they aren't served by any social service providers or organizations in the state (F. Pattison, personal communication, January 15, 2003).

Most participants concluded that ARC serves the public in general. While accurate, ARC targets specific populations as well. A few participants correctly identified North Carolina residents as the main target group. Few identified farm workers, individuals who have been chemically injured, or individuals who are at risk to pesticide abuse as a target audience. Participants' understanding of ARC's population to be the general public is likely due to the broad, introductory nature of the content, and is certainly an area that requires improvement on the site.

Similar to the responses about ARC's mission, participants perceived ARC's services to be primarily the provision of information. Though their responses were correct, ARC also provides a number of other services, as set forth by Pattison, which are not communicated well, if at all, on the site:

> We provide information about what is going on at the state level—the different issues—to folks who need to know about it. We clarify issues and maintain an independent perspective. If folks are having a problem, we try to get them balanced, thoughtful information to empower them. We help people who are actively being poisoned or suspect that they have been exposed by helping them find information about the chemical, if they know what it is, and what immediate steps they should take, like go take a shower, and other basic emergency steps. If someone has cockroaches in their house we help them come to an understanding of what the problem is, which may just be the dumpster behind their house, a neighbor, or cracks around the sink. We try to help them make informed decisions about a whole range of stuff, pest problems to the farm next door. We also visit groups to talk about whatever pesticide related issue they are interested in. We do workshops on alternatives in the garden, alternatives in the house, or how to make

changes in your school (F. Pattison, personal communication, January 15, 2003). Each of ARC's services forms an integral part of the success or failure of the nonprofit's mission, and as such should be clearly expressed on the site. Although someone is unlikely go to the Web to find assistance during an emergency, if ARC posted information about the provision of this service and/or what to do in such circumstances, users—particularly those knowingly at high risk for exposure—may educate themselves on how to handle such problems before they occur. In addition, local groups interested in furthering public awareness should be able to search the Web site to identify ARC as a source of public speakers.

Recommendations

In some ways, ARC's site is very effective. As evident from the results of the study, the quality of the site, in general, and the quality of the content, specifically, were evaluated highest by participants. Most participants commented on the wealth of valuable information provided. Four participants mentioned that they would like to spend more time on the site or use it as a resource in their own pursuits, and one participant planned to recommend it to another individual.

However, there is room for improvement in usability. It can be gleaned from the study results that ARC's site appeared to be wrought with organization, navigation, and presentation problems. Information and education are the basis for the social change advocated by a mission-driven organization. Participants in this study expected a clearer, stronger message about the mission and goals of ARC. The results also revealed that the design elements detracted from the value of the content. Visitors will not be able to experience or learn from high-quality content if they are unable to find it, if design elements are distracting, or if individual pages do not highlight crucial information. In addition, contrary to its stated aims of generating activism among the public, the ARC site currently represents an informational site rather than an interactive site that induces users to take initiative.

Effective Communication of Organizational Mission and Goals

Following are a number of recommendations for the ARC Web site redesign to develop a more usable, useful site that effectively communicates ARC's mission and goals.

- **Design a home page that is representative of the organization.** ARC's home page should better indicate what the site is about, its purpose, and why visitors should want to move further into the site. An item on the post-test questionnaire that asked participants if they thought the site's home page contributed to their understanding of the site's content received a significantly low score. One participant mentioned that he had no idea what to expect of the site after viewing the home page. Moving the content currently contained on the "About ARC" page to the home page would be logical from the user's perspective, as it introduces the organization and its mission.
- **Include more pictures and graphics on the site.** Study participants frequently commented that they liked the pictures on the site because they were interesting and provided a break from the lengthy content. There were requests for additional pictures, particularly on the home page to entice visitors into the site. Some participants wanted pictures that made a stronger statement and that are more identifiable in subject matter.
- **Develop a logo that represents the organization.** The current graphic on the ARC home page did not convey a meaningful message to many of the participants. Some suggested images of flowers, crops, or other subjects that express a strong message and clearly represent the organization.

- **Create a more attractive, polished design.** None of the participants were impressed by the graphic design of the site and a few even stated they found it dull or sterile. Through more appealing colors, a friendlier font, and additional design elements, the site may be able to grab attention and entice visitors further into the site.
- **Decrease the amount of content on each page and link to secondary pages that provide additional information.** Presenting information on numerous pages will provide several levels of specificity so visitors can target the information they need and prevent users from feeling overwhelmed. Almost every participant commented that the page lengths were too long, and some participants thought the pages provided more information than they would ever read. It would be appropriate for the main page of each section within the site to contain only introductory or summary information, with secondary pages that provide more comprehensive and detailed information for those visitors who are interested.
- **Logically organize and label content within the site**. Information should be clustered in expected ways, with straightforward titles that clearly explain what the page is about. Participants had trouble finding information on the site, either because they did not understand navigation labels and page titles or because the labels and titles did not accurately reflect the content contained on the pages.
- **Organize content on a page to facilitate scanning and quick recognition.** Some participants commented that the red, bold headlines helped them to identify important sections of pages. More headlines, larger spacing, and smaller chunks of text will highlight important information, facilitate scanning and reading, and help visitors to feel comfortable with the amount of data provided on each page. Overall, participants found the pages to be disorganized and difficult to scan quickly.

- **Provide a consistent organizational logo at the top of each internal page that returns visitors to the home page when it is mouse-clicked.** An obvious, linked logo to the home page is a feature common to most Web sites. Visitors to the current ARC site must hunt for the home button because it varies in location on each page.
- **Develop a section containing ARC publications and reports**. Many participants had trouble finding ARC's report *Bitter Rains* because it was contained in the "What's New" section. Decision-makers, members of the media, and other individuals should get quick, straightforward access to ARC's published documents. A section labeled "Publications" would provide easy access as well as publicity.
- **Update the site more frequently.** Every participant complained that the site contained too much information that is out of date. To give visitors the impression that the site and its content are important to the organization (and therefore to the users, as well), ARC should update their Web site more often and remove outdated content. Additionally, including a "last updated" reference on each page will notify users as to how current the information is.
- **Provide annotations for all links on the "Links" page.** The "Links" page was a favorite of many participants, particularly the descriptions that followed many of the Web site links. Participants would have appreciated an annotation to accompany every link provided. The annotations identify why the link is relevant to the ARC site, why an individual may want to visit the site, and what information is contained on the site.
- **Retain the introductory, non-technical content, but add a more social-activist tone to the language.** The site currently feels strictly informational and would be more effective if it also felt influential. Many participants mentioned that they

appreciated that the content was at an introductory level so that novices to the subjects could understand the issues. However, a few participants suggested that the content should better reflect the organization's objective of taking action and working for change.

- **Provide a number of ways for visitors to take action.** Individuals visit advocacy Web sites for information and to find ways that they can affect change in their lives, communities, and beyond. Participants were disappointed that the site offered few suggestions for taking political or personal action. For example, ARC could promote the reduction of pesticide use in households and businesses by offering viable alternatives, or encourage parents of school-age children and teachers to recommend low-toxicity program-implementation to their schools. Other suggestions include providing users the ability to send e-mails directly to government and regulatory offices, e.g., to report pesticide-related problems or to support or protest government policies.
- **Provide more information about ARC's mission, goals, services, and target populations.** Participants identified many of ARC's goals, such as educating and informing the public and enacting policy change. However, goals and services such as supporting victims of pesticide abuse, public speaking, and suggesting pesticide alternatives were not identified by any of the participants because these services are not clearly specified on the site. Explaining its mission is particularly important for ARC because its name—Agricultural Resources Center— is not indicative of the scope of its efforts. Participants perceived ARC's site to focus more on issues of concern to the organization than on services and objectives that may be of greater

interest to the user. If potential supporters cannot understand clearly what ARC does or whom they serve, ARC's resources will not be as effective as they could be.

Effective Web Sites for Nonprofit Advocacy Organizations

As Sehmel (2001) mentioned in her study, there is not enough known about users of advocacy Web site users, what such users expect of advocacy sites, or how organizations can develop their sites to best meet user needs and goals. Though this issue was not a research goal of this study, participant comments have identified some of their expectations and desires of advocacy organizations' Web sites.

- Organize content with varying levels of detail to appeal to individuals with different levels of expertise on the topic.
- Provide a number of ways for visitors to contact the organization and/or receive newsletters or email updates.
- Provide current information about the organization's activities so that visitors can get a sense of the organization's involvements and interests.
- Provide staff biographies and pictures, if appropriate, so visitors can get a sense of who is running the organization.
- Suggest other Web sites where an individual can get additional information on the organization's issues.
- Refrain from setting a tone that is overly emotional, forceful, or radical, as it may intimidate some visitors.

Conclusion

The goal of this study was to determine if the Agricultural Resources Center is effectively communicating its mission and goals through its Web site. This user study achieved its research goals in that it identified a number of strengths and weaknesses in the design of the site, and participant comments and actions provided insight into how visitors perceive the site. Participants' understanding of the mission, services, and served populations of ARC revealed where the site fails in communicating its mission and goals. Results of the study and research recommendations will be useful in improving the site design and communication strategy.

Although this study recruited participants that have characteristics of the ARC site's target population, which might limit how these findings can be generalized to other Web user populations, participant comments and the researcher's recommendations can provide guidance for other nonprofit organizations in developing effective Web sites that support their missions and goals. And, other nonprofit advocacy organizations can learn from the research goals, methods, and results to develop and conduct their own usability study.

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Appendix A: Participant Consent Form

Source: AA-IRB Manual, Sample A
Academic Affairs Institutional Review Board of the University of North Carolina at Chapel Hill

Introduction to the Study:
You are invited to participate in a research study evaluating the use of a Web site maintained by the Agricultural Resource Center (ARC), a non-profit environmental organization. This site functions as a communication medium for ARC's research and education efforts. Ingrid Pohl, a master's degree student at the University of North Carolina at Chapel Hill, is conducting this study, under the supervision of Dr. Barbara Wildemuth.

Purpose:
The purpose of this study is to determine if ARC's mission and goals are communicated on its Web site by evaluating user satisfaction, task completion ability, and navigation efficiency on the ARC Web site. Data gathered from usability study sessions with approximately ten participants will assist the Web site re-designer in making appropriate improvements and changes to the site for future users.

What Will Happen During the Study:
1. This study will occur in one session with four parts.
    - During the first part, you will be asked to complete a background questionnaire containing demographic questions (age, gender, etc,) and questions regarding your current level of Internet use.
    - During the second activity, you will be asked to browse the Web site for up to 20 minutes while speaking aloud your actions, impressions and observations
    - During the third activity, you will be asked to complete a series of tasks using the Web site.
    - During the fourth activity, you will be asked eight questions about the Web site and your impressions of the Web site. You will also be asked to complete a questionnaire regarding your experience with and impressions of the Web site.
2. The usability study session will take place in the Interaction Design Lab using the Internet connection and browser provided.
3. The usability study session will take approximately one hour.
4. The usability study will require you to speak aloud regarding your impressions and your actions.
5. You will be observed by the researcher and audio and video recorded while you use the Web site.

Your Privacy is Important:
- Every effort will be made to protect your privacy.
- Your name will not be used in any of the information obtained from this study or in any of the research reports.

- The audio and video recordings of your participating will be used only for internal purposes and will not be publicly released. They will be destroyed at the end of the study.
- Since efforts will be made to protect your privacy, we ask you to agree that we may use the information obtained from this research study in any way we think is best for publication or education.

Risks and Discomforts:
We are unaware of any personal risk or discomfort you will have from participating in this study.

Your Rights:
- You decide on your own whether or not you want to be in this study.
- If you decide to be in the study, you will have the right to stop being in the study at any time.

Questions or Concerns
If you have questions or concerns about participating in this study, please call Ingrid Pohl at (919) 929-6889 or her advisor, Dr. Barbara Wildemuth at (919) 962-8072.

Institutional Review Board Approval:
The Academic Affairs Institutional Review Board (AA-IRB) of the University of North Carolina at Chapel Hill has approved this study. You may contact the UNC-CH Academic Affairs Institutional Review Board at aa-irb-chair@unc.edu at any time during this study if you have questions or concerns about your rights as a research participant:

I have had the chance to ask any questions I have about this study, and they have been answered for me. I have read the information in this consent form, and I agree to be in the study. There are two copies of this form. I will keep one copy and return the other to the investigator.

_____ _____

(Signature of Participant) (Date)

Appendix B: Introduction Script

Introduction to the Study

First, I'd like to thank you for participating in the study. I'm going to read this introductory script to you now so that I can provide you with the exact instructions that I provide to everyone else and to ensure I don't forget anything of importance.

The goal of this project is to evaluate the interface, navigation, and information quality of the current ARC site. We want to explore the site to identify features that could be improved. We're also interested in finding out about features that are particularly helpful. The results of the evaluation will be summarized and reported in my Masters Paper. They will also be used to help redesign the ARC site.

During the study you will be asked to browse the ARC site for up to 20 minutes. After the browse segment you will be asked to use the site to complete 5 information-finding tasks. Next, I will ask you 8 interview questions about your experience browsing and searching the site. And finally, you will complete a questionnaire about your overall satisfaction with the site.

I'd like you to think aloud while you perform the browse and task activities. By this I mean that you should verbalize what you are doing and why you are doing it. I'd also like to hear any confusion, frustration, or delight you have with the site or different features. I may prompt you for your thoughts from time to time.

Throughout the entire study, please remember that it is the ARC site, not you, that is being evaluated. I have no connection with the current design, so don't feel any need to spare my feelings. Don't say what you think I'd like to hear; I'd rather know exactly what you think. And because your confidentiality will be protected no one will be able to connect your statements to you.

I will be videotaping and audio recording our session. But I assure you that all tapes produced during this session will be destroyed after I've written my paper. And your identity will be protected in any study results.

I need you to review and sign this statement of informed consent. Please let me know if you have any questions with the study.

Introduction to the Browse Activity

For the browse activity, try to browse the site as you normally would. Try to start forming some opinions about the site as you browse. I'll stop you when it has been 20 minutes but if you complete your independent exploration before 20 minutes please let me know and we'll proceed with the task activity. Again, I'd like you to think aloud while you are browsing. Any questions before we begin?

Introduction to the Information Finding Task Activity

All of the information these tasks ask for can be found on the ARC site. You should feel free to work on each task at a pace that is normal and comfortable for you. Try not to pay more or less attention to the task than you normally would. If any task takes you more than 10 minutes we'll move on to the next task. Likewise, if you are ready to move onto the next task without completing the current one that is fine. After you complete each task please return to the home page we're at now. As you work on each task, I'd like you to imagine that it is something you or someone close to you needs to know. Again, please speak aloud your thoughts, opinions, decisions and why you are making those decisions. Any questions before we begin?

Appendix C: Demographic and Internet Background Questionnaire and Results

Sources:

- The Questionnaire for User Interaction Satisfaction 7.0, Human-Computer Interaction Lab, University of Maryland, College Park
- GVU's WWW User Survey www.gvu.gatech.edu/user_surveys

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Instructions: Please answer the following 12 questions. Your responses will be used to describe the background of the participant group as a whole. Your responses will not be associated with you in any way. Please ask the researcher if you have any questions.

1. Age

   33 Mean

2. Gender

   3 Male
   5 Female

3. What is your primary language (i.e., the one you speak most of the time)?

   8 English
   ___ Spanish
   ___ Other_____

4. Please indicate the highest level of education completed.

   ___ Grammar School
   ___ High School or equivalent
   ___ Vocational/Technical School (2 year)
   1 Some College
   4 College Graduate (4 year)
   3 Master's Degree (MS)
   ___ Doctoral Degree (PhD)
   ___ Professional Degree (MD, JD, etc.)
   ___ Other_____

5. Which of the following best describes the area you live in?

   ___ Urban
   4 Suburban
   4 Rural

6. How comfortable do you feel using computers, in general?

_4_ Very comfortable
_3_ Somewhat comfortable
_1_ Neither comfortable nor uncomfortable
___ Somewhat uncomfortable
___ Very uncomfortable

7. How comfortable do you feel using the Internet?

_4_ Very comfortable
_3_ Somewhat comfortable
_1_ Neither comfortable nor uncomfortable
___ Somewhat uncomfortable
___ Very uncomfortable

8. How long have you been using the Internet (including using email, gopher, ftp, etc.)?

_1_ Less than 6 months
___ 6 to 12 months
_2_ 1 to 3 years
_1_ 4 to 6 years
_4_ 7 years or more

9. Where do you most often access the Internet?

_5_ Home (including a home office)
_1_ Work
_2_ School
___ Public Terminal (e.g. library, cybercafe)
___ Other Places

10. On the average, how much time do you spend per week on computers?

___ less than one hour
_2_ one to less than 4 hours
_4_ 4 to less than 10 hours
_2_ over 10 hours

11. How often do you visit the Agricultural Resources Center Web site?

_7_ Never
_1_ Occasionally
___ Monthly
___ Weekly
___ Daily

12. For what reasons have you visited the Agricultural Resources Center Web site? If you answered “Never” to question 11, please leave this question blank.

- *Visited once to see what it had on it. Just to browse*

Appendix D: Structured Interview Questions

1. How did you feel about your performance completing the tasks overall?
2. What elements of completing the tasks were particularly easy or difficult?
3. What did you like best about the site?
4. What did you like least about the site?
5. What suggestions do you have to improve the site?
6. What is the Agricultural Resources Center's mission?
7. What are the Agricultural Resources Center's main services?
8. Who does the Agricultural Resources Center serve?

Appendix E: Post-Test Questionnaire

Instructions for 1-5: Please circle the numbers that most appropriately reflect your impressions about using this computer system. NA=Not Applicable. If you have any questions, please ask the researcher.

1.	Overall reaction to the Web site:	terrible						wonderful	
		1	2	3	4	5	6	7	NA
2.	Overall reaction to the Web site:	frustrating						satisfying	
		1	2	3	4	5	6	7	NA
3.	Overall reaction to the Web site:	dull						stimulating	
		1	2	3	4	5	6	7	NA
4.	Overall reaction to the Web site:	difficult						easy	
		1	2	3	4	5	6	7	NA
5.	Overall reaction to the Web site:	rigid						flexible	
		1	2	3	4	5	6	7	NA

Instructions for 6-30: For the following questions, please respond to the statements on a scale of 1 (Strongly Disagree) to 7 (Strongly Agree).

		Strongly Disagree		**Neutral**				**Strongly Agree**	
6.	The logo on the site's home page is attractive.	1	2	3	4	5	6	7	NA
7.	I find the text font and size easy to read.	1	2	3	4	5	6	7	NA
8.	Colors used in the Web site are pleasant.	1	2	3	4	5	6	7	NA
9.	The amount of information displayed on a page is just right.	1	2	3	4	5	6	7	NA

		Strongly Disagree						Strongly Agree	
10.	Graphics, icons, and photos contribute to my understanding of the site's content.	1	2	3	4	5	6	7	NA
11.	The screen layout of this site is attractive.	1	2	3	4	5	6	7	NA
12.	This site organized its information in a way that is easy for me to understand.	1	2	3	4	5	6	7	NA
13.	The labels on menu items are understandable.	1	2	3	4	5	6	7	NA
14.	Menus and embedded links are helpful in navigating the site.	1	2	3	4	5	6	7	NA
15.	I find it easy navigate this site.	1	2	3	4	5	6	7	NA
16.	I always know where I am within this site.	1	2	3	4	5	6	7	NA
17.	No matter where I am in this site, I can easily return to the home page.	1	2	3	4	5	6	7	NA
18.	The internal directional links are placed consistently on each page.	1	2	3	4	5	6	7	NA
19.	Page titles help me understand the content of the page.	1	2	3	4	5	6	7	NA
20.	Information on this site is easy to find.	1	2	3	4	5	6	7	NA
21.	This site provides enough information about the mission of the Agricultural Resource Center.	1	2	3	4	5	6	7	NA

		Strongly Disagree						**Strongly Agree**	
22.	This site provides enough information about the main issues of the Agricultural Resource Center.	1	2	3	4	5	6	7	NA
23.	This site provides enough information about the services the Agricultural Resource Center offers.	1	2	3	4	5	6	7	NA
24.	The information on the web site is appropriate for the Agricultural Resource Center's mission.	1	2	3	4	5	6	7	NA
25.	The site's home page helps me understand what the site is about.	1	2	3	4	5	6	7	NA
26.	This site's menu helps me understand the content in this site.	1	2	3	4	5	6	7	NA
27.	I understand for whom this site is intended.	1	2	3	4	5	6	7	NA
28.	Information on this site is current and up-to-date.	1	2	3	4	5	6	7	NA
29.	The quantity of information provided in this site is sufficient.	1	2	3	4	5	6	7	NA
30.	I trust the information presented on this site.	1	2	3	4	5	6	7	NA

Appendix F: Participant Responses to Structured Interview Questions 6–8

Question 6: What is the Agricultural Resources Center's mission?

- Their mission is to be an advocate for the citizens of North Carolina and the world, and to keep their eye on the Pesticide Board. I see them as being an educational advocate of sustainable practices and as an information provider.

- I don't know what that is, actually. I said that, what is their mission? I don't remember just from browsing what it is that ARC does, what they did.

- I think the mission is to educate people about chemicals and pesticides that pollute our environment. I think it is predominantly an information-giving organization.

- The Agricultural Resources Center's mission is to promote information about the harms of pesticides; what people can do to reduce their exposure.

- It looks like educating people about pesticide and herbicide use and what you can do to prevent it from being sprayed around you, or who you need to contact to prevent it from being sprayed in other areas. And basically just educating people about what can happen, what the side effects are.

- It is to inform people about what is currently going on, through news articles and information they provided. They want you to go to other places to search out information. They want to interest you, make you more aware, make you understand the consequences about pesticide use and herbicides. It is kind of just a helpful web site for people interested in the subject. I would go to it if I needed some links, or if I was starting a project about it. It has the basic information, and tells you where you can find more information. It has some questions and answers.

- I think it is to educate the public on the dangers of pesticides. In fact, as soon as you go to the site, I don't even think it says Agricultural Resources Center at the top. It says Pesticide Information something. So right away you get a sense that this is a group concerned about pesticide use, pointing out how dangerous it is. I don't know if this is obvious to everyone, but to me it seemed clear, maybe I'm wrong, but my guess is that it is a grassroots kind of organization. Government is often careful to be too negative or too positive about something. This seems not as afraid to make statements that I fully agree with, but I can't imagine that this is EPA sponsored. They can't say such strong things because they get themselves in trouble, because the public will ask why they even allow any of this out there. I did get the sense that its a grassroots organization trying to educate about how dangerous pesticides can be.

- Basically to educate the public about pesticide use, widespread use dangers, and all the unknowns surrounding it. It is interesting that ARC and the Pesticide Education Project seem to be the same thing. Maybe this is just their focus at the moment? It is confusing.

Question 7: What are the Agricultural Resources Center's main services?

- Information and lobbying to the North Carolina Pesticide Board. For the public good.

- Well I'm going to go back to it because I don't have a firm grip on all of the statistics. I'd like my husband to read it just so he gets fully informed. It is better coming from this than from me. Second, I really like the links. Personally, those are its two services. Those are sub-services of the main mission to educate people about pesticides.

- Providing information and I guess they invite you to do what you can. I guess their service is to give encouragement on working on this problem, to show that there are other people doing things. That it is a hazard and not something to just shrug off.

- Distributing information about pesticides. What their lobby efforts are and who you can contact to help them lobby.

- I would say I'm not really sure what they do beyond writing a web site, which is kind of a dubious honor I guess.

- It seems like they are a public advocate, legal advocate. And information providers.

- I don't know what their main services are, other than education.

- Advocacy, information dissemination, and butting heads with the Pesticide Board.

Question 8: Whom does the Agricultural Resources Center serve?

- Hopefully anyone who is interested in pesticides or who is using pesticides. Farmers, who hopefully may be aware of the dangers. And the public in general.

- I didn't really get a sense of that. It seemed broad information for the public, for anybody. For anybody who was interested. It wasn't for children or adults. Because of the terminology, it seems almost studious. It seems for well-educated people, for people conducting research. Not for layman or anything.

- The public.

- It seems like they just serve anybody in the area. I guess that some of the information could be out of the area but a lot of it seems to be linked. So people in the state who are interested in finding out more about pesticides in the areas around them. And it seems to me that they are looking to serve homeowners and people who are worried about their property or the area around them.
- I would say, contrary to expectations for them being the Agricultural Resources Center, it seems to be just the people in general. They had information for anyone

who has power lines running across their property. I didn't get any impression that they specifically focused on farmers.

- Anyone doing a project on pesticide use. Anyone who is interested in reducing their pesticide use. And anyone who is just kind of concerned about what is being sprayed around them. It doesn't look like too much of an academic site where you would go there and find really in depth technical information about pesticides. And it is definitely not a company site, like a power company, where you would go and try to decide their policies.

- I think they serve residents in communities that are scared about something or concerned for children's safety. Or a student that is doing a project. Really anybody that has bothered to look this up on the Internet, out of concern, interest, or curiosity.

- That is a good question. If someone is looking into the danger of pesticides, like if a mother wants to know about something or reads something in the paper about pesticides or arsenic treated wood, they could do a google search and I'm assuming that this site would come up. They can inform ordinary citizens. I think it mainly serves people who are already interested in making a difference and have some base knowledge. I would assume it is for people who already know there are some dangers to pesticides. Activist-minded people.