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Digital library creators and users : evaluating intended users versus actual users

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**DIGITAL LIBRARY CREATORS AND USERS:
EVALUATING INTENDED USERS
VERSUS ACTUAL USERS**

A Thesis

Presented to

The Faculty of the Graduate School of

Library and Information Science

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Library and Information Science

By

Debra LM Dvornik

May 2004

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ABSTRACT

DIGITAL LIBRARY CREATORS AND USERS: EVALUATING INTENDED USERS VERSUS ACTUAL USERS

By

Debra LM Dvornik

The creation and use of digital libraries is explored in this case study by using four digital libraries. Current literature emphasizes the importance of end-user research in digital library development. However, little research is being conducted to discover who is actually using digital libraries. This thesis evaluates who the intended users are versus who the actual users are. The four digital libraries chosen for this study are: Digital Library for Earth System Education (DLESE), Project Gutenberg (PG), CeltDigital (CD), New Zealand Digital Library (NZDL) Niupepa Maori Newspaper Collection (NMN). An administrative questionnaire is given to the designers and administrators of the digital library in order to determine their mission, goals and who their target user population is. A web-based survey is implemented in order to discover who is actually using the digital library and their satisfaction level. A comparison is then made to determine if the actual users are the creators' intended user group.

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Chapter 1: Introduction

Throughout their history, the purpose and function of libraries have centered on the principles of information collection, organization, provision, and preservation. Libraries must continually identify and seek to understand the different and evolving needs of user populations in order to keep up with changing times and consistently provide new services. Today, these services encompass an ever-changing and increasing number of technological advancements, including the development of digital libraries. Even though research and development activities of digital library projects have become widespread and of interest to many communities (Kochtanek, 1999), minimal attention is being given to understanding the purpose and use of digital libraries (Theng, 2000). Building good digital libraries requires an understanding of who will use them, what their purpose will be, the work context in which they will be used, and what is technically feasible to build. Improvements in technology, along with the current drive toward a national information infrastructure, lead to a wide range of possibilities regarding digital collections, services, and how users seek information (Bishop, 1995).

Statement of Problem

User-centered research is just beginning to emerge, which can help designers and policy makers formulate appropriate goals for digital collections and services. The views, needs, and experiences of information creators and users can be explored and understood using this type of research. Problems in designing digital libraries are often the result of the large amounts of information involved, without a clear understanding of what potential users wish to do with the digital library system (Bryan-Kinns, 2000).

Usability testing is invaluable in determining how the user will interact with the digital library. The results of such studies can help designers and policy makers not only formulate appropriate goals, but also develop a more complete understanding of costs and benefits, and then design and allocate resources to technologies and programs which will help to best achieve their goals (Bishop, 1995).

Importance of Study

Digital libraries began as a means for scholars and scientists to share information (Arms, 2000). The creation of the World Wide Web made it possible to link information on the Internet to computers all over the world. The cooperative sharing of information became the basis for the development of digital libraries. They support distinct organizations, serve unique user groups, emphasize a variety of different types of collections, and promote specialized institutional objectives. As the desires and needs of actual users are identified, the digital library environment becomes a networked, electronic learning space that supports different views and uses, changing as technology continues to develop, and supporting educational and cultural advancement (Greenstein, 2000). It is proposed that an understanding of why and how actual users utilize a digital library will directly influence its design and purpose. This case study uses four digital libraries to evaluate the connection between intended and actual users of a digital library.

Chapter 2: Literature Review

Current literature emphasizes end-user research, which contributes to the creation and design of digital libraries. Understanding users' information-seeking behavior is instrumental to developing successful and effective digital libraries. To date, little research has been done to discover actual users of digital library sites (Theng, 2000). In this study, the purpose and goals of developing digital libraries will be explored in order to understand intended users. In addition, the wide range of existing user studies, from a variety of settings, will contribute to the development of a Web-based survey to evaluate actual users. The resulting evaluation will be based on intended users versus actual users of digital libraries.

Digital Library Purpose

Since digital libraries are a fairly new concept, there are currently no identified standards or definitions, nor commonly held ideas of a digital library's purpose (Borgman, 1999). Therefore, reviewing the existing research literature to gain understanding of the most current concepts, specifically regarding definitions and purpose, will help develop the foundation for this user study: What is the purpose of digital libraries, how are they intended to be used, and by whom? Background material on digital libraries, including explanations of terminology and concepts, can be found in several books (Arms, 2000; Borgman, 2000; Graubard & LeClerc, 1999; Lesk, 1997; and Rubin, 2000).

It is difficult to do research on digital libraries unless there is an attempt to identify their purpose. Levy (2000) reviewed the problem of purpose in American public

libraries as well as American academic/research libraries before turning to digital libraries. He believes that by looking at the evolving purpose of traditional libraries a parallel can be made in regards to digital libraries. When public libraries were first established their mission was to serve as a new kind of educational institution -- to assist the public in advancing their education. As the patrons of public libraries became interested in reading popular literature, the mission evolved to reflect the changing interests and needs of the public. The academic library began as a means of collecting and organizing information that its faculty and students would need. With the cost of journal subscriptions increasing, new concepts were explored as to how an academic library could continue to collect, organize, and provide access to scholarly information while being able to afford these services. The introduction of digital libraries brings about new challenges in providing access to information in the rapidly changing electronic environment. Levy believes that developing a digital library purpose will contribute to an expanded and focused research agenda.

McCray and Gallagher (2001) discussed ten principles that contribute to the design, implementation, and maintenance of digital libraries. These include: expecting change, knowing your content, involving the right people, designing usable systems, ensuring open access, being aware of data rights, automating whenever possible, adopting and adhering to standards, ensuring quality, and being concerned about persistence. By being aware of basic principles, the creators of digital libraries are taking seriously the issues of content, open access to information, and the needs of future users.

Digital technology is changing the way information is being provided and accessed. Marcum (1997) discussed how the evolving electronic environment is affecting research libraries and how they are being maintained. There is a need for the research community to develop common standards and best practices.

Kochtanek and Hein (1999) reported a Delphi study undertaken at the School of Information Science and Learning Technologies in the College of Education, University of Missouri. The study was conducted as part of a fall 1997 web-based course entitled Library Information Systems, to better understand the field of digital libraries. Identified individual experts in digital libraries were polled, using the Delphi Technique, to reach a consensus on key questions about digital libraries. They found that digital library development appears to parallel modern library development. Digital libraries are collaborative, involving an array of experts needed to collect, organize, and deliver digital information. Digital libraries have the potential to transform the way information services are provided, and the role of the librarian in the digital environment is an extension of what librarians have been doing for years. Digital libraries will influence the organizational structure of modern libraries, as well as the human resources connected with those organizations. The relationship between those involved in providing and those using information will be impacted by the continuing development of digital libraries. New ideas will result from the challenges and opportunities faced by their evolution. Research and development of digital libraries will continue to draw experts from varying backgrounds to advance future efforts.

Research on the purpose and use of digital libraries can involve small user studies or the comparison of data from different sets of studies. Small user studies often involve questionnaires that solicit input from real users. Several small user studies can be conducted, and the results can then be compared. This type of research is also useful in identifying areas in which further research is needed. Theng (2000), along with Mohd-Nasir and Thimbleby (2000), demonstrated that it is possible to gain understanding of the purpose of digital libraries and their use in relation to design issues by conducting several small user studies and comparing data from these different sets of studies. The information gleaned from these studies supports the development of digital libraries and their different uses. However, future work will be needed to validate this method of research as a successful tool and to test the reliability of its results with different types of digital libraries.

Digital libraries are being developed for different purposes and for different uses, but are most often available for general use. Users have various needs, abilities, and interests, and end-user studies have been influential in guiding the design of digital libraries to meet their needs. Blandford, Stelmaszewska, and Bryan-Kinns (2002) studied multiple digital libraries in the context of a single user session. Their research method of taped video observation along with think-aloud commentary was used to gather data, and this was followed by an interview. Difficulties for users were identified in the areas of accessibility and working across boundaries. Often sites were unpredictable to users, dependent on site licenses that permitted partial access to resources, or temporary access, making it hard to tell what could or could not be achieved by the user.

Usability Studies

The effort of six digital library projects to communicate with each other about user research was discussed by Bishop (1995). The Digital Library Initiative (DLI) Project, funded by the National Science Foundation (NSF), the Advanced Research Projects Agency (ARPA), and the National Aeronautics and Space Administration (NASA), has produced many key usability findings and introduced theoretical and methodological challenges on which Bishop's study draws. The Allerton Institute at the University of Illinois provided a methodology forum on digital libraries in the fall of 1994. As individuals and groups of all kinds begin using these networked information tools and creating various types of digital libraries, research and development surrounding digital libraries is flourishing. A DLI User Research Working Group has been formed to explore new methods for tracking virtual users, making sense of quantitative and qualitative sources, and dealing with a large and heterogeneous user population. Published and unpublished papers of project members are referenced by Bishop for further exploration.

Among the current research in this area, Bryan-Kinn and Blandford (2000) looked at studies of what potential users might be doing in a digital environment, including how people are likely to use digital libraries and what are possible new designs of digital library interfaces. Studies were noted that consider the way users of different social, economic, or academic background use digital libraries. Techniques of evaluating users are identified which include: diary, questionnaire, observation, usability testing, focus groups, interviews, and logs. Other research is being conducted on usability of specific

interfaces, in particular, searching and browsing behavior. However, little research is being done on the nature of tasks users with access to digital libraries try to accomplish, or comparisons of different approaches to these tasks, or what people require of digital libraries and how they might wish to use them. Future studies are needed to address these issues, drawing from methods and techniques of the studies done on conventional library usage.

Studying user behavior over a period of time will be useful in creating a functional and effective digital library system. France, Nowell, Fox, Saad, and Zhao (2000) followed the transition of MARIAN, an innovative search system suitable for digital libraries, from an abstract concept to a practical and usable system. Patterns of use were discussed by these researchers as a means of guiding future system evolution. Here again, intended users were studied in order to discover a wide range of users' abilities and sophistication, with the hope of uncovering problems with the system based on how it would actually be used. As with traditional libraries, digital libraries respond to needs in user communities, and they will wither or thrive depending on whether they serve or fail to serve their user population.

Usability testing has long been a practical tool for library evaluation; however, in most cases, it has not yet been adapted to the electronic environment. One exception is studies about the use of electronic card catalogs or library Web sites that evaluate user behavior and its affects on design issues. For example, Battleson, Booth, and Weintrop (2001) focused on usability testing as a tool for evaluating effectiveness and ease of use of academic library Web sites.

The user survey has for many years been a part of library tradition in identifying the patron's needs. Talbot, Lowell, and Martin (1998) discussed user survey methodology, success and failure of conducting user surveys, and the actual survey process. Their article asserts that the importance of usability testing is that it helps libraries evaluate and meet constantly changing user needs.

Research on potential and actual users was reported by Bishop (2000) who discussed a study conducted by the Social Science Team of the federally funded Digital Libraries Initiative (DLI) project at the University of Illinois. Techniques used were focus groups, interviews and observations, usability testing, user registration and transaction logging, and user surveys. A key practical and methodological issue in digital library design is how to set up the infrastructure. This article introduces the idea of digital libraries as part of an assemblage of artifacts, knowledge, practice, and community that involves workplace-based compromise by library staff, system designers, and patrons. A growing understanding of the socio-technical nature of the digital library infrastructure and assemblage presents new ways of dealing with the problems that face digital library users. A full range of user problems were discovered in this study. In fact, more user-related problems were uncovered in this study than in previous research. It seems that problems were overlooked, that users do not know what they do not know and do not understand what they do not understand, and that in many cases they do not talk about it in a survey. Using a variety of techniques allowed these researchers to develop more complete explanations on usability.

Different users may interact with one particular Web site in various ways, performing various tasks, and in various contexts. User interfaces need to be able to adapt to these different user requirements. Paterno and Mancini (2000) discussed the levels of support that can be given to each user during navigation of a museum Web site. The premise is that little attention has been paid to the problem of different types of users who access the same information for different purposes. It is important that user interfaces are able to adapt to each set of goals. The adaptation of hypermedia systems to individual users is discussed. Knowledge of how users use a system will affect the design of the site.

The nature of access to information resources and the relationship of access to use was discussed by Bishop (1997). This study draws on work associated with the Digital Libraries Initiative (DLI) project at the University of Illinois which ran between 1994 and 1998. DeLiver is a testbed collection of journal articles mounted on the Web, with full text of recent articles relating to engineering, computer science, and physics that uses user authentication and registration processes. The project has officially ended, but the testbed is still available for campus users. Throughout the project, research on user needs and behavior has been incorporated. The issues confronted in this study are likely to arise in the implementation stage of any electronic-library or electronic-publishing system that is based on user authentication and registration processes. Insights were obtained from various user studies, needs assessment interviews, usability tests, and transaction logs, and helped identify barriers to access as well as develop expectations related to use. Combining the expertise of system designers, user, librarians, and social

scientists is necessary for identifying and addressing access issues and interpreting usage data. The development of appropriate metrics associated with digital library access and use will aid in the documentation and understanding of these use issues. Collecting data and pursuing studies that can help interpret data is critical in exploring the wide variation of findings related to digital library access and use.

Online Survey Studies

Cherry and Duff (2002) presented a Web-based survey study of a digital library project at the University of Toronto, *Early Canadiana Online (ECO)*. This was a follow-up to a study that had been done in the previous year. The purpose of the study was to discover any changes in the use of this digital library and its purposes over time, including whether this site could be used in teaching and research. The results of this survey paralleled the first survey. It was discovered that the digital library had the potential to attract new users and increase appreciation of the material presented. The importance of this study was that research should take into account the types of tasks carried out, the cultures of the users, and the different user groups. Digital libraries of historical material have the potential to attract new user groups who will use the collections in unexpected ways.

Xie and Wolfram (2002) investigated Wisconsin's BadgerLink, an example of an emerging state digital library. Their hope was to better understand modes of interaction among different participants and how these interactions impact the organizational usability. This study explored who the users of a state digital library are and how they use it, what contributing factors influence organizational usability, and the relationship

between the state digital library and physical libraries. Log usage, library surveys, and end-user surveys were used for collecting data. The researchers found that two-thirds of the state digital library users accessed it from home; however, the most frequent users also accessed it from a library. The majority of respondents to the study were informed about the state digital library by means of a physical library. Resources accessed were for education and research purposes rather than informal browsing, and availability of information through a digital library did not negatively impact use of a physical library.

The challenge today is how to conduct survey studies efficiently and effectively while retaining validity. The Internet, as a powerful means of information access and communication, offers new opportunities to researchers, and web-based user survey is an important but currently underdeveloped method of gathering information on system usage and learning about diverse expectations and needs of the digital library user population. However, little research has been done on the validity and appropriateness of this approach. Zhang (1999) presented a case study to better understand the use of the Internet for survey research, including possible solutions to problems, and the potential the Internet can offer to survey researchers. Evidence is provided that web-based questionnaires have great potential. Zhang also suggested ways in which web-based surveys can be designed to create user-centered transaction logs, use and user analysis, and system evaluation. However, she points out that in order to reduce biased returns, researchers need to provide alternative ways to distribute surveys and receive responses.

The Internet cannot serve as the only means of collecting data if researchers need representative returns from a sample. This includes studies where potential respondents

are Internet users. Internet-based surveys are still evolving, and their full potential is yet to be realized. One of the challenges is in presenting and interpreting the survey results, including representativeness, validity, and response rate. Another challenge is machine dependency such as influence of software and hardware, network traffic, etc. The biggest challenge seems to be the lack of survey research guidelines for conducting studies using this new approach and for interpreting the resulting research findings.

The use of web surveys seems to have caught the survey methodology community by surprise. The development of web survey procedures has come mostly from computer programmers, with little or no training in survey methodology. Dillman and Bowker (2001) looked at the need for survey methodologists to bring their knowledge of causes and consequences to the development of web surveys, particularly in the area of sources of survey error, challenges in preventing such error, principles for web survey design in context of these errors, and understanding and improving ability to conduct scientifically valid web surveys. It is necessary to give attention to four types of survey errors: sampling, coverage, measurement, and non-response. New research is needed to identify how web-based surveys can achieve their purpose as an effective means of conducting sample surveys, thus determining whether web surveys can be relied on as a viable research method.

A recurring theme in online survey articles is the fact that little scholarly research is being done on Internet-based surveys as a new research methodology. Smith (1997) discussed the contrast between e-mail and web-based survey techniques used in the ongoing study of web surveying methods. The most critical problem with Internet-based

research is the seeming impossibility of random sampling, making it possible to only tentatively generalize to a very specific population. However, random sampling will become less and less of an issue as more sophisticated means of tracking users are developed, and more knowledge regarding user demographics is discovered. As the knowledge about well-studied segments of overall populations increases, probability sampling will become less and less an issue. A major challenge that remains is the inability to determine response rate.

The different types of Web-based surveys and the issues of validity, error, and non-response in this type of survey were discussed by Gunn (2003). Skills required to produce a Web-based survey are different than those required to conduct other types of surveys. Because of the technology involved, developing Web surveys has come from people with a technology background rather than survey methodology professionals. Problems with Web page design and computer coding can have a significant influence in Web-based surveys. Advantages in Web surveys include: faster response rate, easier to send reminders to participants, easier to process data, and dynamic error checking capability. Concerns of Web surveys include: questionnaires that look different on different browsers, respondents that have different levels of computer expertise, data security, and random sampling. Research exploring the concerns about surveys on the Web is beginning to improve the design and effectiveness of the Web-based survey.

Disadvantages of Internet-based polls are related to the lack of research done so far in this area. Cilesiz and Ferdig (2003) discussed the need for more research in order to utilize the advantages of the Internet, while reducing disadvantages. As the Internet is

a relatively new medium for collecting data, it is important to discover if this particular means of data collection makes a difference in the results obtained. The question is whether participants respond differently to web-based surveys than to other forms of surveys. Results of this study show that people tend to participate and share their opinions in Internet-based polls, and they are therefore effective and should be used where they are convenient and advantageous.

Cherry and Duff (1999) discussed their method and technique of conducting a web-based survey. They used a web-based questionnaire employing Perseus Survey Solutions software to design and administer the survey. The information gleaned from their web-based survey offers possible new directions for their digital library to take. Their findings suggest that digital library research needs to consider the types of tasks carried out, as well as the culture of different user groups. They argued that digital libraries have the potential to attract new user groups who will use the collection in unexpected ways.

Ongoing Research

Some of the most valuable user and usability research can be found on the Web sites of a number of universities and research institutions. Some of the most current research can be found at the following sites:

- Digital Libraries – Phase 2 at <http://www.nsf.gov/pubs/1998/nsf9863/nsf9863.htm>
- Digital Library Federation at <http://www.diglib.org/>
- University of Maryland College of Information Studies at <http://www.clis.umd.edu/research/projects/dlrg/>

- Projects of the University of California Berkeley Library SunSITE at <http://sunsite.berkeley.edu/R+D/ucblibrary.html>
- Research Institute of Digital Libraries at <http://sunsite.berkeley.edu/R+D/ucblibrary.html>
- NCSU Library Usability Research Laboratory at http://www.lib.ncsu.edu/dli/about_usability_lab.html
- The Internet Engineering Task Force (IETF) at <http://www.ietf.org/>
- Loughborough University Information Science Research Group at <http://www.ietf.org/>

Summary

The current research on users and usability studies particularly emphasizes the importance of understanding who the users are going to be when considering the design and creation of digital libraries. The consensus of research being done is that all aspects of user studies should be incorporated into the development process to ensure that varied needs and skills of possible and potential users are taken into consideration. The design of digital libraries should directly reflect the purpose and goals of meeting the needs of users. However, research has yet to identify how the purposes of digital libraries can be linked to the types of user groups who will actually use them. Thus, by exploring the intended users and the actual users of a small group of representative digital libraries, it is possible to study the extent of influence the actual users will have on the growth and development of the digital library.

Chapter 3: Methodology

Design

Choice of digital libraries. This is a case study, using four different, distinct digital libraries, for the purpose of analyzing their intended users and their actual users, using an administrative questionnaire and a user online survey. The original plan was to use the California Digital Library (CDL) as a single case study, but the timing of this user study did not correspond with CDL's interests. After searching for a variety of different types of digital libraries and making initial contacts and responses, the following digital libraries were chosen for investigation: Digital Library of Earth System Education (DLESE), Project Gutenberg (PG), CeltDigital (CD), and New Zealand Digital Library (NZDL) Niupepa Maori Newspapers (NMN).

The first step taken in the present study was to obtain permission from these digital libraries to use their projects. Contact was made with key administrators, and authorization was obtained to use their sites as the subjects of this study. Once permission was granted, a correspondence began with the administrator involved with the creation and development of each of the digital libraries, specifically, Lynne Davis of DLESE, Michael Hart of PG, Lara Lasner of CD, and Te Taka Neegan of NMN.

The administrative questionnaire. Secondly, each administrative representative agreed to complete the administrator questionnaire (Appendix A, Administrator Questionnaire). The purpose of the questionnaire was to obtain information regarding the digital library creation and development process in regards to the intended user population. Information gathered from the questionnaire included: the administrator's

opinion and attitude regarding the digital library creation and development, goals of the digital library as it was created, possible change of focus during the development process, the involvement of users in the digital library creation and development, any user evaluations the digital library utilized, and unresolved issues to be considered in the future development of the digital library.

The user survey. The third step was to obtain permission to attach a survey to the chosen digital libraries for users to respond to. Current research centers on identifying the intended user population, and subsequently conducting a user study on a random sample of the identified user population. This study used a web-based survey to identify the actual users of the digital library, including who they are, how they found the site, and why they are using the site (Appendix B, User On-Line Survey). The goal was to obtain valid and reliable information on the actual users of these digital libraries. Users were asked to rank the sites and comment on the effectiveness of each in terms of suitability of materials and services, how the collection matches the users' needs, the digital library system's efficiency, how information obtained from the site is utilized by actual users, and the level of satisfaction (or dissatisfaction) in using the site. Demographic data about the user population in terms of age, educational level, and occupation were also collected.

Posting the survey. The survey was to be available on the web for one month. Due to complications in getting the surveys posted and obtaining results, the time frame was adjusted for each digital library as decisions were made regarding linking the surveys. Exactly how the survey was to be linked to a digital library site was determined in consultation with each administrator. Theoretically, there are numerous different ways

of posting the user survey. For instance, one possibility is a pop-up, another is routing through pointer link, and still another is email. An ideal solution is to obtain user identification and contact information and then distribute the survey questionnaire to a randomly selected group. A valid possibility is to have a web site built for the questionnaire, and then a link can be included in the digital library site to direct users to it. However, there are multifold difficulties in actual implementation. One is the difficulty in establishing user identity in the web environment and the privacy issue; another is the administrator's reluctance to interrupt their digital library site. With consideration of these difficulties, the actual method of posting the survey questionnaire was determined in consultation with the system administrators of each digital library, with maximum flexibility for increased participation.

Implementation

Pre-test. Questions of the user survey were designed to determine demographics, extent and type of use, and overall opinion of the digital library experience. The unique characteristics of an online survey presented additional considerations in the designing of the survey. Internet users seeking information expect efficiency and speed. This must factor into the decision on the type of questions to ask, the length of the survey, and where to place it. The survey must be short enough that it would not require much time to take, but would have sufficient questions to obtain the required research information. Once the questions were developed, the survey was given to several fellow graduate students for feedback, in order to discover the length of time it takes to complete the survey and to determine if the questions were clear. After positive feedback from the

graduate students, the survey was presented to each administrator for approval. It was necessary to make sure that the type of questions asked on the survey corresponded to the interests of each digital library. Following the final approval of the survey, the positioning on the web site was then determined.

Web-based survey design. It is known that design and placement of the survey can have a significant influence on the type and amount of responses (Gunn, 2002). It was decided that the best approach was to install a common gateway interface (cgi) program on the San Jose State University's school web server, and then create an URL for each digital library survey. A link could be placed on each site, leading the user to the survey, and when completed, the program would bring them back to the site. The goal was to reach as many different types of users as possible, from returning users to those who just happen to stumble onto the site. However, it turned out that most system administrators did not want to place the link on their digital library homepages, and consequently it was necessary to work out a different arrangement of link placement with each participating site.

Actual posting of the survey. User studies are significant to the developers of digital libraries, who are usually involved in some type of user evaluation. The difficulty in getting approval was coordinating this study with current research being done by the specific digital libraries. The four digital libraries chosen for this study had not been involved in previous online user surveys, but were very interested in implementing this Web-based survey.

DLESE (Appendix C, DLESE) is a distributed project, a community initiative that integrates the efforts of partners throughout the Earth system science, education, library, and technology communities, with ongoing usage in various projects for different purposes such as the following: DLESE Program Center, Digital Water Education Library (DWEL) project focused on K-12, community services, specific collections and services for faculty; and an evaluators' guidebook. The only information known about DLESE users is the number of real sessions being conducted, which is projected to go up to 100,000 per month (currently about 10,000 sessions per month). Privacy and access concerns have made it difficult to attempt collecting other data on users. However, a current project underway is comparing search input to library holdings. DLESE, being a community-based digital library, is very interested in the current user base. To that end, outreach efforts are being made to broaden the user base and develop the library.

As a community-based digital library, DLESE depends on the cooperation and feedback of that community. They have a link on their site titled *News and Opportunities*, where users, educators, and developers communicate ideas and information with each other. The DLESE administrators felt that this would be the best place to post the survey link. The link was posted in *News and Opportunities* under both *News of Interest* and *Research* (Appendix D, DLESE Survey Link). After three weeks of no response, it was agreed that an item would go out in their monthly newsletter mentioning the survey. The concern was that this would attract only those who are already involved with DLESE, and not new users. The respondents saw the notice in the newsletter, then specifically linked to the survey. However, with the goal being to reach

actual users, it is hoped that the responses will be from those who are actually using DLESE.

Privacy is an issue of concern to digital libraries in developing policy regarding user studies. This has influenced Project Gutenberg (Appendix E, PG) in gathering user data. Up to now, PG administrators have been interested more in production than in circulation, and are therefore particularly interested in this research. Their target audience is the whole world, and therefore they hope to keep limitations to a minimum in order to reach as many users as possible.

PG sends out a weekly newsletter to those users who have signed up for it. They initially posted an item in the newsletter (Appendix F, PG Newsletter) directing interested users to send an email request to the researcher, who would then send the link to the survey. After a time period of very little response, it was decided that an additional item would be placed at <http://www.ibiblio.org/gutenberg/> (Appendix G, PG "ibiblio" Posting), directing users to the survey. Again, the concern was that the responses would be limited to only those users who have already signed up for the newsletter, but with the additional posting to "ibiblio", it was hoped that user responses would increase.

CeltDigital (Appendix H, CD) is the graduate project of a sole owner/webmaster. Due to time constraints on the part of the webmaster, user studies had not been conducted. It is estimated that the site gets a total of 1500 hits per month. CD placed the link to the survey at the top of their homepage, in bright red font, with a purple link (Appendix I, CD Survey Link). This is the researcher's concept of how the link should

be placed for optimum exposure to the wide variety of users who would click on a digital library link.

Much of the early research on digital libraries was very technology driven, or document driven, without much significant research conducted on what a given set of users actually need or want to do. Of no exception, the New Zealand Digital Library (Appendix J, NZDL) is in fact a project that focuses on advancement of digital library technologies. As part of this project, the Greenstone digital library software (an open source system) was developed and made available for free use. Most of the digital library sites listed on their homepage are demo projects based on this software, and the only real digital library hosted by the NZDL itself is the Niupepa Maori Newspapers collection (Appendix K, Niupepa/Maori) (Appendix L, Niupepa/English), which was developed by Te Taka Keegan as part of his dissertation research. This is the collection that was used for this study.

NMN also placed the link to the survey on their home page, with a bright icon labeled *NEW* placed beside it to draw attention to it. It is offered in both the Maori language (Appendix M, Maori Survey Link) and the English language (Appendix N, English Survey Link). Ideally, if the link can be placed where it is easily accessible, there is a better chance of learning overall who the actual users are.

Survey time frame. Posting the survey on each digital library corresponded with the requirements of the administrator. The intention was to have them run at the same time for a month. Getting permission and working out the arrangements resulted in different time frames for when the survey would be posted on each digital library. There

were concerns about placing the survey on the home page, and the administrators had to consider where would be the best location to place it.

<i>Posting</i>	<i>DLESE</i>	<i>PG</i>	<i>CD</i>	<i>NMN</i>
Initial	May 1, 2003: link on website – news opportunities	May 1, 2003: post to newsletter	June 15, 2003: link on home page of digital library	June 30, 2003: link on home page of digital library
Adjustment	May 25, 2003: post to newsletter	June 10, 2003: add link to “ibiblio” website	Continuous	Continuous
Removal	June 30, 2003	July 31, 2003	August 10, 2003	August 20, 2003

Table 1: Survey time frame

Chapter 4: Data Analysis

There were a total of 339 hits on the online survey from the four digital library sites, of which nine were dummy hits by those who chose not to complete the survey. Therefore, only 330 completed responses are included in the data analysis. The survey responses were examined to determine who the actual users of each digital library project were and whether they were from the intended user population as claimed in its mission statement and by its administrator/designer in response to this survey.

Demographics

Overall, 3.9% (13) of the responses were from Digital Library for Earth System Education, 81.5% (269) were from Project Gutenberg, 8.5% (28) were from CeltDigital, and 6.1% (20) were from Niupepa Maori Newspaper Collection.

The users who responded to the survey can be categorized by three demographic variables: educational level, profession, and age, assuming that each user contributed only one response to the survey. Of the total 330 valid responses, the categories are represented in the following manner:

- *Educational level.* 12.7% of the respondents were high school graduates, 48.2% were college graduates, 23.3% had masters, 11.5% had doctorates, and 4.2% indicated "other" which included those still in high school. The percentage figures are statistically significant, with chi square = 161.309 and $p < 0.01$.
- *Professional career.* 8.2% of the respondents were educators, 2.1% were

librarian/media specialists, 7.0% were researchers, 23.3% were business professionals, 24.5% were students, and 34.0% were others (chi square = 161.309, $p < 0.01$). Other categories of profession not listed as choices but mentioned in comments include almost all possibilities one can imagine. Specifically, they are: writer, mother, theater director, engineer, journalist, chemist, proofreader, gardener, truck driver, computer programmer, retired, fire captain, gunsmith, communications technician, software engineer, meteorologist, taxi driver, construction worker, security, parole officer, artist, photographer, hobby scholar, marketing consultant, self-employed, sports entertainer, archivist, skilled laborer, physician, translator, and unemployed.

- **Age.** 9.1% of the respondents were under 20, 43.3% were 20-34, 27.3% were 35-49, 17.6% were 50-64, and 2.7% were 65 and over (chi square = 168.394, $p < 0.01$).

User Population

DLESE

Background. The Digital Library for Earth System Education is a grass-roots, community-based effort involving teachers, students, and scientists. The idea for DLESE began when the Geoscience Directorate (GEO) of the National Science Foundation (NSF) initiated a competitive grants program in 1998, called Awards to Facilitate Geoscience Education (AFGE). One of the awards was issued to Mary Marlino, Principle Investigator (PI), of the University Corporation for Atmospheric Research

(UCAR) and the Program for the Advancement of Geoscience Education (PAGE). The Geoscience Education Working Group stated that the purpose of the program is to offer the best geoscience education at all levels, to encourage active learning, and to promote the integration of geoscience research and education. In the second year of the awards program, a single large-scale grant for digital library development was awarded. This resulted in the formation of a steering committee (SC) for a Digital Library for Earth Systems Education (DLESE) that is representative of the diverse interests in Earth systems science education, and in the publication of a document outlining the vision.

Intended users defined by mission and goals. A digital library is being created to provide educational resources and services for learning about the Earth system that will meet the needs of all age levels in all types of settings. This prototype project is a Web-based, community-wide, data access system for geoscience multimedia educational materials, where researchers can gain experience in emerging technologies, gather feedback from users and contributors, and establish partnerships with other organizations that have large collections. The primary objective is to strengthen undergraduate geoscience curricula and faculty development by establishing an index/catalog/search engine system that gives users a central site from which to search for and contribute to geoscience course materials that are part of participating institutions as well as at the central site. Key leaders and educators in Earth and space science meet and develop action plans for the establishment of a national digital library, which refers here to both a collection of electronic materials and the community-based organization that would

manage the collection, develop new software tools, and provide consulting and training to library users.

A core philosophy is that DLESE views “users as contributors.” The mission is “to improve the quality, quantity, and efficiency of teaching and learning about the Earth system by developing, managing, and providing access to high quality educational resources and supporting services through a community-based, distributed digital library” (DLESE, 2003). The goal of DLESE is to be the first choice in the community for anyone interested in learning about the Earth.

The administrator noted in her response to the survey that the goal of this project is not only to incorporate the study and understanding of the Earth as a system by anyone interested in learning about the Earth, but also to create a space in which to share materials and resources for both teaching and learning about the Earth. Identified as the primary users are K-12, undergraduate and graduate teachers, and students. Also included in the project’s intended user population, important but not as large, are informal education groups (museum, outreach, etc.), research/PostDocs, and the general public. The designers of the digital library are interested particularly in the building of collections, governance of the library, management, and communication among library co-developers in order to develop this library to meet the needs of the intended users.

DLESE did incorporate user studies in their development process such as focus groups and early adopter workshops, all of which was funded by the National Science Foundation (NSF). Educators and students were observed and interviewed to better understand their work habits and how a digital library might be used in their daily

practice. Studies were done in order to identify specific needs such as using data in the classroom and reaching diverse learners.

Key factors characterizing the intended user population as defined by the mission and goals are:

- Meeting the educational needs of all ages, in all settings;
- "User as contributor;"
- Providing and sharing educational resources and supporting services;
- Being the first choice to those seeking information on Earth systems;
- K-12, undergraduate and graduate teachers and students;
- Informal education settings, research, and the general public;
- Providing information on building a community-based digital library.

Actual user population as shown in data set. There were 13 total responses on the DLESE online survey. Of those, 53.8% had doctorates and 46.2% were other (mostly masters with one college degree), representing no statistical significance (chi square = 0.077, $p > 0.05$). 61.5% of the respondents were educators or researchers, while 38.5% were other which included being involved in some way with the development of DLESE (chi square = 0.692, $p > 0.05$). The majority of the users answering this survey fall into the category of graduate teachers and students, educators and researchers, which is part of the intended user group. 61.5% were between 35 and 49 years old (chi square = 0.692, $p > 0.05$).

Users are referred to this site by colleagues (46.2%) or introduced to it by email and discussion groups (15.4%); however no statistical significance is represented (chi

square = 0.077, $p > 0.05$). The users are involved in the research and development of the resources that are provided on this site, satisfying the primary philosophy of users as contributors. 61.5% are repeat users (chi square = 0.692, $p > 0.05$), and of those 53.8% use this site an average of 1-3 times a month (chi square = 0.077, $p > 0.05$). 38.5% use it to complete a work related task (chi square = 0.692, $p > 0.05$), while 38.5% view this site to check out the resources and services available (chi square = 0.077, $p > 0.05$).

Summary. Web survey results characterize actual users as being contributors, which is an important part of the intended user population. Educators and researchers use this site to seek information and resources on Earth system education, and contribute to the development of a community based digital library which is another defining characteristic. However, none of the percentage figures quoted above is found statistically significant because of the small sample size. Whether this digital library is meeting the needs of the user population as described in the mission statement and goals will be discussed in the user satisfaction section.

PG

Background. PG was founded by Michael Hart, a professor of electronic text at Benedictine University in Illinois, in 1971. Hart realized that the greatest value of computers would not be computing but rather storage, retrieval, and the ability to search what was stored in our libraries. He decided to type the Declaration of Independence and send it to everyone on the network. In 1971, the Internet had just gone transcontinental, and his was one of the first hundred computers on the Internet. If he had sent the Declaration of Independence to everyone, he would have crashed the network.

Consequently, he posted a notice on the Internet instead, and about six of the one hundred downloaded it. Thus, the concept of Project Gutenberg (PG) was developed.

Intended users defined by mission and goals. The PG philosophy is to make information, books, and other materials available to the general public in forms that a majority of computers, people, and programs can easily read, use, quote, and search. The goal is to make as many texts available to as many users as possible all over the world. Electronic Texts (eTexts) are made available in the simplest, easiest-to-use form. PG eTexts are written in Plain Vanilla ASCII, the lowest set of the American Standard Code for Information Interchange. This way, 99% of the hardware and software that most people use will be able to read and search these files. PG chooses eTexts which they hope a large portion of the audience will want to read and use frequently. Their target audience is 99% of the general public. PG's goal is to get a million books to a billion people in all corners of the world.

PG represents a paradigm shift, from limited distribution to unlimited distribution, in what is being called the information age. PG is attempting to publish all the texts in the public domain on the Internet, but with the changing copyright laws, this is a constant challenge. Copyright laws restrict the growth of the public domain and can even remove texts from it. Many of the books PG is placing on the Internet are out of print and are being saved from obscurity and possible oblivion.

PG's hope is to reach 10,000 books by the fall of 2003, with the help of over 1,500 volunteers. As of August of 2003, 8,000 of the 20,000 plus items listed by the Internet Public Library have been produced on PG. PG's original goal was to create

10,000 eTexts and get them to one hundred million people, thus giving away a total of one trillion eTexts. With this goal in sight, plans are being made for a new goal - to get one million eTexts to one billion people, which would be a giveaway of one quadrillion eTexts by the end of 2015.

The administrator agreed in his responses on the survey that the main goal is to change/save the world by creating unlimited distribution technology which would lead to “the Neo-Industrial Revolution.” In other words, the goal is to give away a trillion ebooks without ever having had a million dollars go through his hands. The real target audience is not the “ivory tower crowd,” but everyone, for the rest of history.

Key factors which characterize the intended user population as defined by its goals are:

- Reaching 99% of the general public;
- Creating unlimited distribution;
- Providing information, books, and materials to everyone;
- Using forms that the majority of computers, people, and programs can easily read, use, quote, and search;
- Giving away one trillion eTexts;
- Reaching all corners of the world;
- Providing materials that the majority will want to use and reuse frequently.

Actual user population as shown in data set. PG users were the largest portion of respondents with 269 of the total 330. Of those, 53.8% were college graduates and 21.9% had masters showing statistical significance (chi square = 209.420, $p < 0.01$).

27.9% were business professionals, 25.3% were students, and 35.3% were other (chi square = 110.535, $p < 0.01$). The PG users represent every possible career as listed in the other category. In terms of age, 47.2% were between 20 and 34 and 24.2% were between 35 and 49 (chi square = 159.532, $p < 0.01$). Even though a large portion of users are educated, students, or professionals, they also include an incredible list of people from all walks of life, which is one of their main goals.

62.3% of the PG users found this site by surfing the web, with Google being the search engine of choice (chi square = 420.567, $p < 0.01$). Many of these users found the site many years ago, and continue to keep it on their favorites list. 64.2% are repeat users (chi square = 21.552, $p < 0.01$). 42.6% use this site 1-3 times a month on average while 34.2% are using it a minimum of once a month (chi square = 62.277, $p < 0.01$). 32.7% were viewing this site to check it out, or for curiosity, and 36.5% were on this site for other reasons which include: reading for personal and recreational enjoyment, looking for classics, taking advantage of works in the public domain, volunteering as a distributed proofer, for free and easy access to valuable material, self study, to find out of print books, and download rare e-texts (chi square = 135.612, $p < 0.01$). The number one reason for using this site is for the joy of reading.

Since one of PG's main goals is to reach users all over the world, it is important to note that of the 269 respondents, 190 were from the United States and 79 were from 36 other countries. The largest non-U.S. groups were in Australia (12), Canada (10), and England (12). Other countries with 1-4 representatives include: Argentina, Bolivia, China, CzechRepublic, France, Germany, Iceland, India, Indonesia, Iran, Ireland, Israel,

Italy, Japan, Mexico, Netherlands, New Zealand, Norway, Panama, Poland, Portugal, Scotland, Serbia, Seoul, South Africa, Spain, Sweden, Switzerland, Ukraine, Venezuela, and Wales. PG providers can be satisfied that they are reaching all parts of the world.

Summary. The results of PG's web survey indicate the actual users represent the general public from all over the world. Not only are the users excited about the amount and variety of materials provided by PG, they also become active proofreaders to continue to add to the wealth of material available. The number one reason for using PG is the joy of reading and the enthusiasm about making books free and easily accessible to everyone.

CeltDigital

Background. CD was created by Lara Lasner. This site was the project for her Digital Library Course GSLIS790.2, with Professor Colleen Cool, as part of her graduate work at Queens College's Graduate School of Library and Information Science. She had been interested in Celtic culture for about six years previous to this, and wanted to create a comprehensive Celtic Web site. Lara has since graduated, and the library is now ongoing and continuously developing.

Intended users defined by mission and goals. The goal of CeltDigital (CD) is to create a comprehensive Celtic Web site. The mission statement is as follows: "The Celtic Digital Library is currently being created to provide the most comprehensive access to digital links, artwork, and information about both the Celts of 400BC to 1500AD and Celtic Reconstruction/resurgence of today. The Celtic Digital Library's first priority is to provide easy access to all who use it, whether it is the scholar, the student or just

someone interested. Its intended audience is members of the general public who are interested in information about the Celts and need basic starting points" (CD, 2003). The library provides easy access, has an easy-to-follow format, and offers a simple design that can be accessed by all types of computers. Currently, information is found by browsing and navigating via a site map. A search engine will be added in the future.

The primary goal of this site is to collect and organize as many Celtic links and art as possible and provide an easy-to-use format. The library is divided into ten sections and a bibliography. The sections include the following: Celtic Archaeology, Celtic Art Library, Celtic History, Celtic Journals, Celtic Language Library, Celtic Literature/Myth Library, Celtic Music/Dance, Celtic Religion, Directories, and Reconstruction/Organizations/Festivals. This library is a general reference source about the Celts, and each site added is evaluated and placed in the area where it is easily accessible. It can be used by the scholar, but not all sites are scholarly in nature. Sites that include different interpretations of the same information are added, so that this library becomes a place to find a variety of opinions.

The administrator in her survey response claims that the main goal of this site is to be a starting point for scholars, students, and the general public who are looking for Celtic material and artwork on the web. She hopes to provide the most comprehensive guide to the Celtic Culture.

Key factors characterizing the intended user population as defined by its goals and mission statement are:

- Anyone interested in Celt information;

- To be used by student, scholar, general public;
- Providing a comprehensive list of links to Celtic information;
- Providing easy access to anyone who will use it;
- Creating a starting point for anyone looking for Celtic information;
- Providing access to all types of interfaces;
- Creating general reference for Celt sources.

Actual user population as shown in data set. There were a total of 28 responses for CD. Of those, 39.3% had college degrees and 60.7% indicated other including high school, masters, or doctorate indicating no statistical significance (chi square = 1.286, $p > 0.05$). 21.4% were students and 57.1% indicated other which includes retail manager, security, home-based business, mother, writer, artist, photographer, and computer system administrator (chi square = 7.143, $p > 0.05$). 35.7% were between ages 20 and 34, while 32.1% were between 35 and 49 (chi square = 3.714, $p > 0.05$).

75.0% of the respondents found CD by surfing the web with Yahoo being the search engine of choice (chi square = 7.0, $p < 0.01$). 92.9% were first time users (chi square = 20.571, $p < 0.01$). Both figures indicate statistical significance. The question of how often this site was used was not answered by 91% of the respondents. 53.7% of the respondents reported that they used this website for personal research, representing no statistical significance (chi square = 0.143, $p > 0.05$).

Summary. In spite of the statistical insignificance of some percentage figures quoted above, the results of this web survey seem to indicate that users include a variety of the general public. A search for Celtic information brings the majority of the

respondents to this site for the first time, which then offers links to other Celtic sites that are also used by the users. The question of whether the search results met their needs will be discussed in the user satisfaction section.

Niupepa Maori Newspaper

Background. The Niupepa Project (Keegan, 2001) is a collection of 42 newspaper titles published in New Zealand between 1842 and 1933 that constitute a unique historical record of the language of the indigenous Maori People, including the evolution of the written form of this language, and the events and developments during the colonial history of the country. In 1988, the Alexander Turnbull Library, a research library within the National Library of New Zealand, began searching the libraries of New Zealand for historic newspapers that were either published in the Maori language or for a Maori audience, hoping to assist in the preservation of the rapidly decaying newspapers. This became known as the Maori Newspaper Collection, or Niupepa, 1842–1933.

Intended users defined by mission and goals. This collection is a valuable resource for historians, sociologists, theologians, and linguists. It includes information on important historical events and opinions about New Zealand's early and turbulent history. In 1996, the collection was put on microfiche and distributed to the New Zealand libraries.

The New Zealand Digital Library (NZDL) wanted to make the collection available on the WWW for all students and researchers of the Maori language, at no cost. This became the Niupepa Collection. They also wanted to advance the collection to an electronic environment with more powerful full-text search capability. A digital

facsimile of each newspaper was produced, with an electronic text version of each page that would enable the Greenstone Software to perform full-text searches of the collection, incorporating a page-level index, with text for each page held in a separate file. Creating a digital library opens the collection to access for cultural, sociological, linguistic, historic, and geographical research to laypeople, students, and scholars all over the world.

The administrator confirmed in his response to the survey that the goal is to be an extension of NZDL, which is undertaking research to develop the underlying technology for digital libraries and make it available publicly so others can use it to make their own collections. The specific goals of Niupepa are to use this NZDL architecture and software in a Maori language environment and to make this collection more accessible by placing it on the web in order to give users the ability to perform full text searching. Since the collection is primarily in the Maori language, the intended user is students and researchers in the Maori language. However, since the collection dates back to New Zealand encounter and colonial history, a secondary user group would include historians and researchers analyzing historic information.

Key factors characterizing the intended user population as defined by its goals are:

- Making available the Maori language newspaper collection;
- Introducing NZDL software in an Maori language environment;
- Providing full text searching;
- Intended users are students and researchers;
- Secondary user groups are historians and researchers of historical information.

Actual user population as shown in the data set. There were 20 responses to the Niupepa survey, with 35.0% having masters, 25.0% college degrees, and 40% are other including doctorates representing no statistical significance (chi square = 0.700, $p > 0.05$). 35.0% of the respondents were researchers, 30.0% were students, and 25.0% were educators (chi square = 2.800, $p > 0.05$). 40.0% were between the ages of 35 and 49, 30.0% were between the ages of 50 and 64, and 25.0% were between 20 and 34 (chi square = 0.400, $p > 0.05$). This indicates that the majority of users who responded to this survey are students and researchers, who are the Niupepa's intended audience.

45.0% of the users found this site by surfing the web, while 55.0% through a colleague or by personal referral (chi square = 0.200, $p > 0.05$). 65.0% were returning users (chi square = 1.800, $p > 0.05$), with 53.8% using this site on average one to three times a month (chi square = 0.077, $p > 0.05$); however, 35.0% of respondents did not answer this question. In terms of reasons for using this site, 55.6% came to this site to conduct personal research, and the majority of the rest came to complete work-related tasks (chi square = 0.222, $p > 0.05$). Of those using this site, 78.9% would use this as a first choice for seeking information on historical Niupepa newspapers and the Maori language (chi square = 6.368, $p > 0.05$). None of these figures represent statistical significance.

Summary. Although the percentage figures quoted above are not statistically significant due to small sample size, they seem to characterize the actual user as a researcher or educator using this site for research. The material provided on this site is specifically available for this type of user.

User Satisfaction

DLESE. Users of the DLESE website tend to find more than they are looking for, or at least some of what they are looking for, representing no statistical significance (53.9%, chi square = 0.077, $p > 0.05$). However, it is felt that google is just as effective at providing this type of information. The general agreement is that DLESE resources are growing but still in its early stages with lots of gaps to bridge. One difficulty is with content rather than structure. It is difficult to find Earth Science resources that can be used in a freshman course because the resources are not properly designed or tested. Another complaint is the lack of information about where materials come from, whether or not they are for use in classrooms, and exactly how they should be used. It is doubtful that materials marked as useful for K-16 are really viable materials for all age levels. This raises the question of whether or not DLESE is satisfying its purpose of providing resources and services for all age levels in all settings. In spite of the complaints, it is interesting to note that 53.8% of the users do use DLESE as a first choice for finding this type of information, while 46.2% use other web sites or search engines such as Google (chi square = 0.077, $p > 0.05$).

Generally, the users who answered the survey agree that (1) DLESE has thorough and comprehensive information; (2) it is possible to find information easily, results of searches yield the information being sought, browsing increases familiarity with this site; and (3) the overall display is good. One concern is that the resources are too complex to be used by the student masses and that many of the interactive sites fail when large classes attempt to use them to complete an assignment. More effort should be made to

have K-12 teachers involved in this project if their needs are to be met. It appears that developers lack an understanding of the different levels of students' cognitive ability, preferred learning modes, and differing ability to accomplish tasks. How resources are evaluated seems to be the biggest concern.

PG. The respondents of the PG survey were a very enthusiastic group finding more than they were looking for (43.5%) or at least finding some of what they were looking for (35.9%), representing a statistical significance (chi square = 184.985, $p < 0.01$). An important aspect of this digital library is that users are encouraged to volunteer as proofreaders and to suggest works they would like to see on the site, to help improve the digital library's collection.

The surveyed users seem to agree that this is the best digital library on the Internet that offers free access to a large quantity of diverse books and materials. The main complaint is about the project's not being able to have the same access to books that are still copyrighted, but the project's coverage of rare and out-of-print books is most impressive. Users seem to be satisfied with the variety of subject matter available, including children's books, history, and classics. However, there is dissatisfaction about the project's offering of technical and scientific books. 46.8% of the users were on this site to download eTexts for personal reading (chi square = 243.897, $p < 0.01$). This includes looking up plays that are in the public domain, browsing books for entertainment, looking for additional titles by favorite authors, or finding specific works from authors such as Plato, Knut Hamsun, and Albert Camus. PG is the first choice for

locating this type of material (74.2%), with other sources including Google, libraries, and bookstores (25.8%) (chi square = 60.063, $p > 0.05$).

The PG users are very active in this site. They offer their services in providing material and comments to keep this digital library growing. It is not surprising that the users find its information thorough and comprehensive (49.2% agree and 31.5% strongly agree, chi square = 204.808, $p < 0.01$). 46.2% agree that the information can be found with ease (chi square = 239.664, $p < 0.01$). 45.0% agree that the search results include the information the user is seeking (chi square = 194.431, $p < 0.01$). Overall, 50.8% agree that browsing increases the familiarity with this site (chi square = 295.805, $p < 0.01$). 48.7% agree that the site is good and easy to use (chi square = 84.579, $p < 0.01$). 55.2% agree that the experience on this site is effective (chi square = 173.324, $p < 0.01$). All of these figures represent statistical significance.

Over the years, technological improvements of the project have increased its ease of access. However, there are software or hardware difficulties that add to user frustration, such as when a link is broken, or when a page is removed without being archived. Infrequent users find it difficult to obtain the information they are seeking, but well worth the frustration since the material is free and generally easily accessed. The search engine on this site gets the largest complaint.

The main goal of PG is providing free access to all the public domain material to as many people all over the world as possible. The general responses indicate that this is the case. Nearly every respondent commented on their excitement about being able to find so many free books at one site. The number one use of this site is to download

eTexts for personal enjoyment. People with a range of computer expertise and all types of computer software and hardware are able to make use of this site. Although the interface causes some complications, the users found it satisfactory in that there is not much design overload making the site too busy. The plain simple user interface is efficient, easy to navigate, quick to load, and the plain text format is universal. Other advantages of using this site are that (1) books are available twenty four hours a day; (2) the site is accessible from any computer; and (3) the texts can be copied or shared via email. The extensive and fascinating archives make available most of what a user would be looking for, other than copyrighted works. The agreement among respondents is that PG represents the true spirit of Intellectual Freedom.

CeltDigital. 42.3% of the survey respondents reported that they found more than they were looking for, and 30.8% found some of what they are looking for, representing no statistical significance (chi square = 1.000, $p > 0.05$). It is noted that this site has a lot of great links to Celtic information, which is one of the primary goals of CD. When searching for information on Celtic culture, CD is one of the sites that comes up. They then offer links to other sites that offer this information.

Reasons for using this site include finding resources for education, research, or work related tasks (39.3%), finding out about the site (25.0%), and other reasons (25.0%) which include personal research, finding out about pagan recipes, and looking for Celtic art, illuminations or jewelry (chi square = 0.929, $p > 0.05$). 51.9% will use this site as a first choice for looking for this type of information and 48.1% use other sources such as search engines or books (chi square = 0.037, $p > 0.05$).

The general feeling is that this site is not complete but is a good start for anyone seeking Celtic information. 48.0% of the respondents believe that the information found here is thorough and comprehensive (chi square = 2.960, $p > 0.05$). 48.0% agree and 24.0% strongly agree that this site is easy to use (chi square = 2.480, $p > 0.05$). 44.0 % agree that the results cover the information sought (chi square = 2.240, $p > 0.05$). 56.0% agree that browsing increases the familiarity of this site (chi square = 0.360, $p > 0.05$). 64.0% agree it is good and easy to use (chi square = 2.667, $p > 0.05$). However, none of the percentage figures quoted above is found statistically significant.

The general agreement is that this digital library is easy to use, organized, easy to navigate, and has adequate sources as a starting place when looking for Celtic material. As a reference to other links, this is a very good site, but it is not always helpful when looking for a very specific topic, such as Insular manuscripts. Some of the difficulties that users experienced with this site are: inability to copy illustrations, not enough pictures provided for Celtic work, broken links, and not enough subdivisions of categories. This is not a unique site since the same kind of information can be found elsewhere, but the respondents appreciated the inclusion of so many links to useful resources. The site definitely meets the goal of CD to be the starting place for seekers of Celtic information.

Niupepa. The main agreement is that this is a wonderful source for finding texts in the Maori language. 57.9% agree and 31.6% strongly agree that the information found at this site is thorough and comprehensive (chi square = 1.471, $p > 0.05$). 63.2% agree that the information can be found easily (chi square = 2.000, $p > 0.05$), while 68.4%

agree that the results covered the sought information (chi square = 4.765, $p > 0.05$). 47.4% agree that browsing increased the familiarity with this site (chi square = 0.059, $p > 0.05$), and that the overall display is good. However, none of the quoted percentage figures are found statistically significant.

It is exciting to the majority of users that there is access to these historical resources that cannot be found anywhere else. It is also a good resource for those learning the Maori language. The keyword searching is easy, and it is easy to understand the results. However, it is felt that some better explanation to what is in the resources would be helpful. The goals of introducing this type of full text searchable software and being accessible to a unique historical collection are being met.

Chapter 5: Interpretations

Digital libraries are evolving as technology provides new means of sharing and accessing information. Their development is dependent on understanding who will use them, what the purpose is, and how they will be used. The objective of this study is to learn about who is actually using digital libraries as compared to what their goals and statements of purpose are, and who their intended user population is. By defining the characteristics and needs of actual users and matching them to the digital library's purpose, the hope is to better comprehend the relationship between the provider and user of information.

Findings

Demographics. Digital libraries are created with specific user populations in mind. The four digital libraries used in this study can be classified into two different types. DLESE and NMN are being designed not only as a means of providing specific information to specialized groups, but also to research new ways of presenting that information, incorporating advancements in technology. Their intended users reflect both the information sought and the research being done. The other type of digital library represented in this study are two that offer information to the general public with no research as part of their purpose. PG and CD offer information to anyone using the Internet.

The results of the survey reflect that the majority of respondents fall within the category of college graduates. The two digital libraries that seek to serve the general public (PG and CD) have a wider distribution over the educational spectrum. The two

digital libraries whose emphasis is on research and education (DLESE and NMN) have more masters degrees and doctorates responding. DLESE respondents were mostly Doctorates who are involved in the Earth system education field and contribute to its design and development, which is in keeping with their purpose of users as contributors.

Education	Overall	DLESE	PG	CD	NMN
High School	12.7%	0%	14.1%	10.7%	5.0%
College	48.3%	7.7%	52.1%	39.3%	25.0%
Master	23.3%	38.5%	21.9%	21.4%	35.0%
Doctorate	11.5%	53.8%	9.3%	7.1%	20.0%
Other	4.2%	0%	1.9%	21.4%	15.0%

Table 2. Education of users of 4 digital libraries

The overall distribution of responders' professions is in the other category, which represents every possible career and lifestyle. However, DLESE and NMN have larger percentages of educators and researchers which would be expected as defined by the type of digital library they are and their goals. NMN also includes business professionals who are interested in using the Greenstone software to develop digital libraries for their particular business, and students doing research on the historical information offered in the unique collection of Maori newspapers. PG's hope is to reach 99% of the general public which is reflected in the wide range of users from all walks of life who responded to the survey. Likewise, CD offers information to anyone using the Internet seeking information on the Celt culture, and the users who responded to their survey come from all types of profession and life styles.

Profession	Overall	DLESE	PG	CD	NMN
Educators	8.2%	38.5%	5.6%	7.1%	25.0%
Librarian/Media Specialist	2.1%	0%	1.5%	7.1%	5.0%
Researcher	7.0%	23.1%	4.5%	3.6%	35.0%
Business Professional	23.0%	0%	25.3%	21.4%	30.0%
Student	24.5%	7.7%	25.3%	21.4%	30.0%
Other	34.8%	30.8%	35.3%	57.1%	0%

Table 3. Profession of users of 4 digital libraries

It is interesting that the largest age groups represented are those between 20 and 34. DLESE and NMN users are from the older groups who would have their masters or doctorates and be involved in the research and educator population. This would be consistent with the idea that the intended user is from the field in which the digital library is being created: for DLESE those involved in Earth system education and for NMN those interested in researching the historical material found in the Maori newspapers. The information offered on PG and CD is mostly sought for pleasure or personal interest research, and seems to have a wider range of age groups represented. Again there is a distinct difference in the type of digital library being created and the age group it attracts.

Age	Overall	DLESE	PG	CD	NMN
Under 20	9.1%	0%	10.0%	7.1%	5.0%
20 - 34	43.3%	7.7%	47.2%	35.7%	25.0%
35 - 49	27.3%	61.5%	24.2%	32.1%	40.0%
50 - 64	17.6%	23.1%	16.4%	17.9%	30.0%
65 and over	2.7%	7.7%	2.2%	7.1%	0%

Table 4. Age of users of 4 digital libraries

User Population. Each digital library has clearly defined their intended user population by their mission or statement of purpose and goals. As a result of the purpose of each digital library, they have established the type of user they are proposing to serve. DLESE has as one of their main goals to have users as contributors, and therefore anyone using the site is also seen as a contributor who is involved with the development and designing of the site. The type of users that are active in this site would be expected to be educators or researchers in the field of Earth system education, which is who actually responded to the online survey. NMN is specifically being designed not only to provide an example of how the Greenstone software can be used to create digital libraries, but also they are introducing the use of this software in the Maori language and in presenting historical information, both areas of interest being represented by those who responded to the survey. While DLESE and NMN are clearly research motivated digital libraries, PG and CD offer specific information and services but are seeking to reach as many users in the general public as is possible. They would expect to have users who more clearly represent the characteristics of the general public. For both PG and CD the users who responded to their survey do encompass the wide range of users they are hoping to reach. The intended users are clearly being defined by the type of digital library that is being designed, and as the results of this survey show, that is who actually responded to the survey.

User satisfaction. The digital library may be having its intended user group respond to the survey, but how are they satisfying the specific goals they have defined by meeting the needs of those users? Each digital library used in this study not only

specifies who they intend to reach but also what they would like to do for them. All four of these digital libraries have their intended users answering the survey, but not all of the users are completely satisfied in all the defined areas of intended use.

DLESE respondents were from the educational and research community of Earth system education. They felt that this site has great potential but is still in the infancy stage with many areas in which improvement is needed. The main area of complaint, which is an important part of the stated goals, is that the group of K-12 educators, who should be part of the contributors for material relating to this group are not being consulted as they should be. There are questions as to whether the material on this site is adequately evaluated to meet their needs.

PG had the largest group of responses to their survey, and the most enthusiastic group. These users not only use the information on this site but become active participants in providing new material. This site is dependent on volunteers, so when a user feels something is missing, they simply volunteer and contribute that material. The main complaints are the simple software used, and not being able to get copyrighted material. Of course the plain software makes it possible for the largest group of users to be involved with this site as the majority of computer systems will be able to read and download from this site. This is of course the main goal, to reach as many people all over the world as possible and the results of the survey show they are satisfying that goal. The copyright issue is one that no one has any control over and so it is merely a frustration and not a real complaint.

Those who responded to CD's survey feel that this is a great site for beginning a

search on this specific information, which is their main goal. The main complaints are that it is not really a unique site at this point, and that this information can be found through any of the search engines. But, it is nice to have so many links in one place in which to begin a search. Most users are involved in personal research or interests, and are looking for specific information that may or may not be offered on this site.

NMN offers very unique information that can not be found anywhere else at this point. The satisfaction at finding this site was very enthusiastically positive. Added to that is the agreement that the full text searchability offered by the Greenstone software makes the information more accessible.

Implications

The methodological challenge of this study was the lack of research guidelines in doing web based surveys. This technique is just beginning to evolve; its full potential is not yet realized. It is unclear how to adequately present and interpret the survey results, in particular in the area of representativeness, validity, and response rate. Another difficulty is the computer dependency of this type of research, and the influence of software and hardware that is beyond the researcher's control.

Findings from Internet-based surveys can not be generalized to the whole population, or even to a target sample, since not everyone has equal access to the Internet. However, since this study is focused on digital libraries the defined, user population would be those who use the computer for their information seeking needs, whether at home, business, or a physical library. Of more direct influence would be an individual's comfort level with the computer, and how this would affect them answering the survey.

Also of concern is if the survey looks differently on different browsers. What the researcher prepares would not necessarily be what the respondent was seeing, and how would this affect the way in which a user would answer the survey. Currently there are also the privacy concerns that users have in responding to surveys and providing accurate information. A better understanding is needed on how respondents react to Internet-based surveys during a survey session.

Online surveys can be considered self-selected. The subjects themselves decide whether or not they wish to take the survey. The result is that it is near impossible to get a probability sample. Of those asked to respond, a small proportion (usually less than ten percent) will reply. The smaller the size, the less likely it is to be representative of the identifiable population. The findings for DLESE (13 respondents), CD (20 respondents), and NMN (20 respondents) should take the sample size into consideration. When surveying the general public, which is the main defined intended user group for PG (269 respondents), not everyone is given a known nonzero chance of being included in the survey, since not everyone has access to a computer or the skills to use a computer, and therefore coverage error is likely to be high. Non-response errors occur when subjects change their minds, and submit empty or partially incomplete surveys. There were nine responses that were not done but submitted and not included in the analysis. 15 of the 330 responses were incomplete or partially filled out, but were part of the analysis and could contribute to nonresponse error.

Not mentioned in the research literature, but of interest to this researcher, is the influence of positioning the survey on the site in relationship to the response rate. Being

unwilling to place the survey on the homepage creates the necessity of finding placement within the site which may make it more difficult to find. DLESE placed the link to the survey on a page that listed news items of interest. After several weeks of no response, it was decided to place it in a newsletter with reference to the survey link. All 13 respondents saw the mention in the newsletter and then went directly to the survey. But, CD and NMN placed links directly on the home site, and they each got equally low response rate. The one digital library that had the most responses, PG, had their survey posted on their welcome page sponsored by ibiblio.org. However, they also had the most enthusiastic group of users which might account for the high response rate.

Chapter 6: Conclusion

Research Limitations

The reported findings need to be taken with caution and awareness of possible limitations of this research. Some of the possible limitations obviously stem from the methodology of the web-based survey itself.

Web-based surveys are new to the research community. The literature indicates that these surveys are effective and should be used. People tend to participate and share their opinions. The challenge is how to interpret and report the findings appropriately. The results of this study show that those who responded to these four digital library surveys represent the intended users as indicated in the mission, statement of purpose, and goals. However, influences such as sample size, survey design, and placement of survey might have affected the validity of the results.

Research is needed to gain better understanding of random sampling as it pertains to online surveys. A means of tracking user population in regards to their demographics will decrease the necessity for generalizability of well studied segments of the overall population (Smith, 1997). When random sampling is important to the research, other possibilities of collecting data in conjunction with a survey can be incorporated, such as email requests, or surveying every n th visitor on the web site. Privacy continues to be a concern to Internet users, and it must be taken into consideration when striving for truly random sampling.

Another problem of web-based surveys is having no response from subjects and determination of proper sample size. The fact that all members of a given population

may not have an equal chance of participating in a survey, or that the surveys solicit volunteer respondents, makes it scientifically unjustified to draw conclusions about the overall population based on research findings (Dillman, 2001). Respondents to web-based surveys are likely to be individuals who have access to a computer or are at a certain comfort level with using a computer and this may affect his or her decision of whether or not to respond to an online survey. Those who chose to respond may not necessarily be representative of the whole population.

The problem of having no response is another concern. Further research is needed to develop surveying procedures that may increase the response rate to a level comparable with those obtained with other surveying techniques (Dillman, 2001). Possible causes of having no response may include subjects' lack of computer experience and poor survey design. Understanding what factors contribute to a subject's failure (or unwillingness) to complete the online survey may help improve the design of questionnaire and surveying procedure, and consequently, increase the response rate.

When developing online surveys, it is important to follow the proper procedure of designing web questionnaires. There is a need to develop design principles that will make web surveys more effective and efficient, and thus help decrease survey errors. New research is needed for identifying the best means of conducting web-based surveys to reach its full potential. Issues to be considered include, but not limited to: completion time of survey; proper use of radio boxes, entry check boxes, or mixed styles; how the survey look on different computer screens and with different browsers; and placement of

the survey on a web site. In addition to specific design issues, there is also a problem of how the design affects the response rate.

Recommendations

The users who responded to this survey provided significant feedback as to what the digital libraries were used for and how successful these projects were in meeting users' informational needs. With possible limitations of this research in mind, we may nevertheless discuss the research findings and make suggestions for future digital library development as well as for improvement of existing digital library projects.

The digital libraries that are research driven, such as DLESE and NMN, have a different user population than those who serve the general public. Not only do research digital libraries provide specialized information, but also their goal is to be in the forefront of technical advancements. It can be noted from our research findings about these two digital libraries that the respondents held higher educational degrees, are involved in some way in the business of education, and have something to do with the creation and gathering of the material made available from the digital library site. However, the biggest complaint was that even though these were research digital libraries, they did not completely satisfy the needs of their targeted user communities.

The users of DLESE are also expected to be the main contributors for its advancement and growth, but those who responded to this survey felt that not enough effort was made in taking their feedback into consideration. Some users believe that the project's collection does not meet students' needs, and they wondered how the material was evaluated. Nevertheless, judging from their website, the DLESE team seems to

encourage the users to provide feedback and get involved in the project's development and growth in a variety of ways such as by participating in focus groups, workshops, and committees. A web-based survey such as this one may allow the DLESE administrators to gather more feedback information from the actual users for further improvements of the site. For example, the problem of material evaluation may be addressed by having more educators involved in the process.

One of NMN's main functions is to develop the Greenstone software so that anyone can use it to develop a digital library. Their research is more from the developer's point of view rather than the user's. Having not conducted any user study, they have no way to learn if the software is user friendly in actual use. More user studies will help the administrators find out whether this software is working as expected and where problems may exist. Inconsistencies in the way the site operates can be identified. For instance, when only texts are sought, unnecessary graphics are loaded, and this slows down the searching process.

Digital libraries designed for the general public such as PG or CD need to know how effective and useful their sites are. The goal is to provide information but not how that information is being used. This type of survey allows the administrators to find out how their sites are being used, and what other types of information or services their users would like to gain from there.

Concluding Remarks

Libraries continue to evolve as the users' needs change in an ever-changing world. The possibilities are unlimited in an electronic environment. However, the needs

of users can become lost if technology remains the focus. As the user population begins to expand, digital libraries evolve to encompass a variety of purposes. Research has not kept up with the realities of this development. It has not yet given us a clear indication of whether the actual users of digital libraries are the same as intended by the creators.

The importance of this issue lies in the fact that if the actual user is the same as the intended user, then the goals of the digital libraries have been adequately met. However, if the actual users prove to be different from the intended users, or if the actual users include user groups other than those that were originally intended, what does this mean in terms of the growth and development of digital libraries? This type of user research is helpful in redefining goals of developing digital libraries in order to take into consideration all the possible potential users, even those who may not have been considered in the initial stage of development.

In this research, four digital libraries were selected as cases for observation. Online questionnaires were designed, approved by the administrator, and then posted on the digital library site. Each digital library had different requirements in providing links to the survey which may or may not have influenced the responses. The Web-based survey was either posted to a newsletter which provided a link to the survey, or had a link on the home page. The surveys were allowed to run for one to two months. Once the data were collected, a series of analyses were conducted to yield research findings. The results of this study indicate that the actual users of each of the digital libraries studied do encompass its intended users to a certain extent.

Although the sample size and response rate of this survey study may not be adequate, it provides some insights on who is actually using the digital library and for what purpose. It reveals not only if the intended users are being served, but also if they are satisfied with what is provided on the site. The participating users voiced their opinions on whether or not the digital library was meeting their needs, and some even offered useful suggestions for future improvement. As the development teams of digital libraries continue to discover who are using their site, for what purposes, and how they are satisfied, these projects will evolve and develop to better meet the changing needs of their user populations.

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Appendix A
Administrative Questionnaire

Thank you for your support in allowing me to use your digital library in my graduate thesis study. Along with the background information obtained from your site, I would like to gather more information about your digital library project.

Please answer the following questions based on your experience with and knowledge about the development of your digital library project.

1. What was the goal of the [digital library] as it was planned?
2. Were any groups clearly identified as the [digital library]'s intended users? If yes please explain.
3. Was any user study conducted in preparation for development and design of the [digital library] project? If yes, please explain.
4. Was any user representative on the development team and/or included in the decision-making?
5. Has any evaluation study been conducted since [digital library] was launched into full operation?
6. To your best knowledge, do you think [digital library] has changed its focus since its initial conception?
7. To your best knowledge, do you think [digital library] is serving its intended users as expected?
8. Are there any unresolved issues regarding future development of the [digital library]? If so, please explain.

Appendix B

User On-line Survey

Thank you for your interest. My name is Debbie Dvornik and I am a graduate student at the School of Library and Information Science, San Jose State University, San Jose, California. I am conducting a survey of digital library users for my thesis research, and I am hoping that you can help by completing this online questionnaire. It is brief and will not take much of your time. Your assistance is highly appreciated. If you are interested in receiving a report of the research findings, please enter your email at the bottom of this page. You are welcome to contact me at dvorniks@pacbell.net or my committee chair Prof. Geoffrey Liu at gliu@wahoo.sjsu.edu if you have any questions regarding this research project. Many thanks for your help.

Confidentiality/Consent Statement

Confidentiality/Consent Statement

This survey is an online questionnaire attached to this digital library being studied. By answering and submitting this survey, you the user are consenting to its use in the Digital Library User Study, with the full knowledge that all information provided will be used for the indicated research only. No personal information will be kept, or given to anyone, at any time. Results are reported in the aggregate only and no personally identifiable information is used in the analysis or in the final report.

Back to Survey

A. Demographics

1. What country/state do you live in?

Your area is:

☐

Urban

☐

Suburban

☐

Rural

2. Your educational level is:

High School
College
Masters
Doctorate
Other

3. Currently you are a:

Educator
Librarian/Media Specialist
Researcher
Business Professional
Student
Other

If other, please indicate:

4. Your age is:

Under 20
20 – 34
35 – 49
50 – 64
65 – and over

5. Do you have a disability that plays a part in your use of the Internet?

☐

Yes

☐

No

If yes:

Sight
Hearing
Mobility
Cognitive
Other

If other, please indicate:

B. Use of this Digital Library

1. You found this digital library through:

publication
surfing the WWW
email/discussion group
colleague
personal referral
other

If other, please indicate:

2. Is this your first time visiting this digital library?

☐ Yes ☐ No

If first time, do you intend to visit again?

☐ Yes ☐ No

If not first time, how frequently do you visit this digital library?

less than a month
on average, 1-3 times per month
on average, 1-3 times per week
daily

3. Generally speaking, you have been using this digital library for what reason?

check it out/curiosity
complete assignment for school
conduct personal research
complete work related task
other

If other, please indicate:

4. In general, from this digital library you found:

more than you were looking for
exactly what you were looking for
some of what you were looking for
a little of what you were looking for
none of what you were looking for

More comments:

5. Your specific reason for today's visit is:

Find out about site/curiosity
Find resources for education/research/work
Get contact material
Seek support for school or work project
Find new or opportunity related to digital library

If other, please comment:

6. This digital library is your first choice for acquiring this information:

☐ Yes ☐ No

If No, your first choice would be:

C. Please rate the following

	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	Does not apply
1. The information you found on this digital library is thorough and comprehensive.	☐	☐	☐	☐	☐	☐
2. You are able to find the information you need with ease.	☐	☐	☐	☐	☐	☐
3. The digital library holdings are comprehensive	☐	☐	☐	☐	☐	☐
4. The results displayed from a search covered the information sought.	☐	☐	☐	☐	☐	☐
5. The browsing experience increased your familiarity with the site and its resources.	☐	☐	☐	☐	☐	☐
6. The overall display was pleasing and easy to navigate.	☐	☐	☐	☐	☐	☐
7. The overall experience was effective and satisfying.	☐	☐	☐	☐	☐	☐

Comments:

D. Please comment on the following:

1. Describe the aspects of this digital library you like:

2. Describe the aspects of this digital library you dislike:

3. Include any other comments you would like to share:

E. Please enter email if you wish a response:

Enter E-Mail address:

<u>s</u> end	<u>c</u> lear
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Appendix C
Digital Library for Earth System Science
DLESE

Figure 1 : <http://www.dlese.org>

Appendix D

DLESE Survey Link

Figure 2: <http://www.dlese.org/> News & Opportunities/Research/Archives

Appendix E
Project Gutenberg

PG

Figure 3: [www.http://gutenberg.net](http://www.gutenberg.net)

Appendix F
PG Newsletter

Figure 4: Outlook Express/PG Newsletter

Appendix G

PG “ibiblio” Survey Posting

Figure 5: <http://www.ibiblio.org/gutenberg/>

Appendix H

CeltDigital

CD

Figure 6: www.celticdigital.org

Appendix I
CD Survey Link

Figure 6: www.celtdigital.org

Appendix J

New Zealand Digital Library

NZDL

Figure 8: : www.nzdl.org

Appendix K

Niupepa Maori Newspapers

NMN

Niupepa/Maori Language

Figure 9: <http://www.nzdl.org/niupepa> Maori

Appendix L

Niupepa Maori Newspapers

NMN

Niupepa/English Language

Figure 10: <http://www.nzdl.org/niupepa> English

Appendix M

NMN

Maori Survey Link

Figure 11: <http://www.nzdl.org/niupepa> Maori

Appendix N

NMN

English Survey Link

Figure 12: <http://www.nzdl.org/niupepa> English

Appendix O

Human Subject Review Board Approval Letter

**San José State
UNIVERSITY**

**Office of the Academic
Vice President**

**Academic Vice President
Graduate Studies and Research**

One Washington Square
San José, CA 95100-0505
Voice: 408-924-7500
Fax: 408-924-2477
E-mail: gradstudies@csd.sjsu.edu
<http://csd.sjsu.edu>

To: Debra L.M. Dvornik
1255 Hughes Ave.
Santa Rosa, CA 95407

From: Nabil Ibrahim,
AVP, Graduate Studies & Research

Date: May 1, 2003

The Human Subjects-Institutional Review Board has approved your request to use human subjects in the study entitled:

"Digital Library Creators and Users."

This approval is contingent upon the subjects participating in your research project being appropriately protected from risk. This includes the protection of the anonymity of the subjects' identity when they participate in your research project, and with regard to any and all data that may be collected from the subjects. The approval includes continued monitoring of your research by the Board to assure that the subjects are being adequately and properly protected from such risks. If at any time a subject becomes injured or complains of injury, you must notify Nabil Ibrahim, Ph.D. immediately. Injury includes but is not limited to bodily harm, psychological trauma, and release of potentially damaging personal information. This approval for the human subjects portion of your project is in effect for one year, and data collection beyond May 1, 2004 requires an extension request.

Please also be advised that all subjects need to be fully informed and aware that their participation in your research project is voluntary, and that he or she may withdraw from the project at any time. Further, a subject's participation, refusal to participate, or withdrawal will not affect any services that the subject is receiving or will receive at the institution in which the research is being conducted.

If you have any questions, please contact me at (408) 924-2480.

The California State University
Chico
Bakersfield, Calicut, Chico, Citrus,
Dominguez Hills, Fresno, Fullerton,
Hayward, Humboldt, Long Beach,
Los Angeles, Maritime Academy,
Monterey Bay, Northridge, Pomona,
Sacramento, San Bernardino, San Diego,
San Francisco, San Jose, San Luis Obispo,
San Marcos, San Diego, Stanislaus