

***Breaking Down Barriers Through the Creation of an International Digital Library for Children***

**Ann Carlson Weeks, Allison Druin, Benjamin Bederson,  
Juan Pablo Hourcade, Anne Rose, Allison Farber  
Kara Reuter, Juhyun Lee, Mona Leigh Guha, and Yoshi Takayama**  
Human-Computer Interaction Lab  
University of Maryland, USA  
and  
**Jane White, Jessica Anthony, and Brewster Kahle**  
The Internet Archive

*A research project, begun in the fall of 2002, expects to tap the potential of the Internet for breaking down barriers and building tolerance and understanding through access to exemplary children's books from all over the world. The creation of the International Children's Digital Library (ICDL) is the focus of a five-year project being conducted by the University of Maryland/College Park and the Internet Archive with funding from the US National Science Foundation (NSF) and the Institute for Museum and Library Services (IMLS). This paper describes the project, discusses initial research findings and outlines the direction of ongoing research.*

## **Introduction**

Books can build links between people and bridges among cultures. Through books, young people can begin to understand who they are, explore the world around them, and learn to what it means to be literate in today's society. Research has shown that children's use of books can increase their cognitive, social, and motivational development (DeHirsch et al., 1966; Erikson, 1950; Meek, 1982). Access to narratives from different cultures can offer children opportunities to better understand the world around them as well as who they are in relation to that world. In an era of much uncertainty and conflict throughout the world, can there be a more important priority?

News media from around the world regularly report misunderstandings, intolerance and outright aggression among individuals and groups from different cultures. While research has shown that children absorb the ambiance, stereotypes and attitudes prevalent in their communities (Vendley, 1998; Wright, 1994), research also has found that if young people have opportunities to share personal experiences and "stories," attitudes may change (Jackson, 1983).

Unfortunately, the reality is that in most countries throughout the world, children rarely have access to books that reflect other than their own language and culture. In many communities, book collections in school and public libraries are small and may be significantly out of date. Limited and/or non-existent physical library facilities and inadequate financial resources offer almost insurmountable challenges for many librarians, parents, administrators, and teachers. Many children have limited access to reading materials of any type in their homes.

Books published in other countries can provide authentic accounts of the people, history, and traditions of other lands and help to counteract stereotypes and the often more sensation-prone information provided through television or other media (Salzman & D'Andrea, 2001). And yet, most libraries in the United States have inadequate foreign language collections. In 1995, the last time information was collected, librarians in fewer than 25% of schools nationwide rated their foreign language and/or English as a Second Language materials as excellent or adequate to support the curriculum (National Center for Educational Statistics, 1998).

Significant problems regarding access to libraries and books are reported by librarians and library administrators from throughout the world. In 1997, it was reported that fewer than 30% of the schools in South Africa had libraries, and yet it was common to see computers (Hart, 2000). In China, over 80% of the schools in large and medium-sized cities have established libraries in schools; however, in less developed areas of the vast country, fewer than 30% of the schools have libraries, yet approximately 50% have at least one computer (Xiaobin et al., 1996). Reports from librarians in Denmark, Russia, Kazakhstan, and the Netherlands indicate that libraries are important components in primary and secondary schools, and yet budget cuts have severely limited their abilities to provide the range of materials needed in today's global society. Most lack ready access to materials in a variety of languages (International Association of School Librarianship [IASL], 2002).

Policy makers, educators, and computer scientists suggest that technology may provide an alternative for breaking down barriers and making the world's literature available for all children. The promise of the Internet has been that no classroom, group or person should ever be isolated from the world's greatest knowledge resources. They envision a time when individuals anywhere and anytime can use the Internet to connect to a digital library to search all of human knowledge (President's Information Technology Advisory Committee [PITAC], 2001). If this technology is used knowledgeably and responsibly, it can connect resources and people from throughout the world in heretofore unimagined ways.

Unfortunately, until quite recently, when it comes to children, the promise of the Internet and digital libraries has fallen short. While there is an emerging and significant research field devoted to digital libraries and information retrieval, most content and interfaces are targeted at adults or older students. Few digital libraries have been developed that offer suitable content or interfaces for learners from 5 to 13 years old. To use these libraries, children must negotiate interfaces that require complex typing, proper spelling, reading skills, or necessitate an understanding of abstract concepts or content knowledge that are beyond their still-developing abilities (Druin et al., 2001; Moore & St. George, 1991; Solomon, 1993; Walter et al., 1996). And yet, access to a vast range of resources from cultures throughout the world through a digital library offers enormous promise for expanding the world of literature for children.

A new research project, begun in the fall of 2002, hopes to begin to tap the potential of the Internet for breaking down barriers and building tolerance and understanding through access to exemplary children's books from all over the world.

## **Creating a Digital Library for Children**

The creation of the International Children's Digital Library (ICDL) is the focus of a five-year research project being conducted by the University of Maryland at College Park (UMD), a leader in human/computer interaction research, and the Internet Archive, a non-profit foundation committed to creating a comprehensive archive of the Internet. The project, funded by the U.S. National Science Foundation (NSF) and the Institute for Museum and Library Services (IMLS), has as its primary goals:

- the creation of a digital library of at least 10,000 children's books in at least 100 languages that is freely available over the Internet,
- the development of a icon-based interface that enables children to search, browse, read and share books in a digital format; and
- an investigation of how access to this digital library can inform the creation of technology for children, improve library practices, and influence children's attitudes toward books, reading, technology, libraries, and the world around them.

A prototype for the Digital Library ( [www.icdlbooks.org](http://www.icdlbooks.org)) was launched on November 20, 2002. The initial collection included 181 books from 27 countries (including Egypt, Croatia, Singapore, South Africa, Australia, New Zealand, and the United States) in 18 languages. This paper discusses the partnerships that have been established and the unique design methods that are being used to create the digital library for children. It also summarizes the lessons the team

has learned during the first three months of the Library's deployment over the Internet and changes that have resulted from these discoveries. It describes the ongoing questions that the project is addressing and the suggested ways that the project can help to build bridges among people.

The research team includes librarians, computer scientists, educational researchers, visual artists, information scientists, children (ages 7 to 11) and classroom teachers. To work together, the team uses a combination of techniques known as "Cooperative Inquiry" (Druin, 1999; Druin, 2002). These techniques offer an approach to research that can be used to gather data, develop prototypes, and forge new research directions. With these techniques the team has begun to address questions such as

- How do children of varying ages (3 to 13) choose books?
- What kinds of online tools can best support children in their use of digital materials?
- How can librarians, teachers, authors, publishers, illustrators, and scholars from all over the world cooperative to create an international digital library?
- How can this digital library be used in school and public libraries throughout the world?

The goal of this research is to give diverse people a voice in the technology design process to make digital libraries more appropriate for children's needs and to make this digital library accessible to learning communities throughout the world.

### ***Digital Libraries of Children s Materials***

There are few large-scale collections of digitized children's books to explore. In March, 2003 the largest collection of full-text digital books for children numbered fewer than 400 titles, which were published between 1850 and 1870. This collection of children's literature is being created at the Digital Library Center at the University of Florida (<http://palm.fcla.edu/juv/>). At the core of this collection are books from the Baldwin Library of Historical Children's Literature, housed in the Department of Special Collections and Area Studies at the University of Florida. Additional titles will be added from the Departments of Special Collections at the Florida Atlantic University, Florida State University, and the University of South Florida. The foundation for this collection was a cataloging and preservation microfilming project funded by the National Endowment for the Humanities (NEH).

Other sites that include collections of public domain titles include "Children's Books Online for Free" (<http://www.editec.net>), which includes fewer than 100 fully digitized books online, with plans to increase the number to 2,000 titles, and the University of Virginia's Electronic Text Center (<http://etext.lib.virginia.edu/ebooks/>), which includes approximately 200 books identified for young readers.

Most sites show only titles, sometimes with summaries, reviews or associated activities (e.g., <http://www.bookadventure.com>, <http://www.bookchilde.org>, <http://fusion.sims.berkeley.edu/ReadingTree>, <http://www.twbookmark.com/children>). Other sites offer only options to purchase books (e.g., <http://www.ebooks.com>, <http://www.ipicturebooks.com>, <http://www.tundrabooks.com>). Few of the sites provide books in any language other than English.

An examination clearly shows that most sites were not designed primarily for use by children. The interfaces rely on keyword searching and/or "point-and-click" lists that necessitate typing or reading long lists of titles. Some interfaces offer a combination of book cover images with titles, but then offer limited methods for reading the actual book pages. The industry standard for book readers, *Microsoft Reader and Adobe Acrobat eBook Reader*, were designed primarily for adults reading long books or documents consisting mostly of text (Hourcade et al., In Press).

## ***Creating the Visual Interface***

Between 1999-2002, a research team at the University of Maryland's Human-Computer Interaction Lab (HCIL) developed and tested a visual interface that supports young children ages seven to nine in querying, browsing, and organizing multimedia information. This initial project had multimedia resources focused on animal information donated by the Discovery Channel and the Patuxent Wildlife Research Center. It was used by children at Yorktown Elementary School in Bowie, Maryland to test and refine the interface.

Building on this research foundation and generalizing to a broader library collection and audience of children, the research team created a prototype for browsing, searching, and reading books electronically that was initially tested in August 2002. An interdisciplinary team of researchers from computer science, information studies, education, art, and psychology are working with children ages 7 to 11 to design this new library. Children's ideas are heard throughout the entire technology design process. To make this a reality, children work in the labs as researchers twice a week during the school year, and two intensive weeks over the summer. Together, this interdisciplinary and intergenerational team brainstorms, sets project directions, tests new ideas, and implements technologies (Druin et. al., 2001).

## ***Collection Development***

In addition to this partnership for interface development, the ICDL has also established partnerships for collection development with national libraries, public library systems, professional associations, commercial publishers, authors, illustrators, and school districts around the world. The Internet Archive, a non-profit organization focused on digital collection development, has been leading this effort for the project. Collection guidelines are being jointly created, materials identified and digitized, and fair use models are being explored. Approximately one half of the books in the initial prototype collection are within copyright. In some cases, the books were contributed with specific restrictions. Some publishers or authors agreed to donate their materials only if they were encrypted for book viewing using the Adobe eBook Reader. Others set limits upon the length of time that the books could remain in the collection. All are interested in understanding the market potential for such a delivery mechanism.

The materials included in the collection reflect similarities and differences in cultures, societies, interests, lifestyles, aspirations, and priorities of peoples around the world. The collection's focus is on identifying materials that help children to understand the world around them and the global society in which they live. It is hoped that through a greater understanding of one another that tolerance and acceptance can be achieved.

The collection has two primary audiences. The first audience is children ages 3 to 13, as well as librarians, teachers, parents, and caregivers, who work with children of these ages. The second audience is international scholars and researchers in the area of children's literature.

It is anticipated that all works included in the collection will be presented in their entirety and will not be adapted or abridged from their original published form; however, works originally published as abridgements or adaptations of other works may be included in the collection. Materials included in the collection may be

- currently available in print and within copyright,
- out of print but within the copyright protection of the country in which they were published, or
- freely available in the public domain.

Materials within the collection are available over the Internet to all users without charge. During the period of the research study, it is anticipated that approximately 40% of the collection will be made up of important historical materials that are in the public domain and approximately 60% of the collection will be contemporary materials that are in copyright. During the process of creating the collection, the ratio between historical and contemporary books will vary based upon the availability of materials. Historically important literature and contemporary award-winning titles will be added to the collection as they become available.

In addition to the collection of published materials, the ICDL may also include information that extends the understanding of the materials such as biographical information about authors or illustrators, reviews or annotations of works by users of the ICDL or others, activities to support use of the materials by children or others, and/or translations of materials to expand use by children. The primary function of the collection is to serve as the basis for ongoing research concerning the development of computer interfaces for children and the use of digital materials by children and librarians.

## ***The ICDL Architecture***

The initial ICDL software was written in Java and relies upon Sun's freely available Java 2 platform, currently available for Windows, Solaris, Linux and Mac OS. It is built using the *Jazz Toolkit for Zoomable User Interfaces* (Bederson et al., 2001). The software is deployed with Java Web Start technology that enables a user to download, install, and launch the software with a single click on a web page link after the Java software is installed. The ICDL software may then be launched either from the project's web page, or a desktop icon. Most books are stored unencrypted on a Web server in jpeg format and accessed directly through the Java client software. However, some books are encrypted according to publishers' requests and are served with *Adobe Content Server*. The encrypted books are accessed through the ICDL's visual search system, but are read with the freely available commercial *Adobe eBook Reader application*.

There are two ways to search for books. One can search by geography by spinning the globe and selecting a region (e.g., Africa, Europe, Asia, etc.). From this process, the search results provide a subset of the collection that is about the region, set in the region, or written by an author from the region.

A richer way to find books is through the visual search interface. The search categories were chosen based on research with children and librarians concerning how children want to look for books. The categories represented by the icons currently include:

- the subject of the book,
- the types of characters in the book,
- the language in which the book was written,
- "true" or "make-believe" books,
- how well it is rated by other children,
- how it makes children feel (e.g., "I want to find a book that makes me happy"),
- the shape of the book,
- the length of the book, and
- the primary color of the book's cover.

Clicking on one of these icons zooms in to reveal the possible attributes in that category, also represented by icons. Clicking on an attribute initiates a search on that attribute. The icon is smoothly moved to the "search caterpillar," which represents the current search. If multiple attributes are chosen, those attributes are ANDed. The search results are presented visually through book covers in the search result area.

Clicking on the search results brings the child to that area where they can then use a *Zoomable User Interface* to visually explore those results. The search results are shown using an embedded version of *PhotoMesa* (Bederson, 2001). *PhotoMesa* presents groups of images in rectangles that can then be examined more closely. Clicking on a group zooms into the group, and clicking again zooms in further to individual books.

Clicking on a single book brings up the "book preview" page, which includes metadata about the book, including title, author, date, language, publisher, contributor, page count and summary. From there, the book can be read with one of the four book readers.

A second interface, which will require less robust computer requirements, will be introduced in the summer of 2003. This interface will be HTML-based and will allow browsing and searching through both the “regions of the world” and the category-based approaches. It was found during the initial launch of the ICDL software that many users throughout the world had difficulty accessing the library because of the high technology requirements and the need for a fast Internet connection. Because of the enormous interest in gaining access to a collection of international children’s materials that was expressed by teachers, librarians, parents, and scholars throughout the world, the research team began exploring alternatives. It is anticipated that the research team will develop, test, and improve both versions of the software throughout the duration of the study.

## **Book Readers**

There are currently three book readers that were developed by the team at the University, and the *Adobe eBook Reader* for books that were required by the contributor to be encrypted. Children may use the reader with which they are most comfortable (except for encrypted books that currently require *Adobe eBook Reader*). The traditional reader is most similar to traditional commercial readers. It shows one page at a time with simple forward and backward navigation buttons. Users can specify the orientation of the controls (horizontal or vertical) and whether the pages are shown one at a time, or in a two-page spread. All pages are deployed with a 1024x768 jpeg image, but when zoomed in (with the magnifying glass icon), an image twice that resolution is downloaded in the background.

The “comic strip” book reader presents a zoomed out view of the visual book pages – oriented in horizontal strips like a comic strip. To read sequentially, a user simply presses the right arrow (or page down key). The interface smoothly zooms into the first page, and then animates to the next page in order upon subsequent arrow presses. At any time, the user may press the “zoom out” button to return to the starting overview page, and then click on any page to go directly to it, no matter what the page order of the book. The page borders are colored to indicate whether a page has been visited or not. The goal of this reader is to support simple overviews without getting in the way of traditional linear access. The HTML-version of the interface uses this reader.

The third option, the “spiral” reader, is more dynamic. Its goal is to provide an experience like flipping through the pages of the book to quickly examine the book’s content. It presents the pages of the book in linear order with a “focus” that is larger than the other pages, and a tail that shrinks. Like the comic strip reader, simple linear access is provided by the arrow buttons at which point the focus page is smoothly zoomed up to fill the screen. Going to the next page simultaneously shrinks the focus page down, rotates the spiral to focus the next page, and zooms up that next page. At any point, the zoom out button can be pressed to shrink the focus page, and then the user can click on any page in the spiral to spin the spiral so that page comes to the focus spot.

## **Initial Lessons Learned**

As noted above, the prototype for the library was launched on the web in November 2002. In an attempt to understand how the library was being used initially by the general web public, the research team analyzed log data. The results of this initial analysis are briefly presented here along with a discussion about what this information may mean regarding future web deployment of the digital library.

## **Results**

During the first three months of public use, log data were collected that suggested who was accessing the software, what search methods were used, and what books were accessed. For a shorter period of time, log data were collected on the use of the book reader interfaces. Based on the web logs and feedback that the team received by email, it is clear that there was broad use of the library by people from around the world including librarians, teachers, children, parents and others.

The log analysis was performed using the commercial Sawmill log analysis product ([www.sawmill.net](http://www.sawmill.net)). In this discussion, the term “visitor” means one who gained access to the project’s website from a unique IP address over the period of the analysis and “page view” means a specific web page accessed by any client. Each “session” is defined to mean access from a unique IP address with no inactive period greater than 30 minutes. All numbers are rounded.

Over the first three months of use, over 100,000 users accessed the general web site. Of those visitors, approximately 89,000 entered the library page that would give them access to the Java application deployed through Java Web Start, which would enable them to run the library. More than 20,000 were able to successfully download the actual Java application file and run the ICDL software.

The majority of the users were from United States, followed by Canada and Taiwan. Aggregated by continent, the users were from:

North America:	67%
Europe:	17%
Asia:	12%
Oceania:	2%
South America:	1%
Africa:	Less than 1%

More than three-quarters of the users (79%) looked for books using the visual search (category) interface, while 21% used the globe interface. Sixty-eight percent of category searches were on a single category with thirty-two on two or more categories. The top five single category searches were:

- Books for three to five year olds
- Books in English
- Books for six to nine year olds
- Books about imaginary beasts and creatures
- Books rated with five stars

The most frequent search categories in the digital library were not remarkably different from searches for books in physical libraries. Visitors looked for books by:

Age (books for three to five year olds, etc.)	18%
Subject of the book	17%
Language in which the book was written	13%
Type of book (genre)	10%
Characters	9%
Setting	8%
Color of the book cover	7%
How the book was rated by children	4%
How the book made children feel	3%

For the users who searched by geographic area with the globe interface, they searched for books by continent as follows:

North America:	29%
Asia:	24%
Europe:	23%
South America:	10%
Oceania:	8%
Africa:	6%

During the initial three month period, 36,000 total books were accessed (not including books that were read multiple times once they were downloaded since it was not possible to track this information.) The most popular book was *Axel the Freeway Cat* (Hurd, 1981). The popularity of this title may have been due to the fact that it was mentioned in numerous articles that appeared in press coverage of the ICDL launch. The next most popular books were (a) *Sun Flight* (McDermott, 1980), an in-copyright book contributed to the collection by Caldecott-Award winning author, (b) Brueghel's *Where's the Bear?*, a simple story in multiple languages donated by the Getty Trust Publications; and (c) *Going Downtown and other Rhymes* (Choo, 1996), a book about life in Singapore, contributed by the National Library of Singapore.

As for the books that were requested by publishers to be encrypted, the total number of books accessed was 1075 (again, not including locally cached accesses). The most popular book accessed through the *Adobe eBook Reader* was *How Do Dinosaurs Say Good Night?* (Yolen, 2000) followed by *Is Your Mama a Llama?* (Guarino, 1989) and *When Sophie Gets Angry-Really, Really Angry* (Bang, 1999). All of these books were contributed to the ICDL by Scholastic, Inc. The total number of books accessed through the Adobe Book Reader was considerably less (19%) than those accessed through the other three readers.

During a three week analysis of the other book readers, it was determined that the Standard Book Reader was used 69% of the time, the Comic Book Reader was used 16%, and the Spiral Book Reader was used 15%. Using these readers, more than 650,000 pages were accessed by all users. On average, each visitor looked at 1.5 books, and this number stayed relatively constant throughout the period. Most visitors viewed only one book, but many people viewed multiple books and more than 100 visitors read ten or more books.

## **Discussion**

Based on the initial analysis of use during the first three months, it became obvious that an application with high-end technical requirements can serve only a small percentage of users on the web. Only 20% of visitors to the ICDL during the initial period were able to run the library software successfully. It was assumed that this number was so low because of the high system requirements needed to run the application (e.g., a fast Internet connection, 250 mg of memory, and Java and Java Web Start installed). In response to the outpouring of email requests asking for access to the site with lower system requirements, the research team began to develop an HTML-only interface. The interface is in the initial testing stages and is expected to be deployed by Summer 2003. The team will compare usage patterns between the Java interactive version of the interface and the more static HTML version to determine how much, if anything, is "lost" to the user without the smooth animation and zooming.

The initial analysis indicates that most users of the ICDL were from North America or from primarily English-speaking countries. This finding is not surprising because the interface, though quite visual, includes text that currently is only in English. In addition, most initial media coverage about the project came out in the American press. As noted above, it is assumed that the high-end system requirements may be a barrier to use in many other countries. Therefore, one area of the research will focus on whether the make-up of users will change when the html-only interface is deployed and when there is explicit support for other languages.

During the initial analysis, most users searched by "standard" metadata categories. Based upon the preponderance of searches by "age" and by "subject," it is believed that most users were adults or adults working with children. When children in the University's lab and on-site in schools and libraries were observed, most seemed to search using the more novel categories. On-site testing of how children search (without adult suggestion) began in late March. The data collected will be compared to public access logs of the website to see if there are differences and to attempt to determine who and how the ICDL is being used. In examining the data on book readers, it was found that the more novel book readers (e.g., the comic strip book reader and the spiral reader) were accessed almost an equal number of times. This finding perhaps suggests that there is no clear favorite interface between the two options - a finding confirmed in earlier pilot studies in the lab with children (Hourcade et al., In Press). While the standard book reader was accessed more than the other readers, this seeming preference may be due to the fact that it is the default book reader. In future research, the default settings will be varied among the book readers to see if usage patterns change significantly.



In examining the books that were accessed most frequently, it was not surprising to find that contemporary books were the most popular. However, it also was determined that *Where's the Bear?*, the book that had text in five languages on each page, also was quite popular. A book of poetry, contributed by the National Library of Singapore, was particularly popular. These findings support the importance of a continuing commitment to identify bilingual and multilingual titles to include in the collection as well as to continue the emphasis on collecting books in as many languages as possible.

One of the primary reasons for conducting this research was to identify and test a means of expanding access to children's books in multiple languages. In the initial research, it appears that this project is responding to this need. What will be an area of continuing study is to determine how these materials may be used effectively with children to increase their understanding of similarities and differences among peoples and cultures.

In the initial study, it was not possible to determine (a) how many of the users were children and how many were adults; (b) how many children visited the library independently and how many visited with parents, teachers, librarians, or other adults; (c) how many users were teachers, librarians, or researchers; or (d) why the users visited the library. Therefore, an empirical study currently is underway to see how pairs of children in school and public libraries use the ICDL. In addition, a voluntary web-based questionnaire is being developed that may provide the team with a better understanding of who the users are and what their needs may be for the future. The team will continue to use web logs to track the general public's use of the ICDL to gain a better understanding of the use patterns over time.

While it has only been a short time since the initial deployment of the ICDL, the public's use of this demonstration system has provided a great deal of information that will help to focus future development. While the interface had been tested extensively before deployment, the biggest challenges turned out to be related other issues.

## Conclusions

### ***Balance Innovation with Public Access***

The enormous drop-off in users who were unable to download the Java *Web Start* application, made a profound impression on the research team. Many emails from frustrated users felt it was "shameful," "unfair to children," and "not supportive of schools and libraries" that such high-end system requirements would be needed to have access to children's books. At the same time, other email messages from many "excited" users expressed delight with the "interface innovations" and the relatively "bug-free experience". The team had discussed the issue of the "high end" technology requirements before the initial release. On the one hand, project funders and partners expected far-reaching research, yet concerns were expressed that potential users might become frustrated. There was particular concern that this international collection would have limited accessibility beyond North America if the technology requirements were too high, a result that the team definitely wanted to avoid.

The outpouring of reaction, both the positive regarding the importance of the project and the negative reflecting frustration because of lack of access from the users from throughout the world, resulted in the team's decision to commit significant resources to creating an interface that could be used more widely by the beginning of Summer 2003. Both the Java and the HTML-versions of the software will be accessible to visitors to the Library.

### ***Speed Matters***

The team was aware that speed is an important factor in the development of any interface; however, the initial phase of this research underlined just how critical it is in web deployment. Users are somewhat forgiving when a static web page takes several seconds to load. If that same slow speed is evident in an interactive Java application, however, people simply have no patience. If the users are children, the impatience is even more pronounced. As noted above, the findings in the initial research demonstrated how critical it is that the team employ a dual development strategy that supports access to the collection of children's materials and allows continuing interface innovation.

## ***There Is Interest in Various Countries and Languages***

Users throughout the world are interested in children's books from many cultures and in many languages. Other than *Axel, the Freeway Cat*, the books that were most frequently accessed were *Sun Flight*, *Where's the Bear*, and *Going Downtown and Other Rhymes*. Each of these books offers a look into other cultures, and in the instance of *Where's the Bear?*, into other languages. This finding confirms that there is great promise in pursuing the development of an international collection of children's books in multiple languages.

## ***Web Logs Can Say Only So Much***

While the analysis of web logs offered a good first understanding of users' activities with the ICDL, much more information is needed. In particular, it is important to know more about who is really using the computer. Before the initial release, team wrestled with the question of how much information could be collected from users. This concern was particularly important because the site is designed to be used by children. It is hoped that the combination of onsite empirical studies, voluntary web-based visitor questionnaires, and web logs will provide data to support the research progress.

## **Future Work**

A version of the interface for the library that does not require Java *Web Start* nor a high-speed Internet connection is in its initial testing phase. The research team has tentatively decided that this simpler, less technologically demanding version may serve as the default interface for the library, although the Java-based (enhanced) version will be available to all visitors. Based on the initial insights gained from the early analysis, it is clear that there is a need for testing and comparing both versions of the ICDL with various empirical methods. The research team members also have come to understand the critical need to balance research priorities with a responsibility for serving the public's interests. It has been made very clear by the visitors to the Digital Library that there is an enormous interest and a pressing need for a collection of children's materials in multiple languages from all over the world that is freely available over the Internet. As the research continues, balancing these two foci may be the biggest challenge facing the research team.

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**Biographical Note**

The ICDL Research Team is an interdisciplinary, intergenerational group of individuals from the University of Maryland/College Park and the Internet Archive/San Francisco. Members of the team include computer scientists, educational researchers, library and information studies educators, graphic designers, graduate students, and children, ages 7-11. The paper describing the ICDL project will be presented by Ann Carlson Weeks, one of five principal investigators directing the research.

**Notes**

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