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The International Children's Digital Library

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The International Children's Digital Library: An Introduction to the Project and an Overview of Initial Research Findings

ABSTRACT

The International Children's Digital Library (ICDL) is a five-year research project to develop innovative software and to create a collection of digitized books from all over the world. Interdisciplinary researchers from computer science, education, library science, art, and psychology are working together with children to create new interface technologies that will enable them to browse, search, access, and read books electronically. By the end of the study, the collection that is freely available over the Internet is expected to include more than 10,000 books in more than 100 languages. This paper will describe the project and present an overview of initial findings from the first year of the research.

Introduction

Books can play an important role in children's lives. Research has shown that children's use of books can increase their cognitive, social, and motivational development. In addition, 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.

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 has also found that if young people have opportunities to share personal experiences and "stories," attitudes may change (Jackson, 1983). 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, 2001).

Following World War II, Jella Lepman, founded the International Youth Library (IYL) in Munich because she believed that sharing children's books could build bridges between countries and understanding among people. Her vision in founding the IYL was to use children's books to "awaken a new understanding of other people and nations." Now, more than 50 years later, a new research project, funded by the US National Science Foundation and the Institute for Library and Museum Services is continuing to work toward Jella Lepman's vision of bringing the world together through children's books by using 21st century technology.

Research Goals

The International Children's Digital Library (ICDL) is a five-year research project, funded by the US National Science Foundation (NSF) and the Institute for Library and Museum Services (IMLS), to create a digitized collection of international children's books. The goals of the research are:

- to create a collection of more than 10,000 books in at least 100 languages that is freely available to children, teachers, librarians, parents, and scholars throughout the world via the Internet;
- to collaborate with children as design partners in the development of computer interface technologies that support children in searching, browsing, reading, and sharing books in electronic form;
- to better understand the concepts of rights management and "fair use" in a digital age;
- to evaluate the impact that access to digital materials may have on collection development and programming practices in school and public libraries; and
- to develop a greater understanding of the relationship between children's access to a digital collection of multicultural materials and children's attitudes toward books, libraries, reading, technology, and other countries and cultures.

The research is being directed by a team from the University of Maryland/College Park and the Internet Archive. A unique aspect of this work is the collaborative partnerships that have been created (Druin, 2001). At the University of Maryland, the work is focused on interface development and the analysis of use of the collection. The University of Maryland is interdisciplinary and intergenerational and includes individuals from computer science, information studies, education, art, and psychology, as well as children, ages 7-11. Children's ideas are heard throughout the entire design process. The children on the team work in the labs as researchers twice a week during the school year and for two intensive weeks over the summer. The interdisciplinary, intergenerational team brainstorms, sets project directions, tests new ideas, and implements technologies.

In addition to this partnership for interface development, the project also has 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 partnership effort for the ICDL project.

The materials included in the collection reflect similarities and differences in cultures, societies, interests, lifestyles, 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. Approximately 40 percent of the books in the current collection are within copyright and were provided by contributors with specific restrictions. Some publishers or authors agreed to contribute their materials only if they were encrypted for book viewing, and others offered their books for a limited period of time. Many contributors expressed interest in understanding the market potential for such a delivery mechanism.

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

The International Children's Digital Library (ICDL) was launched on 18 November 2002 at the Library of Congress in Washington, DC. The collection currently includes approximately 250 books from 18 countries (e.g., Egypt, Croatia, Singapore, Australia, New Zealand, Russia, China, United States and more) in 20 languages.

Description of the Initial Interface

The initial ICDL software, now referred to as the "Enhanced Version," is written in Java and relies upon Sun's freely available Java 2 platform, currently available for Windows, Solaris, Linux and Mac OS. It was built using the Jazz toolkit for Zoomable User Interfaces (Bederson, 2000). 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 (once Java is installed). The software may then be launched either from the 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 at the publisher's request and are served with Adobe Content Server. These books are accessed through the application's visual

search system, but are read with the freely available commercial Adobe eBook Reader application. The ICDL software application currently supports children with highly visual interface technologies to find and read books. A second HTML-based version, now referred to as the “Basic Version,” was released in May 2003. A short description of the “Enhanced” interface functionality follows.

There are two ways to access and retrieve books. The first considers books by geography. There is a globe area that enables children to spin the globe and select 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 (Figure 1).

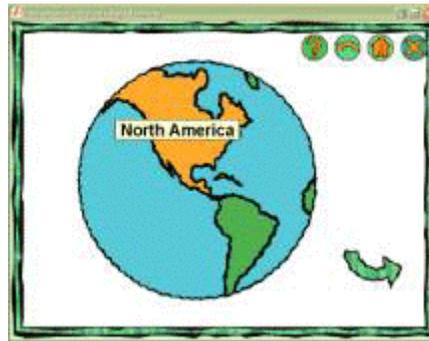


Figure 1: Searching for books using the globe interface.

A richer way to find books is through the visual search interface. Thirteen top-level search categories were chosen based on research with children and librarians concerning how children want to look for books (Figure 2). The categories include: the subject of the book; the types of characters in the book, if it is "true" or "make-believe"; 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; and the color of the book's cover.



Figure 2: The visual search categories.

Clicking on one of these icons zooms in to reveal the possible attributes of that field. Clicking on one those attributes performs a search on that attribute. The icon is smoothly moved to the "search caterpillar," which represents the current search. If multiple attributes are chosen, a Boolean intersection is performed between those attributes. The search results are presented visually through book covers in the search result area (Figure 3). 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.



Figure 3: The visual search results area. This figure shows all books with animals grouped by subject.

The search results are shown using an embedded version of PhotoMesa (Bederson, 2001). PhotoMesa presents groups of images in rectangles, which can then be examined more closely. Clicking on a group zooms into the group, and clicking again zooms in further to individual books.

When a single book is clicked on, the "book preview" page is shown which includes metadata about the book, including title, author, date, language, publisher, contributor, page count and summary. From here, the book can be read with one of the four book readers.

Book Reader Prototypes

There are currently three book readers that were developed by the research team at the University of Maryland (Hourcade et al., in press) and Adobe's eBook Reader for books that the contributor required to be encrypted. Children may use the reader with which they are most comfortable (except for encrypted books that currently require use of the 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. There are controls for the visual "skin" of the controls. Users can also 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 pixel 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 (Figure 4). 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.



Figure 4: The comic strip book reader.

The third book reader, 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 (Figure 5). Like the comic strip reader, simple linear access is provided by the arrow buttons (or normal keyboard shortcuts), 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.

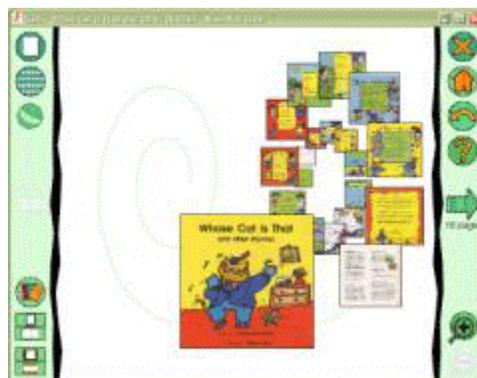


Figure 5: The spiral book reader.

Analysis of First Use

To understand how the initial version of the ICDL software was used during the first six months that the collection was available on the Internet, the team at the University of Maryland analyzed web log data. This log analysis was performed using the commercial Sawmill log analysis product (www.sawmill.net). The log data provided information regarding who was accessing the software; what search methods were used; and what books were accessed. For a shorter period of time, log data was collected on the use of the book reader interfaces.

During the first six months of use, more than 120,000 visitors accessed the ICDL website (www.icdlbooks.org). The team defined “visitor” as a web user from a unique IP address. Of those visitors, more than 26,000 actually “entered” the Library and opened at least one book. Of those users, the most were from North America (67 percent), followed by Europe (17 percent), and Asia (12 percent). However, it could be documented that there were visitors from at least 21 countries. During the period of analysis, over 1.3 million pages were accessed and more than 200,000 books were read. On average, each visitor looked at 1.5 books, and this number stayed relatively constant throughout this period. Most visitors viewed only one book, but more than 100 visitors read ten or more books

The data showed that 79 percent of users looked for books by using the visual search (Category) interface, while 21 percent used the Globe interface. Sixty-eight percent of category searches were on a single category with 32 percent 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

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

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

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 *Sun Flight* (McDermott, 1980), an in-copyright book contributed to the collection by Caldecott Award winning author, Gerald McDermott; *Where's the Bear?* (Brueghel, 1997), a simple story in multiple languages donated by the Getty Publications Foundation; and *Going Downtown and Other Rhymes* (Choo, 1996), a book about life in Singapore, donated by the National Library of Singapore.

During a brief period analysis of the book readers developed by the research team, the standard book reader was used 69 percent of the time, the comic book reader was used 16 percent, and the spiral book reader was used 15 percent.

Additional Analysis

Although the web logs could provide important information, the research team recognized that there were many questions that these data could not answer. Therefore, in April 2003, a voluntary survey was added to the website that invited visitors to respond to a number of questions. One questionnaire was designed for adult visitors and one for children. Each survey asked about the sex and age range of the visitor, as well as the location where the library was being accessed and the number of individuals at the computer.

The information provided from this source indicated that 60 percent of the visitors were female; approximately half the children that visited the website did so with a second person; and parents were the most frequent visitors (30 percent), followed by teachers (25 percent), and librarians (10 percent).

In the first observational study of the use of the ICDL, approximately 100 children, ages 6-11 years from a Maryland elementary school, were invited to use the ICDL software in pairs. Initial analysis of the findings suggests that girls spent more time reading than did boys, and boys spent more time searching than girls. The younger children spent as much time using the ICDL as did the older children, and most children read the first book they selected.

Next Steps

To increase access to the ICDL collection of international children's books, the research team created an HTML interface that is expected to be accessible to most visitors to the ICDL web site. It has much lower requirements for technology and speed of Internet connection. The "basic version" is expected to be much more accessible to users who have less robust Internet connections and computer hardware. It also is expected to be more usable for school districts and/or public libraries that use proxy servers or have firewalls to protect district information. The "basic version" was introduced in late May 2003.

The ICDL project has formed a collaborative relationship with the International Youth Library in Munich to identify and request permission to digitize titles that have appeared on the annual *White Ravens* lists published in the last ten years and that are currently out of print. In addition, the project continues to identify and pursue collaborative relationships with National Libraries, national sections of the International Board on Books for Young People (IBBY) and other organizations that are committed to identifying and promoting outstanding literature for children. It is hoped that through these collaborative relationships that the ICDL collection will continue to grow and to reflect the best in both historic and contemporary literature for children, ages 3-13.

Future research studies will focus on differences between users experiences with the "basic" and "enhanced" versions of the interface; focused studies on search strategies and reading; comparison studies of physical library usage and digital library usage; and international studies on children's attitudes about books, libraries, technology, and other cultures.

The research team invites your participation in the use of the ICDL collection and the ongoing research concerning children's use of digital resources and the benefits to libraries of an international collection of children's books. For ongoing information, please visit the project's website at www.icdlbooks.org

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