An Evaluation of an Information Retrieval System

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THE INTERNATIONAL CHILDREN’S DIGITAL LIBRARY

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Introduction

SYSTEM DESCRIPTION

The International Children’s Digital Library (ICDL; http://childrenslibrary.org) is a digital collection of children’s books from around the world, developed jointly by researchers at the University of Maryland and the Internet Archive. The mission of the ICDL is “to support the world’s children in becoming effective members of the global community - who exhibit tolerance and respect for diverse cultures, languages and ideas -- by making the best in children’s literature available online free of charge” (ICDL, n.d.e). The ultimate goal of the foundation is to collect and make available over ten thousand books for children aged 3 to 13 from many different countries in over one hundred different languages. These books are available to anyone with internet access.

Currently, there are almost 4500 books in the collection. Fifty-five languages are represented, and many of the books are accompanied by translations in one or more languages in addition to the original (ICDL, n.d.c). The books in the collections are either in the public domain, or are donated to the collection by their copyright holders. In addition to contributions by publishers and individual authors, many libraries and other organizations across the globe have made contributions to the library (ICDL, n.d.a).

Users

Because the library interface is available in 16 languages, the set of potential users is large. The library was designed to be used by children, and they are likely its biggest audience. Because the search interface was designed for and with children (Druin, 2003; Hutchinson, Druin, & Bederson, 2007), children can use the library to find books on topics of interest independently by relying primarily on icons rather than searching by typing or browsing by category labels. (These and other search features will be explored in more detail below.) Not only do these features make the library more accessible to young children with limited reading skills, it also makes the library more accessible to children with disabilities. Indeed, digital materials might be better for students with disabilities than their print counterparts (Collen, 2007). For example, the book can be presented on a large screen for students with visual impairments, and the text on each page can be further enlarged by clicking on it.
the other hand, some children may be unable to actually read a book once they find one of
interest. Only books that have have been transcribed or translated are compatible with
screen reading software (ICDL, n.d.b). Fortunately, the ICDL is actively seeking help from
its users to provide translations (even without speaking both languages!) with “Help the
ICDL’ buttons located on search pages. In order to make the collection more accessible, all
books should be transcribed. Alternatively, or in addition, audio versions of the books would
be a useful feature.

Other potential users of the ICDL include educators and librarians. For example, librarians
might use the ICDL to expand their own collection of children’s literature (Lemmons,
2009), particularly in diverse communities where foreign language materials are in demand
(White, Anthony, Weeks, & Druin, 2004), for group read-alouds (Collen, 2006; 2007), or to
teach children about searching and about digital libraries. Educators might use the ICDL
for foreign language learning, to introduce themes of diversity and cultural awareness, in a
geography unit, or with English language learners. The ICDL could also be a wonderful re-
source for immigrant families, who may not have access to children’s literature in their na-
tive language in their new communities (Cummins, 2004). Finally, given the historical nature
of much of the content (e.g., books in the public domain), and the fact that it provides a col-
lection of literature from a number of different cultures, the ICDL could be a useful re-
source for historians or literary theorists interested in children’s literature. On the other
hand, this characteristic of the content may make the library less appealing to young readers
who might find the books dated or irrelevant.

Search Interface
The ICDL provides four methods for searching the collection, including simple search, ad-
vanced search, keyword search, and books by countries. At the top of each of the search
screens, a main navigation bar presents visual icons for the user to easily navigate the library,
and a breadcrumb trail is also available (see Figure 1). In this way, users can readily go to the
ICDL homepage, go back one page, and orient themselves within the site. In addition, all
four search methods allow users to change the search interface to one of the 16 languages
currently available. This feature broadens the accessibility of the library greatly. However, it
might be even more useful if the interface was available in all of the languages represented in
the collection.
The simple, advanced, and keyword search methods only support the Boolean AND (or, conjunctive search). This design decision was based on research showing that children are better at conjunction than disjunction (Hutchinson, Druin, & Bederson, 2007). In addition, although there are four so-called “search” methods, only one of them, keyword search, is a true search mechanism. The others are browsing methods that provide search results based on a user’s selection of any number of a set of search categories. As a result, many traditional search fields traditionally available for collections of books, such as author and title, are not available to users. This is most certainly the result of design decisions made based on the primary user audience, children. However, it might be worthwhile to incorporate an interface for adult users (e.g., educators, librarians, researchers) that would provide more conventional search mechanisms, such as additional Boolean search options and field searching.

In the sections that follow, I will provide more specific information and analysis of each of the four search methods.

**Simple Search**
The default search is “Simple Search,” in which users search for books using popular search categories displayed as labeled icons (see Figure 2). A user builds a query by selecting search categories, which get added via the Boolean AND. Users can also add keywords to their search by typing them in to the box at the bottom of the screen. Users can deselect search categories by clicking on them a second time, and a trashcan icon can be clicked to start a new search. This method of building a query seems consistent with the cognitive skill level of the primary user group. As the query is built, it is written out as an equation (e.g., Three to Five + Kid Characters = 249 books). This provides educational feedback to the child about what happens to the set of results when multiple categories are selected (Hutchinson, Druin, & Bederson, 2007).

A number of other features of the Simple Search illustrate its child-centered design. Most obviously, it is primarily visual, with icons representing each of the search categories. In addition, many search categories that are unique to the ICDL came to be as a “the result of the research team’s collaboration with children” (Weeks, 2007, p. 28). These include cover color, how a book makes a child feel (e.g., happy or sad), book length (i.e., short, medium, or
long books), and character type (i.e., kid characters, real animal characters, or imaginary creature characters). For example, the color search feature was incorporated for a number of reasons: children tend to remember the physical features of a book (e.g., the color of its cover; its location on a shelf); they enjoy searching based on color or attractiveness; and this feature simplifies the search process in the ICDL, where searching for topics in unfamiliar languages might be difficult (Weeks, 2007).

The Simple Search page also presents the search categories together on the search page, rather than hierarchically. This might be counterintuitive for adult users of the system, but the “flattened” arrangement was the result of research showing that children’s (and, in fact, adult’s) searching and navigation is more efficient and successful with this arrangement of categories (Bilal & Bachir, 2006; Hutchinson, Druin, & Bederson, 2007).

**ADVANCED SEARCH**

The “Advanced Search” option is a text-based interface that provides users the opportunity to browse the entire set of search categories, rather than just the most popular (see Figure 3). As was the case for Simple Search, the Advanced Search interface allows users to build a
query by selecting their chosen search categories. For example, when a user selects “Age” as a search feature, the three categories appear, and users can select one or more of them by clicking on a check box (see Figure 4). The option to search by keywords is also available here.

The complete set of search categories available in the Advanced Search function of the ICDL is presented in Table 1. Each of these categories has a controlled vocabulary. We have seen the categories for age (i.e., 3-5, 6-9, and 10-13 years) and some of those for characters (i.e., adults, kid characters, real animal characters, and imaginary creature characters). Another example is genre, which includes fairy tales and folk tales, action/adventure, mystery, funny/humorous, fantasy/science fiction, scary/horror, learning books, plays, poems/songs/rhymes, short story collections, and award winning books.

To use the Advanced Search, users must click on a higher-level category to see the search categories within it. This makes it a bit difficult to use. However, it does make the interface more simple and clean. On the other hand, the more categories that get selected, the more room is taken up by the subcategories within it. Fortunately, only one subcategory from each major category (e.g., Audience) can be viewed on the screen at once. It also takes time...
Figure 4. Building a query in Advanced Search

<table>
<thead>
<tr>
<th>Audience</th>
<th>Appearance</th>
<th>Content</th>
<th>Type</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Cover color</td>
<td>Continents</td>
<td>True vs. make</td>
<td>Culture &amp; society</td>
</tr>
<tr>
<td>Language</td>
<td>Format</td>
<td>Countries</td>
<td>believe</td>
<td>Entertainment</td>
</tr>
<tr>
<td>Publication date</td>
<td>Length</td>
<td>Other Places</td>
<td>Genre</td>
<td>History</td>
</tr>
<tr>
<td>Date added to</td>
<td>Shape</td>
<td>Characters</td>
<td>Feeling</td>
<td>People &amp; relationships</td>
</tr>
<tr>
<td>library</td>
<td></td>
<td>Time Periods</td>
<td>Rating</td>
<td>Places</td>
</tr>
<tr>
<td>Collections</td>
<td></td>
<td></td>
<td></td>
<td>Science &amp; nature</td>
</tr>
</tbody>
</table>

Table 1. Search categories

for each of the subcategory sets to load, and this makes the Advanced Search a bit clunky to use.

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It is helpful that users cannot select categories if no items exists in that particular combination of categories. For example, once I select Age: Six to Nine and Country: Finland, there are no Action/Adventure books in the collection that meet these criteria, so that category is not available (grayed out, with no checkbox available). This makes searches with no results impossible (unless keywords are also being used). This same feature is also incorporated in the Simple Search interface.

**Books by Countries**
The “Books by Countries” search interface emphasizes the international aspect of the library. Users can search for books by selecting continents on a spinning globe to find books associated with a particular region (see Figure 5). This search feature is a very simple and visual way to allow children to find books about a region, set in a region, or written by an author from a region. However, calling it “Books by Countries” is misleading, since the regions that can be selected are larger than the country level, and correspond roughly to continents.

![Location Search](image)

*Figure 5. Books by Countries search interface.*

**Keyword Search**
The Keyword Search can be used along with the Simple and Advanced Search methods. This is the only method by which users can search for titles or authors, along with any other key-
word. Based on my experience, it appears that the keyword is searched across all metadata available, including author, title, summary, etc.

Search Results

**Results List**

In the Simple and Advanced Searches, the search results in the ICDL appear in the middle of the search page itself, and change dynamically as a user enters additional search criteria (see Figure 6). The library designers informally called this the Fisher-Price® design, based on their observation that many children’s toys “often have a central feature with large buttons around the outside” (Hutchinson, Druin, & Bederson, 2007, p. 1621). They thought that a familiar design would make search and navigation easier for young children. In addition, as was already pointed out, a child can see how adding search terms affects the list of results in real time.

![Figure 6. Simple Search results list.](image)

In the Simple Search interface, search results are listed alphabetically according to title, and there are no sorting options available. This keeps the interface simple for younger users. In addition, it is the book cover and title that are likely to be noticed and used as the basis for
selection by these users. However, this arrangement is inconsistent with how titles are displayed in a real-world library, which might be somewhat confusing.

On the other hand, the Advanced, Keyword, and Location Searches provide more flexibility in how the search results are presented. Here, users can view the book covers (default), but also have the option of viewing a text based results list, which lists the title, author, year of publication, language(s), and, in the Location Search, the summary, as well. Results can also be sorted by title (default), language, author, illustrator, and publication date. These options are more consistent with other information retrieval systems, and are more inline with (adult) user expectations. However, I do think it is reasonable that these options do not appear for the Simple Search interface. Finally, the Location Search allows you to further refine the search results by selecting books that are either “from,” “about,” or “set in” the region of interest. This unique feature is most relevant to this particular search method, and I appreciate the designers’ consideration of context in making this option unique to this search method.

**Item Display**

When a title is selected, users are presented with more detailed information about the book (see Figure 7). The record provides a fairly limited bibliographic description of the item, as

![Figure 7. Example item record in the ICDL](image-url)
compared to records we have explored in OPACs and online book sellers. A typical record in the ICDL includes the title, author, illustrator, publication date, publisher, summary, ISBN, number of pages, and cover image. Whether this basic information appears in the record depends on the completeness of the metadata. (However, this issue will be discussed in more detail below). The individual or organization that contributed the book to the library is also included. The record might also include editor, adaptor, reader reviews, notes, and links to places where a physical copy of the book can be obtained (e.g., amazon.com, a library via WorldCat).

One of the positive features here is that children have an opportunity to contribute to the record by writing reviews. However, some users are adults, so adding reviews from other sources would also be helpful. Users with accounts (see below), can also add tags for books. However, these tags are not shared between users, so I would only be able to see my tags, not those of others'. In this age of social media, I think that this is a big weakness. Finally, it might be helpful for users if the record contained a measure of the item's reading level, a feature that is available in many children's OPACs.

From item record screen, the user can click to “Read this Book.” The initial screen in the screen reader shows thumbnail images of all of the pages in the book, and the user can click on any page to begin reading. The books are easy to navigate with buttons that appear on the top right of the main navigation bar at the top of the screen (see Figure 8). Users can make the book full screen, zoom out, zoom in, view one page or two adjacent pages,
turn one page back, and turn one page ahead. Forward page turns can also be achieved by clicking on the book itself. Users can easily navigate back to the “About This Book” item record or go back to their original search by clicking on the appropriate link in the bread-crum trail. The book reader is intuitive and easy to use.

Metadata

BIBLIOGRAPHIC STANDARDS
The ICDL (n.d.d) makes use of a number of bibliographic standards. The metadata elements are based on the Qualified Dublin Core (http://www.dublincore.org/) set. Element definitions are consistent with IFLA’s General International Standard Bibliographic Description (ISBD(G); http://archive.ifla.org/VII/s13/pubs/isbdg.htm), and rules for entering metadata follow the Anglo-American Cataloging Rules (AACR2). It is the intention of the ICDL to make their records interoperable and easily transferable to other formats, such as MARC, so that they can be “shared with other library databases” (ICDL, n.d.d).

On the other hand, the controlled vocabulary used for subject headings are not from a standard cataloging scheme. It is not surprising that the system designers chose to create their own set of subject headings, given the specific target audience and the other design decisions made. Abbas (2005) suggests that there are few age-appropriate controlled vocabularies for children, and little research into the topic. In addition, most searching is actually done via browsing, so a complicated, hierarchical scheme like the Dewey Decimal System or Library of Congress Subject Headings would not suit the system’s design. Further, studies of children’s use of the ICDL indicate that they prefer search categories other than subject (e.g., color), and that they have a different level of understanding (Druin, 2003), two more reasons to rethink metadata schemes for children (Abbas).

METADATA ASSIGNMENT
The metadata in the library is primarily entered by the book’s contributor. The ICDL provides a form (http://www.childrenslibrary.org/servlet/Metadata) and comprehensive instructions (ICDL, n.d.d; http://en.childrenslibrary.org/contribute/metadata.shtml) for supplying metadata. However, it is clear that the ICDL staff review and add to the metadata supplied by the contributor. For example, some of the search categories do not appear on the metadata form (e.g., cover color) or do not appear in the form that they do in the search (e.g., subject; age is open-ended on the form, but appears as a choice between three categories in the search interface). It appears that there is a substantial amount of editing and additional metadata entered by ICDL staff following a book’s submission. This guarantees at least some level of consistency and reliability in the metadata.

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Other Features

Finally, the ICDL has a number of additional value-added features that are worth mentioning. First, users have a number of customization options. Children can choose to read books via the standard reader, as described here, or with a spiral or comic book reader. Druin (2003) suggests that children want to choose how they read a book, and, since no one reader format was preferred in studies, it seems that they have their own personal favorite method. This finding highlights the importance of customization. Additional customization features come with the creation of a free personal account. With an account, users can add tags to books, set a preferred language for the search interfaces, add items to a personal bookshelf, and save their page in a book that they are reading.

Librarians might be interested in the Book of the Day widget, which can be embedded on a library web page and features a new book each day for their patrons or students to explore. There are also featured books, which appear on the ICDL homepage and on the Simple and Advanced Search pages before a query is entered. These are books submitted by users that are usually related to one another in some way. Educators and other adults working with children might also be interested in the site's Exhibitions, which are small sub-collections of books based on themes (e.g., friendship, seasons) that are accompanied by related activities. Finally, many children and adults would be interested in the ICDL apps for iPhone and iPad, which make reading books on the go easy.

Conclusion

The International Children’s Digital Library, as an information retrieval system, has a number of strengths and weaknesses, which have been discussed in this paper. Many of the weaknesses seem to result from the strict focus of the product to be accessible by children. That is, adults might find a number of limitations in the system. Because some portion of the users of the ICDL are adults (e.g., librarians, researchers), I would suggest that a search interface designed for adults would address a number of concerns.

On the other hand, the system is fabulous for children to find books from cultures around the world. It fills a much needed gap in many library collections, and provides free access to high-quality children’s literature to people who may not have access otherwise.
References


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**Sources Consulted**

