

Bringing Together Children and Books: An Initial Descriptive Study of Children's Book Searching and Selection Behavior in a Digital Library

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This study describes how elementary school students search for and select books using a digital library. This work was done as part of the International Children's Digital Library (ICDL) project in order to explore and discover new directions for the development of digital library interfaces for children ages 3-13. Children used two versions of the ICDL software to search for, select, and read books. We performed a frequency analysis of the number of queries run, books selected, and books opened, and compared book selection rates and book opening rates. Popular query categories and titles selected are tallied. We found differences in book searching and selection behavior, query category preferences, and titles accessed by gender and age and no differences by software version.

Introduction

New tools, such as online library catalogs, electronic encyclopedias, online databases, and digital libraries, bring together children and information. As digital information resources become more commonplace in children's lives, a growing body of research has developed concerning children's information-seeking behavior in online environments. Research has found that children in the elementary grades have a wide range of abilities and needs when it comes to information retrieval systems (Solomon, 1993). As information seekers, children display evolving information needs and employ iterative search strategies (Borgman et al., 1995), preferring to browse rather than use keyword searching (Borgman et al., 1995; Bilal, 2002b). There is a high level of convergence among children in terms used for searching (Solomon, 1993) and children have also been shown to choose to browse a narrow set of search results, returning repeatedly to the same results when they are successful (Borgman et al.,

1995).

Although information retrieval systems may be intended for children, many have been found to require knowledge and skills beyond children's developmental abilities (Bilal, 2002a; Borgman et al., 1995; Cooper, 2002a; Moore & St. George, 1991; Solomon, 1993). In response, researchers have developed approaches and best practices for designing tools that accommodate children's unique information needs and usage patterns (Bilal, 2002a; Druin, 2002).

Reading instruction and literacy development also continue to be areas of research interest. Self-selection of reading materials has been shown to be a strong motivator for children to read and read more (Roettger 1980; Tunnell et al., 1988). Some educators have suggested that developing approaches to support children's unique selection strategies may lead them to develop reading skills and exceed their supposed reading level (Carter, 2000; Hunt, 1996/1997; Krashen, 1993).

A number of studies have examined children's book selection strategies in libraries and media centers. Researchers have shown that when looking for desirable reading material, elementary-age children most often seek books based on topic or genre or physical characteristics, such as book covers (Campbell et al., 1988; Cooper, 2002a; Fleener et al., 1997; Kragler & Nolley, 1996; Pejtersen, 1986; Robinson et al., 1997; Wendelin & Zinck, 1983). Younger children are less likely to take note of generic distinctions, such as fiction versus nonfiction (Cooper 2002b), while for older children, genre plays a key role in selection (Fleener et al., 1997). When actually selecting books, children have been found to flip through book pages (Kragler & Nolley, 1996; Robinson et al., 1997), though this strategy may be less central for older children (Fleener et al., 1997). Finally, younger children have been shown to look at several books before making a selection (Robinson et al., 1997).

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Figure 1. ICDL Basic, Categories area.

The goal of this study is to bring together these research areas — children’s information-seeking behavior in online environments and children’s book selection strategies — in order to understand how children use a digital library to search for and select books.

International Children’s Digital Library

The International Children’s Digital Library (ICDL) offers a new approach to providing an international collection of books in multiple languages to the world’s children. The mission of this five-year research project, now in its second year, is to select, collect, digitize, and organize children’s books and create appropriate technologies for access and use by children ages 3-13 (Druin et al., 2003). ICDL is unique among digital libraries in that it offers not only a robust interface for searching the collection, but also provides direct access to the digitized books themselves. The ICDL currently includes 324 books in 23 languages. Over the next five years, the ICDL’s collection is expected to grow to 10,000 books representing at least 100 languages.

Searching for books in ICDL

The ICDL collection may be browsed in two main search areas. The “Categories” search area is organized into

traditional categories, such as subject, genre, and publication date as well as novel categories, such as characters, color of book cover, and shape (Figure 1). The “World” search area enables access to the collection by spinning a globe to select books from, about, or set in a region (Figure 2).



Figure 2. ICDL Basic, World area.

Selecting books in ICDL

Use of ICDL to select books mirrors the process used in browsing for books in a traditional library. After a child runs a query from the Categories or World area, the search results appear, presenting the child with the covers of the books from which to choose, as if perusing the books on a shelf (Figure 3). After selecting a book from the search results by single-clicking it, the child is shown the book's descriptive metadata in a book preview screen, like pulling the book from the shelf to examine it further (Figure 4). If the book appears sufficiently interesting, the child can click on the book cover to open the book. Once in the book reading area, the child may view the complete book texts and images (Figure 5).

The ICDL interface has been implemented in two ways: "ICDL Enhanced," a Java version of the library launched in November 2002, and "ICDL Basic," an HTML-and-Javascript version of the library launched in June 2003 to enable access to a broader audience. Both versions offer children the ability to find books in the Categories and World areas and read books in the book reading area. In addition to these basic features, ICDL Enhanced offers a "Zoomable User Interface" with animation and sounds, visual Boolean AND queries, and multiple book readers with customization features. This software was developed in partnership with children, using a participatory design approach in which children and adults worked together to brainstorm new ideas and build and test interactive prototypes (Druin et al., 2001, 2003).

The interaction with children in the design process has led us to develop new interfaces reflecting children's needs (Druin, 2002). This study grows out of the need for empirical research to better understand how children interact with the interfaces developed by the ICDL team and suggest new directions for future development.

Research Goals

The goals of this study are to:

- describe how children search for and select books using the ICDL;
- discover the variety of book searching and selection behaviors employed by children;
- examine the relationship of gender and age to book searching and selection behavior;
- examine the use of two different digital library interfaces for book searching and selection; and,
- establish a broad understanding of children's interaction with a digital library.

Methods

Because there are few researchers working in this area of children's digital libraries, we had very few preconceptions of what this study could yield. Qualitative methods are most appropriate in this situation. We observed the



Figure 3. ICDL basic, search results.



Figure 4. ICDL Basic, book preview with metadata.

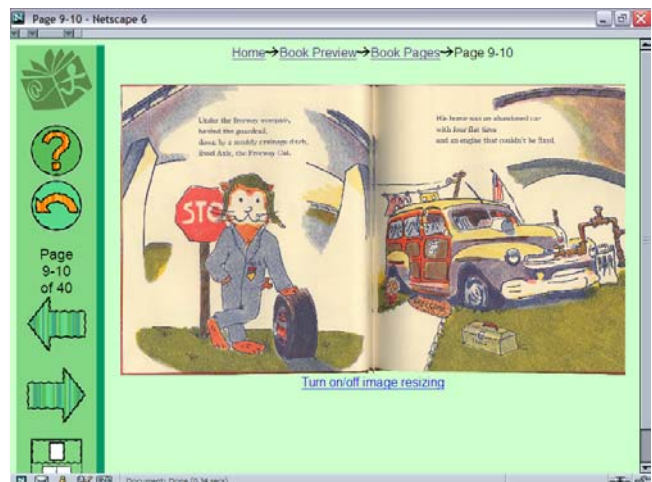


Figure 5. ICDL Basic, book pages.

children in a setting very close to natural digital library use and collected rich data about their interaction with the ICDL. This paper reports only descriptive statistics of

children's searching and selection behavior as a prologue to in-depth qualitative analysis.

Participants and research setting

The study participants were 96 first- through fifth-grade students from 11 classrooms at a public elementary school in the Maryland suburbs of Washington DC. There were 24 children each in the second and third grades and 16 children each in the first, fourth, and fifth grades, half boys and half girls in each grade. The ethnic makeup of the study participants represented the school's diverse population, comprised of 47% white, 42% African-American, 8% Asian, and 3% Hispanic students.

Study experience

We worked with the children in pairs in hopes of generating conversation that would give us insight into the children's motives. Children were matched in same-sex pairs in order to report any findings based on gender. We asked the children's teachers to match the children into pairs based on reading ability and ability to work together cooperatively.

With each of the pairs, one of the researchers read from a script orienting the children to the purpose of ICDL and explaining the study experience. Each pair conducted two library sessions, one with each version of the ICDL software. They were asked to use ICDL Basic (or Enhanced) to find a book they both wanted to read and then to read it. The researchers explained that they were free to spend as much time looking for a book as they wanted, open as many books as they wanted, and read as much of each book as they wanted. The children were instructed to tell the researcher when they were finished. Children were then asked to look for another book using ICDL Enhanced (or Basic). The version of the software the pairs used first was counterbalanced across genders and grades.

The researchers also conducted an opening and closing interview with each pair. The opening interview consisted of five questions establishing each child's library and computer usage habits. The closing interview asked each child whether they had a preference for one version of the software and what they liked and did not like about the ICDL software. In all, the researchers worked with the children for varying amounts of time, ranging from nearly 10 minutes to more than an hour.

Materials and equipment

Special logging versions of ICDL Basic and ICDL Enhanced were prepared to capture mouse click sequences. Log files included detailed information about movement through the various screens and pages within the software, along with every action taken, including the categories browsed and selected and the books accessed. This high level of detail in the log files made it possible to faithfully

recreate the children's interaction with ICDL for this analysis.

At the time of the study, the ICDL collection included 196 books in 20 languages, grouped into 13 main Categories and 6 World regions. Both versions of the ICDL logging software were loaded on three identical laptops and used with three identical one-button mice (to minimize mouse-use confusion with younger children). Video cameras were set up pointing over the children's shoulders at the computer screen to capture children's interaction with the software and with one another. The researchers worked with the children outside of their classrooms in whatever quiet, secluded space was available throughout the day.

Data collected and analyzed

Data collected included 96 log files from each library session (i.e., two log files, one Basic and one Enhanced, from each pair of children), children's responses to the opening and closing interviews, videotapes of the interviews and interaction with the software and each other, as well as any researcher notes. For this paper, only data from the log files have been analyzed.

The data collected from the log files related to searching and selection behavior include:

- the number of queries run, including those that resulted in no book selection or selections of multiple books from the same set of search results;
- the search areas and categories used to run the queries;
- the number of books selected from the search results (i.e., the number of times the book preview page was displayed);
- the number of books opened from the book preview pages; and,
- the titles of the books that were selected and opened.

We tallied the frequency of each of these items and calculated the following rates:

- *book selection rate* — the percent of queries run for which children selected at least one book from the search result set to view in the book preview page;
- *successive search results visits rate* — the percent of queries run for which children returned to the same search result set multiple times to select books;
- *title variability rate* — of the total number of titles selected, the percent of titles selected by only one pair; and,
- *book opening rate* — of the books selected from the search results, the percent of books that were actually opened.

In all cases, data can be analyzed by grade, gender, and software version.

Findings

Searching for books

Number of queries. Of the 96 library sessions (2 for each of 48 pairs), the children ran an average of 3.8 queries (Table 1). The boys in this study tended to query more than girls. First-graders conducted the most queries, on average, trailed by fifth-graders. There were no notable differences by version of the software.

Table 1. Mean number of queries per library session.

Grouping	n	Queries
All children	96	3.8
Boys	48	4.7
Girls	48	3.0
Grade 1	16	6.1
Grade 2	24	2.6
Grade 3	24	2.8
Grade 4	16	3.9
Grade 5	16	5.1

Search area preferences. The children in this study used the World area slightly more often than the Categories area to run queries (Table 2). The younger children preferred running queries in the World area to the Categories area two-thirds of the time. Fourth-graders showed an almost equal preference for the World and Categories areas. In the fifth grade, there was a strong preference for Categories over World. There were no differences by gender or software version.

Table 2. Frequency of queries run by search area.

Grouping	World	Categories
All children	197 (53%)	173 (47%)
Grade 1	64 (65%)	34 (35%)
Grade 2	39 (63%)	23 (37%)
Grade 3	44 (66%)	23 (34%)
Grade 4	30 (48%)	32 (52%)
Grade 5	20 (25%)	61 (75%)

Popular search categories. There was a high convergence overall in the categories used to run the queries. The top five categories account for more than half of all queries (Table 3). There were some notable differences by gender and age in the categories used to run queries. One of the most popular categories among boys

Table 3. Most frequently run queries among all children.

Category	Frequency
World: North America	57 (16%)
World: Asia	40 (11%)
Categories: Genre	39 (11%)
World: South America	31 (8%)
Categories: Subject	27 (7%)
Total	184 (53%)

was *Characters* (e.g., “Real Animals”), which was used only once by girls, while one of the most popular categories used by girls was *Color* (e.g., “Rainbow”), which they used more than twice as often as boys. Among fifth-grade boys, there was a strong preference for *Genre* (e.g., “Science Fiction and Fantasy” or “Scary/Horror”), which was rarely used by girls or children of any other age.

Selecting books

Book selection. After running a query and obtaining search results, children may choose to select a book from the search results and see the book preview page. Of the total number of queries run, most resulted in selection of at least one book from the search results (Table 4). Across age groups, the girls made book selections from the search results more frequently than the boys. Younger children also had a higher book selection rate than the fifth-graders. Nearly half the time the fifth-graders — and one-third the time boys — visited the search results, they returned without making a book selection. There were no notable differences by software version.

Table 4. Percent of queries run resulting in book selection.

Grouping	Book selection rate
All children	72%
Boys	66%
Girls	83%
Grade 1	73%
Grade 2	82%
Grade 3	84%
Grade 4	76%
Grade 5	52%

Successive search results visits. After selecting a book from the search results, children may choose to run a new query, abandoning their previous search results, or instead return to the same results in order to select another book. All children tended to run a new query after making a book selection, though a sizable portion of the queries run led to successive visits to the same search result set (Table 5). The tendency to run new queries was most pronounced for first-graders, while third-graders had the highest rate of successive search results visits. There were no notable differences by gender or software version.

Table 5. Percent of queries leading to successive search results visits.

Grouping	Successive search results visits rate
All children	13%
Grade 1	6%
Grade 2	13%
Grade 3	21%
Grade 4	11%
Grade 5	17%

Popular titles selected. Overall, there was some convergence in the books accessed. Of the books selected, the top five books account for 20% of all book selections (Table 6). However, there were no notable trends in the characteristics of the most popular titles selected. Two of the top five books were picture books, one was a chapter book, one was a collection of short stories, and one book was non-fiction. Two books were published in the last five years, two in the last 15 years, and one was published more than 20 years ago. Two books were not written in English.

Table 6. Most frequently selected books among all children.

Title	Frequency
<i>Bone Idol</i> (Todd, 2001)	16 (5%)
<i>Axle the Freeway Cat</i> (Hurd, 1981)	14 (4%)
<i>El Loro Pelado y Otros Cuentos de la Selva</i> (Quiroga, 1991)	14 (4%)
<i>I Spy: A Book of Picture Riddles</i> (Marzollo, 1992)	12 (4%)
<i>The Ancient Egyptians*</i> (Hassan, 2001)	10 (3%)
* Written in Arabic.	Total 66 (20%)

There were some differences in the most popular titles selected by gender. A number of titles in the top ten for boys, such as *Daniel's Ride* (Perry, 2001), *Skeleton Man* (Bruchac, 2001), and *The Shark God* (Martin, 2001) were rarely selected by girls. Conversely, several top ten books among girls, including *The Bug in Teacher's Coffee* (Dakos, 1990) and *Judge Rabbit and the Tree Spirit* (Wall & Spagnoli, 1991) were rarely selected by boys. In fact, the most popular book among girls was *The Best Bug Parade* (Murphy, 1996), which was never selected by boys.

While there were differences in the titles selected by age, there is no clear-cut pattern with the titles or types of books selected. The top five most popular books among children of all ages included chapter books and picture books. While there was some overlap in the most popular titles among grades — the picture book *Axle the Freeway Cat* was one of the top five most popular books with first-, second-, and fourth-graders and the chapter book *Bone Idol* was one of the five most popular with second-, third-, fourth-, and fifth-graders — each grade showed different title preferences.

Variability of titles selected. Differences among the age groups are more pronounced in the amount of variability in the titles accessed. Overall, of the total instances of book selection, approximately one-third of the titles were selected by only one pair of children (Table 7), but there is a strong convergence by age. The title variability rates increase by age, with first-graders having the least variety in titles selected and fifth-graders the most. Among first-graders, only about half of the titles were selected by only one pair, whereas among fifth-graders, most of the titles

were selected by only one pair. There are no notable differences in title variability by gender or by software version.

Table 7. Percent of unique titles among all book selections.

Grouping	Title variability rate
All children	34%
Grade 1	57%
Grade 2	67%
Grade 3	67%
Grade 4	74%
Grade 5	85%

Book opening. After selecting a book from the search results, children are presented with a book preview offering more detail about the book, including summary, length, and other descriptive metadata. From this book preview, children may choose to open the book to evaluate it further. Across the 96 library sessions, the children opened an average of 2.9 books (Table 8). First-graders opened the most books, approximately twice as many books as any other grade.

Table 8. Mean number books opened per library session.

Grouping	n	Books opened
All children	96	2.9
Grade 1	16	4.8
Grade 2	24	2.3
Grade 3	24	2.7
Grade 4	16	2.8
Grade 5	16	2.1

Of the total number of books selected and previewed, most were in fact actually opened (Table 9). The book opening rates decreased by age. First-graders almost always opened the books they previewed, while fifth-graders opened only about half the books they previewed. There were no differences by gender or software version.

Table 9. Percent of books previewed that are opened.

Grouping	Book opening rate
All children	80%
Grade 1	94%
Grade 2	86%
Grade 3	79%
Grade 4	79%
Grade 5	56%

The remaining aspects of book opening behavior are closely tied to book selection and the data follows the same trends. Namely, the top five books opened match the top five books selected and the variability within the titles opened matches the variability within titles selected.

Search and selection styles

Finally, from the data collected in this study, a number of distinct search and selection styles emerged.

Diffuse searching. In their searching behavior, most children arbitrarily moved back and forth from the World area to the Categories area and from one category to another within the search areas. 75% of the children used this approach, which was somewhat more common with older children.

Methodical searching. A number of children focused their searching behavior, concentrating on one area or category when running queries. One-fourth of the children took a methodical, exhaustive approach, running queries and viewing search results from each of the continents in the World area in turn, or opening each sub-category within a category in the Categories area, one-by-one. This methodical approach was predominantly used by first- and second-graders and was much more prevalent in the World area than in the Categories area.

Successive search results visits. As with methodical searching behavior, some children exhibited similar exhaustive behavior in book selection rather than query formulation. A number of children made book selections by successively returning to a previously generated search results set rather than running a new query. While more than half the pairs made a least one successive visit to a set of search results, one-fourth of the children exhibited a pattern of successive search results visits, often exhibiting this behavior across both versions of the software. For instance, one pair of third-grade girls ran 10 queries, visited these 10 sets of search results 23 times, and finally selected 21 books. This behavior did not predominate among any gender or age.

Pinpointed search and selection. A number of pairs of children were so focused in their searching and selection behavior, they browsed only one category, ran a single query, and then selected and opened only one book. Of the 96 library sessions, nearly one-third exhibited this pattern; 8 pairs of children did this in both library sessions with both ICDL versions. This behavior did not predominate among any age; it was slightly more prevalent with girls.

Discussion

Our data suggest differences by age and gender in children's searching and selection behavior. The findings are discussed in the context of the type of behavior patterns examined.

Searching for books

Number of queries. The first- and the fifth-graders performed the most queries. Because of their differing behavior elsewhere in searching and selection, their motivation was likely different. First-graders may have enjoyed the process of interacting with the software and

browsing search results, leading them to run more queries. Fifth-graders may have been more selective in their book choices and so were led to conduct multiple queries in order to find suitable search results. Further research will be required to understand this trend.

Search area preferences. Clearly the World area was more popular with younger children. These children also tended to employ an exhaustive approach, spinning the globe to view search results from each region of the World. This seems to suggest that a simpler interface with fewer options was more popular with younger children. The World's highly interactive interface with its more literal representative nature may have appealed to younger children, who simply enjoyed spinning the globe repeatedly and clicking on the continents.

Popular search categories. This study confirms prior research suggesting that there is a high convergence in the search terms used by children and that children most often seek books based on topic or genre and physical characteristics. The top three categories in the Categories area were *Genre*, *Subject*, and *Color*. Older boys had a strong preference for *Genre*, while younger children and girls took little notice of the category. Genre is an advanced concept, which may require a certain level of sophistication as well as familiarity with traditional library terminology that younger children have not attained. Also, the genres available in ICDL may have been more appealing to boys than girls. Interestingly, boys in this study searched by *Characters* and girls searched by *Color*. Perhaps girls are more visually sensitive than boys due to a societal emphasis on appearance. Further investigation is needed to develop a better understanding of this aspect of searching behavior.

Selecting books

Book selection. The boys in this study were more selective in their book choices and more often returned from the search results without choosing a book than did girls. The same patterns holds for older children. Older children may have more developed or specific tastes and may have found the collection lacking in this regard. Or, girls and younger children may have been more amenable with each other and, therefore, better able to agree on books suitable for both persons in the pair. Further study on this area might provide an explanation of this difference.

Successive search results visits. This study confirms prior research that some children prefer to repeatedly browse a single set of search results. First-graders exhibited the lowest rate of successive visits to the same search results. These younger children may enjoy the more interactive nature of running queries, especially given their strong preference for the World area. It is unclear why

third-graders exhibited the highest rate of successive results visits.

Popular titles selected. Although no more than one or two of the children in this study were bilingual, two non-English books were consistently among the five most popular titles across all genders and ages. The book preview screen presents basic bibliographic metadata, including the language in which the book is written. However, because overall the children in this study tended to open books to evaluate their selections, perhaps the children may not have noticed that the books were not in English until they opened them and attempted to read. This may also suggest that children can be very interested in books from other cultures and in other languages. Further research will explore children's evaluation criteria in book selection.

Of the titles selected predominantly by boys, the book covers portray traditional subject matter for boys, including a car, shark, and skeleton, in dark, intense colors. The titles selected predominantly by girls have covers that portray cute animals, including bugs and a rabbit, and are lighter and brighter in color. The children seemed to adopt traditional perceptions of "boy books" and "girl books."

It might be expected that younger children would select predominately picture books, while older children would focus on chapter books. In this study, however, the top five titles selected by children of all ages included both picture and chapter books. In a traditional library, these books would likely be shelved separately, but the non-traditional arrangement of the ICDL collection may have encouraged children to explore the collection more broadly.

Variability of titles selected. Variability of the titles selected was greater for older children. The ICDL collection may present a wider variety of selections appropriate for older children. Or, older children may have been more willing to broaden their horizons. Or, through greater reading experience they may have developed more individualized tastes. Again, further research may pinpoint the reasons for this trend.

Book opening. Like prior research, this study shows that children often open several books during book selection. It is clear that the younger children in this study open books they have selected much more frequently than older children. It is not surprising that younger children who tend to read picture books would evaluate books by looking inside and viewing the pictures. Older children, on the other hand, who tend to read chapter books may not need to open books, relying instead on descriptive metadata in deciding whether to read a book or not.

Search and selection styles

While we understand that information seeking involves complex multidimensional interactions between the user

and the information system (Belkin et al., 1993), traditional information behavior models treat information seeking as fundamentally problem-centered (Davenport, 1997; Dervin, 1992; Kuhlthau, 1991; Taylor, 1991; Wilson 1997). Wilson and Taylor put information needs and information use at the center of their information-seeking models and Kuhlthau describes the affective stages that students encounter during information seeking. But how do these models apply to children's book searching and selection behavior when the information motive is itself essentially affective and information needs and use are replaced by wants and engagement?

Although focused on a problem situation, the dynamic nature of Dervin's sense-making approach almost certainly applies to the book searching and selecting behavior of the children in this study. With further insight into children's motivations, the different searching and selecting styles employed by children in this study may be understood via Wilson's gratification theory and Davenport's notion of engagement. However, the information seeking exhibited by the children was not about acquiring knowledge or becoming informed (Buckland, 1991) and thus conventional areas of concern, such as gaps in knowledge (Dervin, 1992), stress and coping (Wilson, 1997), and problem resolution (Taylor, 1991) and standard measures such as search effectiveness and efficiency and relevance judgments seem not to be readily applicable. Further research may uncover additional book searching and selection styles, which may in turn suggest ways to extend these information-seeking models to more open-ended information-seeking situations, such as locating desirable leisure reading materials.

Interface

Finally, we wish to remark on the lack of findings of differences in searching and selecting behavior by software version. During the sessions with ICDL Enhanced, the researchers observed that children tended to respond positively to the sounds and animation, but the log files show that few took advantage of the software's extra customization features. The few children who executed Boolean AND searches did so only by accident. In the closing interviews, when children were asked to express a preference for one version or another, while a few noted that they liked the sounds in ICDL Enhanced, many cited non-version related criteria when expressing a preference, noting, for instance, that they liked the book they read in one version of the software more than the book they read in the other. When it comes to the features related to searching for and selecting books, the interfaces do not differ substantially and, in this study, the children did not take advantage of the additional features offered in ICDL Enhanced.

Conclusions

Based on the findings of this study, we believe that children's searching and selection strategies in using a digital library to locate leisure-reading materials differ by age as well as by gender. Younger children seem to prefer a simpler, more interactive interface, whereas older children employ more sophisticated concepts. For younger children, opening books is a key strategy in book selection, while older children seem, in general, to be more choosy in their book selection habits.

Most of the children in this study were unfamiliar with the ICDL and they were all using the software for the first time. The searching and selection behavior we observed in this study may not represent children's long-term usage patterns as they evolve with experience with the software and the collection. Likewise, given the relatively small number of children in each age group, it is not possible to generalize these findings to various populations. However, behavior patterns that emerged in this study provide an initial understanding of children's book searching and selection behavior in a digital library. These behaviors have implications for digital library design as well as children's services in traditional libraries. Considerations in these areas may include:

- Present different options for search interfaces that differ in complexity to accommodate the various searching styles of children at different ages.
- Organize the collection into a variety of traditional and nontraditional categories to accommodate children's differing search behavior. In a traditional library, alternate arrangements of books by novel themes, such as groupings of red books, or books featuring super heroes as characters may attract children's attention.
- Allow for ample interaction with books in search results or on the shelves that allow for repetitive selection processes.
- Support fast and easy browsing of book pages to aid all children, but especially younger children, in making book selections.
- Develop a collection that addresses the different preferences of children by age and by gender.
- Encourage children to browse and select materials from all areas of the collection.

Future work with these data will include analysis of the videotapes of the children's interaction with the software to get a more complete picture of children's searching and selection behavior. This may help to explain the children's motivation and establish reasons for differences in behavior patterns by gender and age. Additional research will analyze children's reading patterns and behavior within the book reading area.

Further research in this area is also needed to validate the behavior patterns that emerged in this study. Research may examine children's use of other digital libraries that offer both book searching and reading capabilities. In addition, research may compare children's interaction with physical books in libraries and media centers to the book searching and selection behavior exhibited in digital libraries. Such research may contribute to the development of a new model of information seeking when it comes to leisure reading material.

By better understanding children's searching and selection behavior, librarians, educators, and information systems designers can design services, instruction, and products to facilitate self-selection, more easily bringing together children and books and encouraging the practice of lifelong reading.

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