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Analysis of Metadata Schemas for Children's Libraries

Abstract: The purpose of this study is to evaluate two metadata schemas, AACR2+ and the International Children's Digital Library's metadata schema, in light of children's information seeking behavior for book selection. While previous studies focus on the development of child-friendly interfaces, few of these studies discuss a metadata schema for children's libraries. Given that effective information retrieval is based on well-constructed information organization, this study's significance is its greater emphasis on information organization as a relevant factor than in previous studies. The methodology for this study consists of three parts: a meta-analysis of relevant research on children's information seeking behaviors for book choices, a crosswalk of the metadata schemas, and a comparison of two data sets from the previous stages. The study finds that ICDL's metadata schema tends to better reflect children's unique information seeking behaviors for book choices as independent metadata elements than standard library cataloging does. Standard library cataloging tends to describe information reflecting children's unique information seeking behaviors in a note area rather than describing in independent metadata elements. Therefore, by having independent and relevant metadata elements regarding the unique characteristics of children's book choices, ICDL's metadata schema provides more access points in a browse search system.

1. Introduction

The purpose of this study is to evaluate two metadata schemas, AACR2+ and the International Children's Digital Library (ICDL)'s metadata schema, in light of children's information seeking behaviors for book choices. As a part of the study about analysis of metadata schemas for children's libraries, this paper will focus on theoretical framework of information retrieval and two aspects of information organization and meta-analysis of children's cognitive information seeking behaviors for book choice.

School and public libraries provide most of the library services for children in the U.S. School libraries in the United States usually use the Anglo-American Cataloging Rules, 2nd Edition (AACR2), as a basic metadata schema. In addition, standard library cataloging in school and public libraries usually use not only AACR2, but also other complementary cataloging and encoding standards such as MARC21, Library of Congress Subject Heading (LCSH), Dewey Decimal Classification (DDC), etc. In this study, "AACR2+" means metadata schemas used in school and public library cataloging, which includes mainly AACR2 and other complementary cataloging and encoding standards such as MARC21, LCSH, DDC, etc. However, standard library cataloging, especially AACR2, is not created specifically for children and their collections. Given that children have different information seeking behavior than adults, metadata schemas for standard library cataloging may need to be reconsidered in terms of how effective they are for a children's library.

In comparison, ICDL has its own metadata schema in order to respond better to children's information seeking behaviors. In the initial stage of developing the ICDL, the research team, Human-Computer Interaction Lab, University of Maryland – College Park, considered children as design partners (Druin et. al., 2001; Druin, 2005). Especially Druin (2005) presents how the ICDL's metadata schema was created. They observed and interviewed not only children participating in the research, but also other children in local public libraries. Through these interactions with children, they got a better understanding of how children select books, which helped them to picture new metadata elements that reflect children's thinking and behaviors in the metadata schema (Druin 2005, 30). Moreover, the ICDL's metadata schema can be considered as an application profile. In other words, the ICDL's metadata schema is based on Dublin Core (DC), General International Standard Bibliographic Description (ISBD), and AACR2, but adds elements deemed appropriate to children's information behavior.

To identify the characteristics of a metadata schema appropriate for children's libraries and how well they are represented in these two schemas, this study ask the following basic questions.

1. Can current metadata schemas be evaluated in light of children's information seeking behaviors?
2. What does previous research indicate about the unique characteristics of children's information seeking behavior for book selection?
3. What common metadata elements do ICDL and AACR2+ share?
4. Which metadata elements are different between ICDL and AACR2+?
5. How do metadata elements relate to the unique characteristics of children's information seeking behaviors for book choices in light of information retrieval?

2. Background

2.1. Theoretical framework

It is axiomatic that effective information retrieval (IR) is based on well-structured information organization (IO). So far IR has been studied in relation to two aspects of IO: expression of users' information needs and representation of information. Chowdhury (2004, 216) refers that there are two types of IR research: system-centered approaches and user-centered or cognitive approaches. The system-centered approach studies focus on mainly representation of information within IO. This group of studies concern how information is represented by standards or tools such as AACR2, MARC21, metadata schemas, indexing, controlled vocabularies, and so on. The representation of information is closely associated with retrieval algorithms, indexing, interface design, etc. (Chowdhury 2004, 216) Therefore, many studies in the system-centered approaches focus on how to improve precision or recall. On the contrary, the user-centered or cognitive approach studies incline to emphasize expression of users' information needs and information seeking behaviors. This group of studies suggests that users' information needs and seeking behaviors should be reflected in retrieval system. Belkin et al. (1982a, 1982b), kuhlthau (1993), Ingwersen (1996), and Saracevic (1997) propose information retrieval models, cogitating on users' cognitive information seeking behavior. Despite ample literature about information retrieval models based on information organization, user-centered approaches within IO have been rarely discussed. In other words, in the IO domain, there is less attention to how users' information seeking behaviors are reflected in standards or tools of information representation. No matter how effectively IR algorithms search information, if there is not good matching between the expression of users' information needs and representation of information, the retrieved results will be limited. The basic purpose of IR is to link users' information needs to

representations of information. Therefore, the fact that there is no good connection between users' information needs and the representation of information means that IO is not able to support IR. Before discussing how two types of IO separately impact IR, what we need to be concerned with is: within IO, how well do standards or tools of information representation reflect users' cognitive information seeking behaviors.

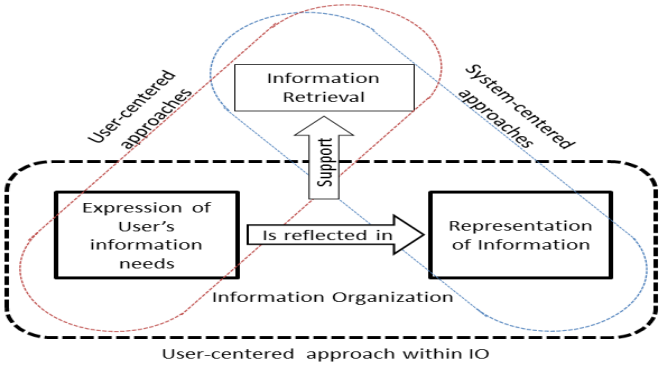

Figure 1. IR and Two aspects of IO

2.2. Scope

[Age] This study deals with metadata schemas for children's materials, but there is no direct interaction with children. Given that young children and older children have different natures of book selection and searching behaviors, the age of children may play an important role in creating a metadata schema. However, in reality, it is hard for school or public libraries to create and apply separate metadata schemas for different age groups. Therefore, in this study the research literature considered in the meta-analysis will address children ranging from early elementary school students to older elementary school students.

[Different nature of collection] Given the types of collections of ICDL and school libraries, the original characteristics of their metadata schemas may be different. ICDL's metadata schema may be more effective for electronic books. On the other hand, standard library cataloging may be more suitable for printed books. In addition, ICDL includes multi-lingual, multi-cultural, and multi-generational books, whereas school libraries typically include less diverse books. The difference in collections, itself, may require different metadata schemas. However, this study tries to limit the type of collection to books and focus on the characteristics of metadata elements related to children's information seeking behaviors for book choice rather than the characteristics of materials or collections.

[Contextualizing crosswalk] When metadata schemas are compared and evaluated, metadata elements are more highly stressed than element values such as controlled vocabularies, thesaurus, or LCSH, etc. For instance, the study will simply contextualize whether metadata elements match each other rather than scrutinize what controlled vocabularies metadata schemas use. It is true that even though the same book is described, depending on users, the way to describe it will differ. For example, if genres are categorized by only three types for children such as picture books, concept books, or fantasy books, genre for adults can be categorized in more detail or by different controlled vocabularies. However, the purpose of this study is to examine whether metadata schemas have a genres element rather than how genres are described.

2.3. **Children's cognitive information seeking behaviors for book choice**

Metadata for children's libraries should reflect children's cognitive thinking. Many studies have been identifying and analyzing children's cognitive information seeking for an interface design in a web environment (Bilal 2000, 2001, 2002, Bilal and Kirby 2002, Todd 2003, Cooper 2005). These studies tend to emphasize children's cognitive behaviors in light of information retrieval or retrieval interface design. However, when it comes to creating a descriptive metadata schema, we need to ask children what criteria they use to choose a book. The cognitive scaffoldings of children's information seeking behaviors for book choice imply that how children's libraries organize books and how they are reflected and represented in metadata. There are a few research studies addressing children's cognitive behaviors in light of book choices. For instance, according to Kragler and Nolley (1996), the first reason of children's book choice is because of a recommendation by peers and class teachers. It provides reasonable evidence that information about recommendations or reviews should be delivered in metadata.

3. **Methods**

The study consists of three parts: a meta-analysis, a crosswalk of the metadata schemas, and a comparison of two data sets from the previous stages.

- Meta-analysis: To find characteristics related to children's information retrieval, relevant research on children's information seeking behaviors for book choices was analyzed and nine characteristics were identified.
- Crosswalk: The metadata schemas crosswalk consists of links between comparable elements in the two metadata schema element sets.
- Comparison: This study compares the results of the meta-analysis with the results of the metadata schemas crosswalk in order to evaluate how well the metadata elements correlate with the unique characteristics of children's information seeking behaviors for book choices.

3.1. Meta-analysis

The study seeks to explore a good metadata schema for children's libraries with a one-size-fits all schema by examining, in the former, what kinds of factors influence children's book choices as a first step. A meta-analysis of relevant research on children's information seeking behavior for book choices will play a role in finding unique characteristics related to information retrieval by children. To examine how metadata elements impact information retrieval by children, the study will compare metadata elements from a crosswalk and the unique characteristics of children's information seeking behaviors for book choices. To do so, the study requires identification of the unique characteristics related to children's information seeking behaviors and children's book choices. Through a meta-analysis of five research on children's information seeking behaviors and book choices (Kragler and Nolley 1996, Moore 1988, Pejtersen 1986, Robinson et al. 1997, Wendelin and Zinck 1983), nine characteristics were identified.

3.2. Crosswalk

The metadata schemas crosswalk consists of links between comparable elements in the two metadata schema element sets. The crosswalk lists elements for comparison in order to find which elements are common and which are different between the schemas. The metadata schemas for the crosswalk are the ICDL's metadata schema and AACR2+. AACR2+ indicates metadata schemas for standard library cataloging: mainly AACR2 complement cataloging

standards. In other words, AACR2 will be compared as a main metadata schema. However, to contextualize standard library cataloging and ICDL's metadata schema, aspects of other complementary cataloging standards are also considered.

3.3. Comparison

This study compares the results of the meta-analysis with the results of the metadata schemas crosswalk in order to evaluate how well the metadata elements correlate with the unique characteristics of children's information seeking behaviors for book choices.

4. Results

This paper will focus on the results of a meta-analysis in detail. The result of crosswalk and deeper analysis of comparison between meta-analysis and crosswalk will be found in the authors' other article (2011).

4.1. Meta-analysis of unique characteristics of children's book choices

[Physical Characteristics] Physical characteristics are divided in detail. Children tend to choose books by information about certain character(s) in a book cover. In a book cover, for example, an object of a character like a cat and the color of a character like yellow are used by children. Therefore, children may have a query like "I want to read a book that has a yellow cat." In terms of types of book cover, hardback or paperback, Campbell et al. (1988) found that children tend to prefer paperbacks over hardbacks. Although depending on the age of children, their preferences will change, it is clearly the case that the physical descriptions of books help children choose a book.

[Intellectual Difficulty] Difficulty is also one of the characteristics children use to select books. In order to judge if a book is too difficult to read, children flip through the pages and check words. Reuter (2008) offers a quote about how children decide reading level difficulty. "I [Jeanette] read a little bit of this one and I discovered it doesn't have big words that I don't know what it means (Reuter 2008, 194)." Kragler and Nolley (1996) also point out this book selection strategy. "They [Children] mentioned flipping through the book, looking inside the text, reading the first and last paragraph as well as looking at the difficulty of the words (Kragler and Nolley 1996, 359)." Therefore, the beginning part of books or a brief introduction like summary at the language level of the text may be useful information to select books. The difficulty is also related to the thickness of books, the number of pages and words, or age appropriateness. Age appropriateness means targeted audiences that can be described in a book or can be decided by a librarian.

[Prior Knowledge] Prior knowledge means certain factors that children already know, so they feel familiar with books. Children's prior knowledge impacts their book choices. Prior knowledge such as particular character names, series titles, or reproduced movies can vary depending on their previous experiences. For example, if children already know about a particular character's name, they may want to read books containing the character. Particular series are also selected or re-selected by children, because they are familiar with the series. Even though each book in a series has different contents and titles, once children are familiar with a series, they want to read other books in the same series. For instance, Maya, one of the children in Reuter's study, explains that she selects a book because she has read other books in the Geronimo Stilton series (Reuter 2008, 191). Like Maya's reason, if series or books have particular character(s) and children are familiar with the character's name like Geronimo Stilton,

the information about particular character(s) is useful. Familiarity can also be connected with other characteristics of children's book choices such as recommendations or awards. If children have heard about books before, their interest in the books will be greater. Therefore, this characteristic will be discussed further within the following categories of characteristics.

Unique characteristics of children's book choices		Origins
Physical Characteristics	Book cover's illustration or character including its objects and colors Size of the print Hardback / Paperback	Kragler & Nolley (1996) Wendelin & Zinck (1983) Moore (1988) Pejtersen (1986)
Intellectual difficulty	Difficulty of words The number of pages or words Age appropriateness	Moore (1988) Robinson, Larsen, and Haupt (1997) Pejtersen (1986)
Prior knowledge (particular character, series, titles, etc.)		Kragler & Nolley (1996) Robinson, Larsen, and Haupt (1997)
Recommendation (by peers, teachers, or family) Awards		Kragler & Nolley (1996) Wendelin & Zinck (1983)
Topics (learning, social activities, or interests)		Kragler & Nolley (1996) Pejtersen(1986)
Media connection (such as TV show, movies)		Kragler & Nolley (1996) Wendelin & Zinck (1983)
Emotions (happy, sad, funny, adventurous, etc.)		Pejtersen (1986)
Frame (The setting in time and place of the subject)		Pejtersen (1986)
Genre		Robinson, Larsen, and Haupt (1997)

Table 1. Unique characteristics of children's information seeking behaviors and book choices

[Recommendation] Recommendation by peers, teachers, or family and awards play a role in motivating children to choose books. The study about development of the Kid's Catalog by Busey and Doerr (1993) introduced Best Stories as a category in a searching interface. Best Stories includes favorite books chosen by both children and experts like librarians and awarded books (Busey and Doerr 1993, 82). Recommendations may also be associated with book ratings and reviews. The ICDL allows children to rate a book on a scale of one to five by stars. The more children like a book, the more stars the book will receive. Children refer not only to the number of stars, but also to other information such as feelings or summaries from other readers.

[Topics] Children tend to look for books related to their learning, social activities or interests. For instance, when children learn about American holidays, they may want to read books about holidays. In addition, if a child belongs to a baseball team, they may want to read a book about baseball. This characteristic of book selection is found in children's digital libraries or school libraries providing browsing interfaces by topic. In terms of the wording for topics, this study does not scrutinize how controlled vocabularies for topics are described. It is true that even though the same book may be easily described, depending the user, the way to describe it will differ. For example, the topic terms for children's books may be described in easy and simple ways, whereas the topic terms for adult's books may be described in more hierarchical and complex structures. However, the purpose of this study is in the later part of data analysis, whether metadata schemas have a 'topics' element rather than how 'topics' are described. Even

though this study agrees with the importance of metadata elements' values in term of their influence on users' information seeking behaviors, the issues about values of metadata require future studies.

[Media Connection] Media connection implies books that have connections with television shows, movies, or other forms of media (Reuter 2008, 192). Children select books after seeing television shows or movies based on the books. This factor is also labeled as familiarity. Children are familiar with a book because of television shows or movies, so that they want to read the book.

[Emotions] According to Pejtersen (1986), children depend on the author's intention, which means "the set of ideas and emotion which the author wants to communicate to his readers (Pejtersen 1986, 133)." The set of emotions may involve words like: funny, exciting, adventurous, humorous, scary, sad, suspenseful, etc. Pejtersen claims that the emotions are intended by authors. However, how children feel after reading can differ from the author's intention. For example, some children think that a book is funny, but others think that the book makes them scared. Therefore, this study interprets differently Pertersen's author's intention. The author's intention in this study means children's emotion after reading. Children's information inquires like "I want to read adventurous books" testify that the emotions play a role as one of the unique characteristics of children's book choices.

[Frame & Genre] These are two subject-related characteristics that influence children's book choices. Frame is the background of content such as time, geographical, or social setting. The information about frame can be either main subjects or used for additional factors to select books. For example, children want to read books that develop a story in winter or in a jungle. Although winter or a jungle is not the main subject, the information about background setting still is considered children's book choice. The other characteristic is genre. Robinson et al. (1997) observe children's book selection/reselection behaviors by genre preferences. Children in their study show apparent genre preference. It implies that genre such as non-fiction, fiction, concept books, etc. are also one of the reasons to select books.

The above characteristics have been introduced in previous research. The meta-analysis in the study tries to find more unique characteristics of children's book choice. Therefore, the study does not point out basic bibliographical information such as title, author, publisher, year, edition, etc. However, it does not mean that basic bibliographical information is not important or is not used when children select books. The issue of how basic bibliographical information is used for selecting books is up to individuals. In other words, depending on children's age, information needs, searching abilities, context of searching, etc, the way that bibliographical information is used and the way that they select books can differ. Nevertheless, it is true that bibliographical information plays an important role in describing books. Therefore, both the unique characteristics and basic bibliographical information are considered as factors for children's book choice.

4.2. Representation of unique characteristics of children's book choices in two metadata schemas

To evaluate how the unique characteristics of children's book choices are reflected in the metadata schemas, table 2 shows the results of merging the meta–analysis and the crosswalk.

In terms of a crosswalk, the elements marked with * are not in the ICDL's metadata specification (http://en.childrenslibrary.org/about/policies/metadata.shtml), but they still play roles as metadata elements when books are retrieved. In addition, [MARC21] means that although AACR2 does not have elements matching with ICDL's metadata schema, the elements can be described in MARC21.

<table>
<tr><th colspan="2" rowspan="3">Unique characteristics of children's book choice</th><th colspan="4">Metadata elements from crosswalk</th></tr>
<tr><th colspan="2">AACR2+</th><th colspan="2">ICDL's metadata schema</th></tr>
<tr><th>Main Elements</th><th>Sub Elements</th><th>Sub Elements</th><th>Main Elements</th></tr>
<tr><td rowspan="4">Physical characteristics</td><td>Size of the print</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>Hard / Paper cover</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td></td><td>X</td><td>X</td><td>Format*/ Shape*</td><td rowspan="3">Others*</td></tr>
<tr><td>Book cover's color</td><td>Note</td><td>Physical description</td><td>Cover colors*</td></tr>
<tr><td>Physical characteristics / Prior knowledge</td><td>Book cover's characters or objects/ Particular characters</td><td>X</td><td>X</td><td>Characters*</td></tr>
<tr><td>Prior knowledge</td><td>Series</td><td>Series</td><td>Title proper of series</td><td>Series title</td><td>Title Information</td></tr>
<tr><td rowspan="4">Intellectual difficulty</td><td></td><td>X</td><td>X</td><td>Length*</td><td>Others*</td></tr>
<tr><td># of pages or words</td><td>Physical description</td><td>Pagination</td><td>Page count</td><td>Physical characteristics</td></tr>
<tr><td>Difficulty of words</td><td>Note</td><td>Summary</td><td>Abstract</td><td rowspan="6">Abstract, keywords, etc.</td></tr>
<tr><td>Age appropriateness</td><td>Note</td><td>Audience</td><td>Age range</td></tr>
<tr><td colspan="2" rowspan="2">Topics</td><td colspan="2">[MARC21: 6XX]</td><td>Subject & Keywords</td></tr>
<tr><td colspan="2">[MARC21: LitF]</td><td>Type</td></tr>
<tr><td colspan="2">Genres</td><td colspan="2">[MARC21: 655]</td><td>Genre</td></tr>
<tr><td colspan="2">Frame</td><td colspan="2">[MARC21: 648, 650 |y |z, 651]</td><td>Setting: When & Where</td></tr>
<tr><td colspan="2" rowspan="2">Recommendation / Awards</td><td colspan="2">[MARC21: 586]</td><td>Award</td></tr>
<tr><td>X</td><td>X</td><td>Rating*</td><td rowspan="2">Others*</td></tr>
<tr><td colspan="2">Emotions</td><td>X</td><td>X</td><td>Feeling*</td></tr>
<tr><td colspan="2">Media Connection</td><td colspan="2">Uniform title [MARC21: X30, 6XX, 700 |t]</td><td>X</td><td>X</td></tr>
</table>

Table 2. Representation of unique characteristics of children's book choices in two metadata schemas

As the metadata analysis does not include the bibliographical information as the characteristics of children's book choice, there are no matching characteristics with the elements in first four main elements of the crosswalk: Title, Statement of Responsibility / Creator(s), Edition, Publication Information. Moreover, there are difficulties in how Note is interpreted because of the nature of Note. In other words, it can include almost all information that does not fit into other elements. However, this study does not expand further on the usage of Note than AACR2 and ICDL's metadata schema suggest. This study tries to evaluate how well existing description in metadata schemas for children's libraries function in light of children's information seeking behaviors and book choices. Therefore, regardless of the generous nature of Note, this study focuses on whether or not the unique characteristics of children's book choices appear as discrete elements in metadata schemas. For example, the study considers that the characteristics of children's book choice, the type of book cover: hardback or paperback, is not described in Note. Of course, depending on librarians or libraries' policies, these characteristics can be provided in Note. Except for the one characteristic, the others appear in either AACR2+ or ICDL's metadata schema, or both.

As table 2 shows, ICDL's metadata schema tend to more strongly reflect children's unique information seeking behaviors for book choices than standard library cataloging does. ICDL's metadata schema is able to describe character(s), rating, and feeling, whereas AACR2+ does not have metadata elements for these information. In addition, AACR2+ tends to describe unique characteristics of children's book choices in a Note area, whereas ICDL's metadata schema describes them in independent metadata elements.

5. Discussion

This study suggests that ICDL's metadata schema covers more unique characteristics of children's book choices. Some of the characteristics such as physical descriptions like colors, familiar characters, recommendations, and emotions, are described in specific metadata elements from ICDL. On the other hand, standard library cataloging does not have specific metadata elements only for children. AACR2 is likely to use a Note area in order to describe information that does not belong to any other elements. Therefore, in AACR2, mostly unique characteristics of children's book choices can be provided in the Note area. Considering the dependent relationship of information retrieval to information organization, the information that is described in a note, not in an independent metadata element may have a different impact on information retrieval. By using keyword searching, information in a note can be found, but it puts an extra burden on the searcher by requiring expertise in keyword searching. Nevertheless, as the previous studies about children's searching behaviors shows, browse searching is more effective for children (Borgman, 1995, Large and Beheshti, 2000). This implies that separate metadata elements function as diverse access points based on unique characteristics of children's book choices. In other words, if information such as rating, emotions, or characters is described in separate metadata elements, children can limit searching for books by these elements not throughout keyword searching. It may not only offer more access points in especially browse searching, but also increase higher precision of the results.

Resource Description and Access (RDA) is a new metadata schema that has recently been gaining attention. The study consults RDA in order to see if there is any improvement with RDA regarding children's information seeking behaviors for book choices. The RDA's significant difference from AACR2 is the focus on describing relationships among entities. AACR2 deals primarily with individual manifestations, whereas RDA tries to make connections of descriptive

data elements based on the FRBR model. Therefore, RDA improves the relationships between manifestations or expressions in AACR2. RDA seems to focus more on describing the relationship among works, expressions, manifestations, and items, by identifying the relationship designators in detail. It helps to provide information associated with media connection or translated works. However, considering RDA's core elements, there are no significant differences regarding children's information seeking behaviors for book choices. According to *RDA Element Analysis*, in the level of metadata elements, RDA does not add elements associated with children's unique characteristics of book choices such as book cover's colors, characters, emotions, etc. It is true that the issues to describe children's collections, taking into account children's information seeking behaviors for book choices, remain in RDA. However, RDA is still in process of the development and is not implemented in practice yet, the possibility to reflect the problems that the study has suggested remains open.

6. Conclusion

• ICDL's metadata schema tends to more strongly reflect children's unique information seeking behaviors and book choices than standard library cataloging does.

• Standard library cataloging tends to describe children's unique information seeking behaviors and book choices in a note area rather than describing in independent metadata elements.

The study has found that ICDL's metadata schema has more effective metadata elements than standard library cataloging to describe children's collections in light of children's information seeking behaviors. However, ICDL's metadata schema also does not cover all unique characteristics of children's book choices. Nevertheless, by having independent and relevant metadata elements regarding the unique characteristics of children's book choices, ICDL's metadata schema provides more access points in a browse search system. Although AACR2 provides information related to the unique characteristics of children's book choices, the way that children search information depends on keyword searching. In ICDL's case, children can select books by browsing categories that represent metadata elements reflecting children's information seeking behaviors. Consequently, in terms of the relationship of metadata schemas and information retrieval system, ICDL's metadata schema allows the information retrieval system to function effectively for children. Having focused on metadata elements rather than the value of them, the study suggests a similar study of the more complex area of subject representation. AACR2 coordinates with other standards like LCSH, LCSH for Children's Literature, or Sears in order to describe subjects, genres, or forms. The ICDL has its own subject thesaurus and controlled vocabularies. However, this study has considered them only at the structural level. Therefore, future studies may require evaluating the contents of the metadata elements related to subjects, genres, etc.

In conclusion, in terms of the relationship of metadata schemas and information retrieval systems, ICDL's metadata schema seems to allow the information retrieval system to function effectively for children. However, the findings of the study have not been ratified in a real environment. Therefore, to confirm the findings, direct research with children comparing the effectiveness of the two schemas in a real environment would be required. This study points to the variables that would be starting point for such ongoing research.

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