Children's interaction with cross-cultural and multilingual digital libraries: I. Understanding interface design representations

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Abstract

This paper reports the results of a study that examined Arabic-speaking children's interaction with the International Children's Digital Library (ICDL). Assessment of the ICDL to Arabic-speaking children as a culturally diverse group was grounded in "representations" and "meaning" rather than in internationalization and localization. The utility of the ICDL navigation controls was judged based on the extent it supported children's navigation. Most of the ICDL representations and their meanings were found to be highly appropriate for older children but inappropriate for younger ones. The design of the ICDL navigation controls was supportive of children's navigation. Recommendations for assessing the cross-cultural usability of the ICDL are made and suggestions for system design improvements are provided.
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1. Introduction

"The on-line digital environment provides an unprecedented, powerful arena for youth to obtain information to participate in global learning communities" (Dresang, 1999, p. 1123). The exponential growth of Web technologies has provided system developers and scholars with the means for developing digital libraries that allow young users to interact with well-organized information and to understand the cultural heritage of the world around them.

Prior research has shown that while children enjoy using various technologies (e.g., multimedia encyclopedias, online catalogs, and the Web), they experience difficulty formulating adequate search strategies, commit

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spelling errors, use Boolean operators incorrectly, and employ search syntax that is not supported in the systems used (Bilal, 1998, 1999, 2000, 2001, 2002; Borgman, Walter, Hirsh, & Gallagher, 1995; Kafai & Bates, 1997; Large, Beheshti, & Breuleux, 1998; Large, Beheshti, & Rahman, 2002; Marchionini, 1989; Revelle et al., 2000; Schacter, Chung, & Dorr, 1998; Solomon, 1993; Wallace & Kupperman, 1997).

Although many information retrieval systems (IRs) are intended for children, they do not support children's information seeking or build on their cognitive developmental abilities (Bilal, 2000, 2001, 2002; Bilal & Wang, 2005; Large et al., 2002; Reuter & Druin, 2004). Many researchers believe that involving children in the design of interfaces may alleviate the problems children experience in using various types of IRs (Bilal, 2003; Druin, 2005; Druin et al., 2002; Large, Beheshti, Nesset, & Bowler, 2004). One of these interfaces is the International Children's Digital Library (ICDL).

The ICDL provides an international collection of digital books for children ages 3–13. It is designed to create a collection of more than 10,000 books in 100 languages that is available to children, teachers, librarians, parents, researchers, and scholars worldwide via the Internet.

The ICDL was launched on November 18, 2002. It is funded by the National Science Foundation and led by both the University of Maryland and Internet Archive to expose children to different cultures through literature. At the time of the study (December 2004), this digital library contained 820 books representing over 33 languages including a collection of books in the Arabic language (http://www.icdlbooks.org).

Studies about use of the ICDL have mainly focused on users' characteristics (e.g., age, gender, children, parents, and teachers) (Druin, 2005), children's book selection and searching behaviors (Reuter & Druin, 2004), and evaluation of subject categories (Hutchinson et al., 2004). While these studies provided insights about the children's searching and browsing behaviors in locating books, they precluded assessment of children's understanding of the ICDL system design representations (e.g., icons, buttons, search and browse features, and other visual cues), and they only included children in the United States. As an international, multi-cultural, and multilingual digital library, the ICDL is to be shared by heterogeneous users from diverse cultures around the world through literature. Since the ICDL has an Arabic book collection, it becomes necessary to examine Arabic-speaking children's interaction with the ICDL and to explore their understanding of its system design representations and their meanings. The present study is the first attempt towards achieving this goal.

Findings from this study will provide understanding of the utility of the ICDL system design representations and navigation controls to culturally diverse children (i.e., Arabic-speaking), and will generate suggestions for system design improvements that are supportive of the children's information needs.

2. Culture and international system design

What does a "trash can" icon mean to Arabic-speaking children? How do we measure the utility of the ICDL for culturally diverse children such as those from Arabic-speaking countries? Hofstede defines culture as "the collective mental programming of the mind which distinguishes the members of one group or category of people from another" (Hofstede, 1991, p. 5). He explains that the patterns of thinking, feeling, and acting are the mental programs that a group of people has acquired and learned throughout a lifetime. In studying the culture of a group of people, one may need to examine the norms or patterns of life of these people including values, heroes, rituals, and symbols (Hofstede, 1991). These components can be manifested in system interface design - from character sets (e.g., the Latin alphabet) to icons, colors, menu accelerators, and documentation (Del Galdo, 1990). Smith et al. (2004) coined the term "cultural attractors" to describe cross-cultural elements of international interfaces: colors, icons, navigation controls, and other visual cues that create the "look and feel" that match the user's expectations of the local culture. The "look" of the interface is the uniform representation of information whereas the "feel" is the interaction with the various elements of the interface (Callahan, 2005).

In the Human–Computer Interaction (HCI) field, cultural variability in interface design is approached in terms of both internationalization and localization. Internationalization centers on the core functionality of the software that is independent from localized interface details, and separates the cultural elements from the software (e.g., language, character sets, culturally meaningful icons) whereas localization addresses customizing an interface for a particular culture through implementation of the cultural elements. Bourges-