

CHAPTER 8

TOWARDS AN ALTERNATIVE INFORMATION RETRIEVAL SYSTEM FOR CHILDREN

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1. INTRODUCTION

A recent survey of more than 1700 households indicates that the main reason many parents purchase computers and connect their children to the Internet at home is for education (*Safe and Smart*). In addition the survey shows that children also use the Internet for educational activities that go beyond required school work. In fact, the fastest growing group of Internet users are children between the ages of eight and twelve (Vise, 2003), who are increasingly using the Web to access educational as well as entertainment materials. Children, however, rely on conventional information retrieval (IR) systems and search engines intended for general adult use, such as MSN or Google, and to a much lesser extent, Web portals such as Yahoo!igans! and LycosZone specifically intended for young users (Large et al., 2004; Large, Beheshti, and Rahman, 2002a).

But research has shown that children's information needs (Walter, 1994), research approaches (Kuhlthau, 1991), and cognitive abilities and higher order thinking skills (Neuman, 1995; Siegler, 1998; Vandergrift, 1989) differ from those of adults. The results of earlier studies on children's use of online catalogues designed for adults indicate that young users are often faced with difficulties locating specific information related to their information needs (Hirsh, 1997). A growing body of research points to the problems children typically encounter when seeking information on the Web. Kafai and Bates (1997) conducted one of the first studies with young children on their use of Web sites, and concluded that they were able to navigate through the links and scroll. Only the older children, however, could use search engines effectively.

Hirsh (1999) investigated the searching behavior of ten fifth graders and concluded that they encountered difficulties in formulating effective search queries and did not use advanced features. Schacter, Chung, and Dorr (1998) conducted a study on Internet searching by fifth and sixth graders and concluded that they did not plan their searches, used ill-defined queries, and preferred browsing. Large, Beheshti, and Moukdad (1999), investigating the information seeking behavior of 53 sixth graders, similarly found that children preferred browsing to searching. Bowler, Large, and Rejskind (2001), focusing on a few case studies of grade six students concluded that search engines designed for adults are unsuitable for children. Wallace et al. (2000), studying sixth graders, discovered that experience in using search engines does not improve children's search strategies and in general information seeking is an unfamiliar activity for children.

This chapter focuses on the theoretical and applied research conducted in several disciplines as the foundation for a new information retrieval system consisting of conventional approaches to retrieving information along with a virtual reality environment, through which children can browse. The chapter is divided into five sections. Section 1 is the Introduction. In Section 2, we begin at the broadest level, describing the four dominant frameworks for learning research. Each of these frameworks is based on a metaphor of how the human mind works when learning. The current dominant metaphor is social constructivism (collaborative IR), which must be reconciled with the individual nature of much of IR searching (the cognitive constructivism metaphor). In Section 3, we describe the affective factor when modeling children's search processes, basing it on Kuhlthau's (1993) Information Search Process (ISP) model. We build into the model affective, empathetic and intermediary or tutoring dimensions, which must be considered for new IR systems for children. In Section 4, we highlight browsing features that correspond to children's searching behavior during the initial stages of their ISP. In Section 5, we propose an alternative IR system for children based on the previous issues and discussion.

1.1. Children

The term "children" may be applied to a wide range of ages, from toddlers to high school seniors. Piaget, from a structuralist perspective, suggested that cognitive developments occur in stages based on age bands of birth to two years, two to seven, seven to 11, and 11 to 16 years (Piaget and Inhelder, 1969). He argued that children need to experience these stages of cognitive development and that younger children do not have the capacity or capability to think in the same way as older ones. Bandura, on the other hand, used a behavioral approach suggesting that children learn through imitating role models and observing their environment (Bandura and Huston, 1961). Whereas Piaget believed that children's major cognitive development takes place before the age of 12, Bandura suggested that development occurs throughout life and is not confined to one or more stages.

In information-seeking behavior age-based categorization may be somewhat artificial, where it might be difficult to distinguish one group from another as some similarities have been observed between the groups. Fidel et al. (1999) investigated the information-seeking behavior of eight grade 11 and 12 students and found that they, too, needed formal training to be effective Web searchers. Agosto (2002) interviewed 32 grades nine and ten students and concluded that they may also encounter problems interacting with IR systems and that a better understanding of their decision-making processes is needed to assist them in searching.

Based on an extensive review of the literature, Large (2005) comments that only one study by Bilal and Kirby (2002) has been published that explicitly investigates the differences between children and adults in searching for information on the Web. Bilal, and Kirby (2002) studied the cognitive, affective, and physical behavior of 14 seventh graders and nine graduate students in information science. They utilized a number of metrics to measure the two groups' effectiveness and efficiency in using Yahoo!igans!, when given specific tasks to search. They found that whilst the graduate students had a success rate of 89 percent, the seventh graders only managed a 50 percent success