

# Primary School Students' Reaction to the Web as a Classroom Resource

Andrew Large and Jamshid Beheshti

McGill University

## **Abstract**

Two grade-six classes in a Montreal primary school used the Web over several weeks to gather information for a class project. After the completion of the project, 50 students were interviewed to gather their opinions on this experience. They discuss the relative merits of the Web as compared with traditional printed sources in terms of information content and retrieval. Although the Web certainly had its enthusiasts, books and magazines also continued to be important. The students commented upon a number of problems they encountered in finding information suitable for their project. To become a more effective classroom tool, the authors conclude either that more helpful interfaces are required to assist in search formulation or that students must be taught how to seek information in this environment. In addition, more information is required on the Web that can be used by young students, and pathfinders are needed to point the students in the right direction.

## **1. The Web as a School Resource**

Alongside textbooks, encyclopedias and magazines, primary school students now have the possibility of exploiting electronic resources to collect information for school projects. CD-ROMs and increasingly the World Wide Web are potentially rich information sources for children. Many CD-ROMs are designed specifically for young users, with content selected to suit the needs of these users and presented in a vocabulary and syntax appropriate for them (Large, Beheshti & Breuleux, 1998). The Web, however, is rather different. Its content is not only huge but also very heterogeneous. It does provide access to some information specifically intended for children, and in some cases, indeed, it has

been produced by children. Other information, while not intended particularly for the young, also may be eminently suitable for them. At the same time, much of the information is neither targeted at young users nor presented in such a fashion as to be readily accessible to them. Certain search engines like Yahoooligans! And Ask Jeeves for Kids are designed for children and do index only sites considered suitable for them, but they are unduly restrictive in access while still not proving necessarily easy for children to use (Bilal, 1999).

A number of studies have explored children's information retrieval behavior in electronic environments: on CD-ROMs (for example, Marchionini, 1989; Large, Beheshti & Breuleux, 1998) and OPACs (for example, Solomon, 1993; Borgman et al, 1995; Hirsh, 1997). As Schacter, Chung and Dorr commented in 1998, however, " children's information seeking and use of the Internet are virtually unexplored areas." Our study, undertaken in spring 1998, was part of a larger inquiry into information seeking on the Web by grade-six students (mostly aged 12 years) conducted over the duration of one class project in one term. It reports on the comments made during interviews with 50 students about their experience of using the Web to find information for a project dealing with the recently completed Winter Olympics in Nagano, Japan (Large, Beheshti & Moukdad, 1999).

## **2. Methodology**

Two entire grade-six classes (53 students) in a Montreal-area suburban primary school participated in the research. The school is located in a relatively wealthy neighborhood and in early 1998 almost 90% of the students had a computer at home, of whom almost half had Internet access. The school itself provided very limited Internet access via one workstation in an IT lab, and many of the students had never used the Internet from school (20% had never used the Internet anywhere, and few could be considered experienced users as established by a multi-choice test at the outset of the research). The students were given a collective introduction to Web searching plus a short individual training session of

around 10 minutes. They were shown how to use two search engines - AltaVista and Infoseek – and few students used other engines in their actual searching. Three workstations with color printers were placed in the classroom, together with three telephone lines. Internet access accounts were opened with a local ISP. Each workstation was installed with Netscape Navigator 4.0, Corel WordPerfect 8, Corel Photo House, and Cyber Patrol filtering software.

The students, working in groups of two or three, were able to use the Web to find information for a class project on the Nagano Olympics. Each group selected one winter sport to investigate, and the objective was for each student eventually to produce a poster about that sport and to make an oral presentation to the class. This topic, chosen by the researchers in conjunction with the class teacher, met four requirements: it was compatible with the general curriculum as established by Quebec's Ministry of Education; it was well-covered on the Web; it provided an opportunity to find multimedia sites; and it was considered to be gender neutral. The students were told that they could also look in other sources – electronic and print – to collect information for the project. The teacher set aside class time twice weekly between 18 March and 6 May, however, for web searches. A session's notional length was 30 minutes, but in practice the students were given flexibility to use more or less time as they chose, and to conduct as many sessions as they wished within these overall constraints (the 20 groups conducted 78 search sessions for a total of around 50 hours; the shortest session was one minute and the longest was 40 minutes, but the mode was 30 minutes, the mean 26 minutes and the median 27 minutes).

A variety of data was collected by the researchers: a biographical questionnaire, a multi-choice Internet test, and a spatial ability test were completed by the students at the outset; all search sessions were directly captured on video; the teacher assessed each student according to nine general educational criteria (overall academic achievement, reading ability, motivation, class behavior, etc.); the final posters were photocopied and photographed; the poster marks were obtained; and both the teacher and 50 of the 53 students were interviewed at the

project completion. This paper is based upon the students' answers to a series of open-ended questions that were audiotaped and subsequently transcribed.

### **3. Results**

Overall, the students were receptive to the attractions of new technology, and only a minority expressed concerns at using computers. Nevertheless, a preference for the Web as a substitute for more traditional information sources did not by any means receive unanimous endorsement. Their reservations related both to the means of finding relevant information using the Web compared with books and magazines, and to the information content that was to be found in these various resources.

#### **3.1 Information Seeking**

The students reported that they had encountered a number of problems in looking for information on the Web (and their comments were supported by analysis of the videotaped search sessions). Very few students shared this opinion expressed by one boy: " I didn' t really find anything difficult...It' s just really, really easy...to find information."

Although browsing via hypertext links was widely employed by most students, during the interviews the students had little to say about this activity. A few said that they found it tedious to click on retrieved pages in order to open them or to return to the list of hit pages, but otherwise they did not express any opinion on the subject.

The students had much more to say about seeking information on the Web using a search engine. Term selection clearly troubled many. They found it difficult to know how to frame their information need in a way that would retrieve relevant information. Although most search terms comprised multiple rather than single words, the students did not find it easy to generate search phrases. In many cases their searches were too general, retrieving pages about their sport but not in the context of the Nagano Winter Olympics. In other instances the search phrase related to the Nagano Games or even the Olympic Games in general, but not to any particular sport. As one student expressed it:

If you were to type in times, it would give me like times from all over the world or something, but I just wanted it for Nagano. If I put Nagano, it would give me Nagano the place and all those other things. It was really frustrating.

Some students explained how they had rotated terms within a search phrase in an attempt to improve relevance; one example given was “ half-pipe snowboarding” or “ snowboarding half-pipe” . In other cases, however, students stubbornly entered for a second, third or even fourth time a search phrase which was unsuccessful in the vain hope that eventually it would turn up trumps.

The students had been introduced in their initial training to a few search techniques: use of the AND Boolean operator, capitalization of initial letters to find proper nouns, and use of quotations to search for a fixed phrase. Only the latter was used to any extent by the students. Some grasped its significance: for example, one explained that “ I think if you put those two things, they’ ll find like both...you’ re going to find curling equipment, not like curling or not just equipment.” The interviews as well as the videotapes revealed that in many cases, however, the purpose of quotation marks was widely misunderstood (the research assistants eventually had to step in to explain their usage, after which they were very sparingly employed).

The greatest frustration expressed by the students was the difficulty of finding a few highly relevant sites. They explained how in some cases a search would retrieve pages that contained “ useless information” , for example, pages dealing with the National Hockey League rather than hockey at the Nagano Olympics. Often the page title would sound interesting, but the page itself would prove irrelevant when they actually looked at it. This frustration was compounded when a search turned up hundreds or thousands of titles

Relatively few spelling mistakes were made when composing search statements, and this problem was not commented upon by any student. Group rather than individual searching undoubtedly reduced the incidence of spelling errors; the

videos show that on a number of occasions an initial spelling error was noticed by another group member and corrected before the search term was sent.

The students were asked to comment upon information seeking using the Web as compared with print sources, either in the context of the Olympics project, or more generally from their experience of using both. The accessibility of the Web was seen as a major advantage over books, especially if the books could only be consulted in a library. It saved time and energy in visiting the library. Many students spoke of the difficulty of finding books in the library because they were on loan, wrongly shelved, or simply not in the collection. In contrast, they said, the Web was always there.

This reason for favoring the Web is related to another given by the students – the speed with which information can be found on the Web. A majority – 39 out of 50 – thought it was faster to search on the Web than in books. One pointed out that the entire Web content can be searched in one go whereas books have to be searched one by one. A minority view, however, was expressed this way:

I find that the Internet takes so long to get just a bit of information, but on books you have a page, right? So you just read it out...you just have to look in alphabetical order. Books are in alphabetical order.

Despite the majority vote for the Web in terms of speed, many students expressed as their suggestion to improve the Web that it respond to their instructions more quickly; they were as intolerant of delay as their elders!

### **3.2 Information Content**

Very few students admitted to difficulties in understanding the vocabulary used on retrieved web pages. In such cases they said they would either look the word up in a dictionary, or else ask a parent or the teacher. More problematic was the actual content of many web pages. The students were used to consulting books written not only with their age group in mind, but also taking into account the kinds of information typically requested in school projects. In the case of the Web, the students said that they often had to “translate” the content into their

own syntax and vocabulary. The information was not neatly packaged for them. In many cases the Web provided too detailed information, or else required the students to select and merge data from several different sites. As one explained: “ some stuff I really didn’ t need , because it went into really big detail, so some parts I cut out and I re-wrote it all.”

Very few students commented upon the authority of information found on the Web, and their comments were very general in nature. Only one girl seemed to have grasped that “ anyone can put anything on the Web, whether it is true or not.”

The Web is a source not only of textual but of visual and aural information. It might be thought that this media richness would appeal to young web users. This proved true as regards still images – photographs – that were widely retrieved and incorporated into the final posters: 47 out of the 50 posters included at least one web image, and the mean was five. The students were asked to explain why they included such images. Some did explain that they added information content, but in general students saw text as providing information while pictures added color and made their posters more attractive. Some even conceded that pictures had the virtue of consuming space on a poster, thus reducing the need for text. A major reason for favoring the Web against print material as a source of pictures was the availability of color printers for web material but typically monochrome photocopiers for print material.

If still images were popular, video, animation and sound was not. Very few students bothered to look for such information, and indeed they avoided it when located. Their rationale was simple: in a project assessed by a two-dimensional poster and an oral, how could sound or moving images be used? They appreciated that in order to incorporate information from such media it would be necessary to convert the information into text – a process involving more cognitive effort than was deemed acceptable. Only one student admitted to doing this – she had found a relevant sound sequence (an interview) and had transcribed it before incorporating segments on to her poster. A second difficulty

with video, as several students noted, was the problem of playing retrieved sequences.

In comparison with books, many students preferred information found on the Web. The most common reason was that much more relevant information could be found. Of course, the topic had been selected in part because it lent itself more to web than book information (magazines would have been useful at the time of the Olympics, but the research was taking place a few weeks later when the topic would have been dropped from their pages). In contrast, though, some students believed that books were better sources of information.

In terms of content level, one student preferred the Web because it contained more sophisticated content than the books in the school library. This was an unusual opinion, however, and other students thought this very fact detracted from the Web's usefulness. They liked the specificity and precision of book-based information: "once you find the book that you're looking for and it has like all the stuff, it won't mix in anything that you don't need." In contrast, the Web represented an information jungle. Some students appreciated that a decision on the Web versus books was not simple – it depended on the subject area. It was pointed out that some subjects, like curling, are too specific to be treated in a monograph, whereas the Web still has a lot of relevant information. Several students commented that the Web was good for up-to-date information, but for other topics books would be more suitable.

#### **4. Discussion**

The students in many cases during the interviews demonstrated an impressive sophistication in their appreciation of the Web's strengths as well as weaknesses as an information source for their school projects. They were able to weigh it against the traditional sources with which they were more familiar, although their conclusions were not uniform. Some remained convinced of the superiority of print, while rather more were sold on the Web. A third group appreciated that the answer is not necessarily for one or another, but that the nature of the information need may tilt the balance in one direction or another.



Although the students were young, nevertheless they had grown up with print and only recently experienced electronic sources in general and the Web in particular. Even younger students who have been less exposed to print may come to draw different conclusions. Indeed, these students, with more Web exposure, may shift their allegiance more sharply in its favor. It should be borne in mind that the data were collected in mid-1998, two years before the CAIS Conference.

Despite these caveats, several conclusions can be drawn. Information seeking on the Web cannot be undertaken successfully relying solely on intuition. Despite some initial training, the students encountered a variety of problems.

Furthermore, their skills did not noticeably improve with practice. Selection of search terms, choices between searching and browsing, modification of strategies that are not working, and so on, remained constant throughout as many as six sessions over several weeks. Two solutions suggest themselves. One is to develop interfaces that offer much more help in dealing with such problems. The other is to provide more training to users. It is interesting to speculate that the problems encountered by these twelve-year old students in all likelihood are very similar to those encountered by many adults. The solutions, whether interface-based or training-based, however, should be targeted specifically at particular age and skills groups.

Improved information-seeking skills will not solve the problems associated with information content. Leaving children unassisted to search the entire Web is perhaps a little like setting them loose in the Library of Congress or the British Library rather than in their local school library or the children's section of the public library. Too much even of the relevant information is packaged and presented in a way that is unhelpful for primary school projects. The students need some level of guidance. Again, this might be offered either by software pathfinders or by guidance from the teacher. The trick here is to retain the opportunities for discovery while offering some boundaries.

The Web is a rich source not simply of text but of visuals and sounds. These resources will only be exploited, however, if the projects given students in schools become more imaginative, providing scope for moving images and sounds easily to be incorporated in the submitted work (a similar conclusion was drawn by Large, Beheshti and Breuleux (1998) in the case of multimedia content contained on CD-ROM-based children' s encyclopedias).

The role of the Web as an information source will continue to grow, and will be ever more widely used in schools. The effective exploitation of its information resources, however, await improvements in its access and content.

### **Acknowledgements**

The support of the Social Sciences and Humanities Research Council, Canada, is gratefully acknowledged, as is the cooperation of the school board, school principal, teacher and students who participated in this research.

### **References**

- Bilal, Dania (1999). Web search engines for children: a comparative study and performance evaluation of Yahooligans!, Ask Jeeves for Kids and Super Snooper. *Proceedings of the 62nd ASIS Annual Meeting, October-November 1999, Washington DC*. Medford: Information Today, 70-83.
- Borgman, Christine L.; Hirsh, Sandra G.; Walter, Virginia A. & Gallagher, Andrea L. (1995). Children' s search behavior on browsing and keyword online catalogs: the Science Library Catalog Project. *Journal of the American Society for Information Science* 46, 663-684.
- Hirsh, Sandra G. (1997). How do children find information on different types of tasks? Children' s use of the Science Library Catalog. *Library Trends* 45, 725-745.
- Large, Andrew; Beheshti, Jamshid & Breuleux, A. (1998). Information seeking in a multimedia environment by primary school students. *Library and Information Science Research* 20, 343-376.
- Large, Andrew; Beheshti, Jamshid & Moukdad, Haidar (1999). Information-seeking on the Web: navigational skills of grade-six primary school students.

*Proceedings of the 62nd ASIS Annual Meeting, October-November 1999, Washington DC.* Medford: Information Today, 84-97.

Marchionini, Gary (1989). Information-seeking strategies of novices using a full-text electronic encyclopedia. *Journal of the American Society for Information Science* 40, 54-66.

Schachter, J.; Chung, G.K.W.K. & Dorr, A. (1998). Children' s Internet searching on complex problems: performance and process analysis. *Journal of the American Society for Information Science* 49, 840-849.

Solomon, Paul (1993). Children' s information retrieval behavior: a case analysis of an OPAC. *Journal of the American Society for Information Science* 44, 245-264.