

Design Criteria for Children's Web Portals: The Users Speak Out

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Four focus groups were held with young Web users (10 to 13 years of age) to explore design criteria for Web portals. The focus group participants commented upon four existing portals designed with young users in mind: Ask Jeeves for Kids, KidsClick, Lycos Zone, and Yahoo!igans! This article reports their first impressions on using these portals, their likes and dislikes, and their suggestions for improvements. Design criteria for children's Web portals are elaborated based upon these comments under four headings: portal goals, visual design, information architecture, and personalization. An ideal portal should cater for both educational and entertainment needs, use attractive screen designs based especially on effective use of color, graphics, and animation, provide both keyword search facilities and browsable subject categories, and allow individual user personalization in areas such as color and graphics.

Introduction

Whether viewed as a cause for celebration or concern, there can be no doubt that in a growing list of countries the Internet is now available in schools and individual classrooms. For example, according to the U.S. Department of Education, 95% of schools in the United States were connected to the Internet as of late 1999 (Martin-Hidalgo, 2000). An item in a Canadian newspaper reported that in the UK, at least 93% of secondary schools and 62% of primary schools had connections during the school year 1999–2000 (Wood, 2000). In Canada itself, SchoolNet, an Industry Canada project, claimed in 1999 to have made the country the first in the world to connect all its public schools to the Internet, and the goal for 2001 is 250,000 connected computers, the equivalent of one connected computer per classroom (Foss, 2000). A prime use of the Internet within schools is to provide students with access to information on the Web as a resource to support class projects.

Given this heavy investment in information technology, it is fitting that a growing number of researchers are investigating how best students can exploit the information con-

tent of the Web. The particular study reported here explores the design criteria that might be applied to Web portals—search engines and subject-organized directories—intended for use by students between the ages of approximately 10 and 13. When children explore the Web they normally employ, at least as an opening step, a portal. This may be a portal that has been constructed for general (that is, adult) use, such as AltaVista, Ask Jeeves, Lycos or Yahoo; alternatively, it may be a portal with a younger audience specifically in mind, such as the four kids' portals examined in this study: Ask Jeeves for Kids, KidsClick, Lycos Zone, and Yahoo!igans!. Do all or some of the portals currently available meet the needs of this audience, or can more effective portals be developed?

The answer to this question was sought not from adult users or designers, but from the user group itself. The opinions of 23 young students were gathered in four focus group sessions. In the case of adult users, of course, there is little remarkable about conducting a user study: probably thousands of different kinds have been conducted to assess various aspects of information-seeking behavior and to measure information system performance. And as Fucella and Pizzolato (1998) comment, "the user-centered approach to design has led to a general improvement in software interfaces." Yet there has been a greater reluctance to employ the same techniques with young users. As Hanna, Ridsen, Czerwinski, & Alexander (1998) from Microsoft's Hardware Ergonomics and Usability Department put it: "Usability research with children has often been considered either too difficult to carry out with unruly subjects, or not necessary for an audience that is satisfied with gratuitous animations and funny noises." They go on to say that in their experience "the usability of a product is closely related to children's enjoyment of it" and, therefore, it is vital to gain the users' perspectives. Scaife and Rogers (1999) add that "kids are aware of aspects of the use of technology that we [adults] are not sensitive to and that we need to be told of."

The goal of this exploratory research was to gather user feedback on various aspects of portal interface design by asking kids to comment upon four specific portals targeted at their age group. In particular, they were encouraged to

focus on screen design and organization, navigability, and usability. They were not asked to comment (although, of course, some did) on the actual content retrieved. Their evaluations of the four portals are reported below. It should be emphasized, however, that the primary intent was to identify design criteria that can subsequently be applied by the authors to develop new kids' portals rather than to attack or defend the actual portals used in this study. It should also be emphasized that the retrieval effectiveness of the actual portals was not being measured in any way; searches were not assessed by their duration, the search steps taken, or their results. Rather, the kids were asked to conduct several searches as a means to get them to use the portals, to explore the features available on these portals and to express their opinions upon them. The data collected relates to the kids' qualitative perceptions of the portals, and no attempt was made to gather quantitative data about the actual searches themselves.

Children and the Web

With some notable exceptions (including Borgman, Hirsch, Wather, & Gallagher, 1995; Hirsh, 1997; Kulthau, Turock, George, & Belvin, 1990; Large, Beheshti, & Breuleux, 1998; Marchionini, 1989; Solomon, 1993) children as information seekers in the electronic environment received relatively little attention until the widespread entry of the Internet into schools and classrooms. The availability of the Web as a potential information resource for practically any school project, however, is now stimulating a growing interest from researchers in the LIS, CHI, and education fields.

Although research on children's information-seeking behavior on the Web is still largely exploratory, involving typically small numbers of school students of various ages, it is now possible to formulate certain characteristics concerning this behavior. Schacter, Chung and Dorr (1998) found that students in grades five and six were reactive searchers who failed to plan systematically search strategies, preferring instead browsing strategies (a finding replicated by Large, Beheshti, & Moukdad, 1999). Strategies, when used, avoided sophisticated techniques such as Boolean, adjacency or phrase searching. Students in both the above studies as well as those in Hirsh's investigation of grade-five students (1999) appeared to browse at the expense of reading the information as they traversed the Web. Older high school students exhibited a similar tendency to browse at high speed through the Web and to skim quickly rather than carefully read Web pages (Fidel et al., 1999). The students rarely progressed in a linear search, but instead would repeatedly return to a "landmark" page, a finding supported by Wallace, Kupperman, Krajcik, & Soloway (2000).

Lazonder, Biemans, and Wopereis (2000), working with Dutch high school students, found that experience in using search engines paid dividends when searching, but that novices were as effective as experienced users when brows-

ing (and, therefore, concluded that training would help in searching but not browsing). Fidel et al. (1999) argue that prior knowledge of the topic being searched helps in successful Web searching. Large and Beheshti (2000) believe that primary school students need assistance if they are to find information successfully, and that such assistance must be provided either by teachers or by the Web portals themselves.

Schacter, Chung, and Dorr (1998) conclude, to their surprise, that the Web seems better suited to open-ended, loosely defined tasks than to highly specific, well-defined tasks. Perhaps this is not surprising, as it is easier to find something on the Web of relevance to a topic than to track down a specific piece of information. Hirsh believes that young children are concrete thinkers who seek information that can be found by using the exact terms set in the assignment, and encounter trouble with anything that is not an exact fit. These two findings are not at odds; specific facts will be found easily by children only if their initial search terms happen to work—they will not find it straightforward to formulate alternative terms. Fidel et al. (1999) found that ease of access was the main advantage of the Web over the library as far as the students were concerned. The students agreed that surfing was much more fun when they were not looking for specific information.

Bilal (1999) has compared the performance by grade-seven students of three Web portals specifically designed for youthful users: Yahoo!igans!, Ask Jeeves for Kids, and Super Snooper. She concludes that as novices, children should use the portals designed for them, but also found that each of the three portals had its own strengths and weaknesses for information retrieval. In a later study of Yahoo!igans!, Bilal (2000) offers a number of suggestions to system designers, who "should develop search engines with powerful searching and browsing mechanisms that build on children's cognitive and physical behaviors to search, browse, navigate, and explore information with certainty and positive affective behavior." She proposes more instructions, search examples, a natural-language interface, output ranking, simple screen displays, context-sensitive help, spell checking, effective feedback, and an on-line tutorial.

Some researchers have commented upon gender effects. Schacter, Chung, and Dorr (1998), for example, found that boys browsed significantly more than girls. Hirsh (1999) found that grade-five girls were more interested in images than their male counterparts. Martin (1998), from her work with grade-four students working in pairs, concluded that female pairs made fewer mistakes than male pairs, tended to work together more systematically, required less teacher intervention and operated more collaboratively.

The above studies have contributed to our understanding about how children approach the Web to gather information, but they did not seek explicitly to gather the users' own critical reactions to the portals that they used to achieve this objective. Our study, in contrast, was designed to do just that: its intention was to shed light upon portal design by

exploring the responses of kids to several existing portals that have been designed specifically for younger Web searchers.

Usability Studies and Children

The idea of conducting usability studies for new software developments is hardly revolutionary, at least in the adult world. In the case of children, however, the situation is rather different. Hanna, Ridsen, and Alexander, usability engineers at Microsoft, could write in 1997 that “not until recently have publications begun to appear addressing the need to include the user in the design process of children’s computer products.” They believe that “the benefits to be gained from gathering data from children as users are unquestionable,” and are critical of research teams that assume because they were once children or because they have children at home, then they can evaluate the usability of a product for children. In Hanna, Ridsen, and Alexander’s opinion, “this rarely results in a good outcome. No amount of adult evaluation will find all the issues that children will stumble into as a matter of course.” They give the example of a funny noise used as an error message that the adult designers thought would prove very effective—it did, to such an extent that the children deliberately repeated the error over and over again just to hear the sound!

Druin (1999) actively involves children as partners alongside adults in her research teams, and has found that children can be an essential part of these teams alongside educators, computer scientists, and artists.

Hanna, Ridsen, and Alexander (1997) recommend that children be divided into three common target age ranges for usability studies, although they add that the age divisions are arbitrary and that many behaviors will overlap: preschool (2 to 5 years), elementary school (6 to 10 years), and middle school (11 to 14 years). They advise that children in the oldest range are very easy to involve in usability testing; most will be comfortable with computers and with unfamiliar adults, and will enjoy carrying out tests.

Microsoft has devoted considerable attention to developing methodologies for usability testing with children. Hanna, Ridsen, Czerwinski, and Alexander (1998) believe that usability research has identified ease of use as a critical factor in engagement, “and as such is key to every child’s product if it is to be a success.” In usability research they follow three processes: analyze the user—to understand the user’s skills, knowledge, and expectations—analyze the tasks—to understand the user activities that a product is intended to support—and design a product in iterative steps based on the earlier two processes. In the study described in this article, focus groups were employed to assist both in the analysis of users and the analysis of tasks as a precursor to the design of one or more models of a children’s Web portal.

Contextual Inquiry

The objective of our research was to critique four Web portals to gather user feedback as a preliminary to designing

a test portal. The chosen methodology was the focus group, as discussed below. It should be emphasized, however, that the focus group was not expected simply to discuss a series of issues raised by the moderator, but rather to interact with four portals, in turn, to express likes and dislikes, and to offer suggestions for improvements. The experience, therefore, was interactive as well as discursive. This makes it different from as well as similar to, more traditional focus group experiences.

In fact, the methodology adopted (and described below) shares certain important characteristics with a technique termed contextual inquiry, as developed by Beyer and Holtzblatt (1998).

Contextual inquiry represents the first step in an overall design process that Beyer and Holtzblatt call Contextual Design. It is a field-gathering technique that studies a few carefully selected individuals in depth to arrive at a fuller understanding of user practice. Users are observed as they work and are asked about their work practices.

Druin (1999) has described a modified form of contextual inquiry that she employed when observing children using a software product (see also Druin, Bederson, Boltman, Miura, Knotts-Callahan, & Platt, 1999). Unlike Beyer and Holtzblatt, but in common with ourselves, Druin worked with a group of children rather than individual children. In her scenario, an interactor (used rather than the focus group term, moderator) asks questions that are directed at what is going on at the moment (How, Why, and What questions). She found that without an interactor (that is, simply observing children using a software product) the children being observed felt uncomfortable, as if they were on a stage, and if the interactor took notes, the children felt not only uncomfortable but distracted. Instead, the interactor became a participant observer, talking naturally to the children and becoming a part of the active experience. This very much describes the approach and atmosphere within our groups.

It also helps to answer the objection made by Nielsen (1997) to the use of focus groups in usability studies. Nielsen argues that focus groups only reveal what people like or dislike; they cannot tell you whether a product is usable. He asserts that the moderator of the focus group usually provides a demo product for the participants to watch before commenting upon it, and “watching a demo is fundamentally different from actually using the product.” In our study the members of the focus group both used and discussed, simultaneously, the Web portals. We did not seek their opinions on the portals but rather asked them to discuss their likes and dislikes as they grappled with them. In this context we believe that our interactive focus groups have a part to play in assessing the usability as well as the likeability of Web portals. Furthermore, Arnone and Small (1999) stress the importance of motivational effectiveness in Web sites designed for children. In their opinion, for a site to motivate it must be engaging and stimulating as well as useful and credible. In other words, liking or disliking a Web site will strongly influence the child’s effective use of

it. It should also be noted that Nielsen's views on focus groups and usability testing are not universally shared; Lieberman (1999), for instance, lists focus groups alongside other usability testing methods such as task analysis, observational and ethnographic studies, field experiments, and surveys in the context of designing children's software products.

Research Design

Data Collection

Portal Selection. Large numbers of Web portals, search engines, and directories are now available to locate information on the Web. These include general portals such as Lycos and Yahoo!, search engines such as Google, and directories such as Open Directory, that attempt to index the entire content (even though in practice none so succeed), as well as numerous portals (or vortals, as they are commonly called) that offer access to more restricted content (in terms of language, country of origin, and subject matter). Included within the latter category are a growing number of portals that are intended for use by children. Such portals typically restrict their indexing coverage of the Web to sites potentially of interest to children, use directory subject categories that are suitable for their targeted audience, and employ interfaces that are likely to appeal to kids.

Four such portals were chosen for use in this study: Ask Jeeves for Kids, KidsClick, Lycos Zone, and Yahoo!igans! Three major criteria were applied in this selection. First, the portals should be intended for users in grades 5 through 7 (between the ages approximately of 10 and 13). Second, they should be intended for educational use as well as or rather than entertainment. Third, they should represent a variety of interface and information-seeking approaches. A fourth criterion—current popularity as measured by site visits—was also applied to some extent. So long as the first three criteria could be met, it made sense to choose portals that already were widely used by children. To this end, PC Data Online (<http://www.pedataonline.com/reports/>) was consulted to identify (in April 2000) the most heavily used children's educational portals. Although several of the top listed portals had to be eliminated because they were aimed at younger children or were not in our opinion educational in nature (Mamamedia.com is an example of both), two portals finally were selected from near the top of this list: Yahoo!igans! in fourth position, and Ask Jeeves for Kids in fifth position. These two portals offered good contrasts (see below) and had also been investigated by Bilal (1999, 2000). The remaining two portals chosen—KidsClick and Lycos Zone—were not on the PC Data listing of heavily used sites, but provided interesting contrasts, especially in interface design, both with each other and with the other two portals.

The following descriptions of the four portals are based on their appearance in June 2000.

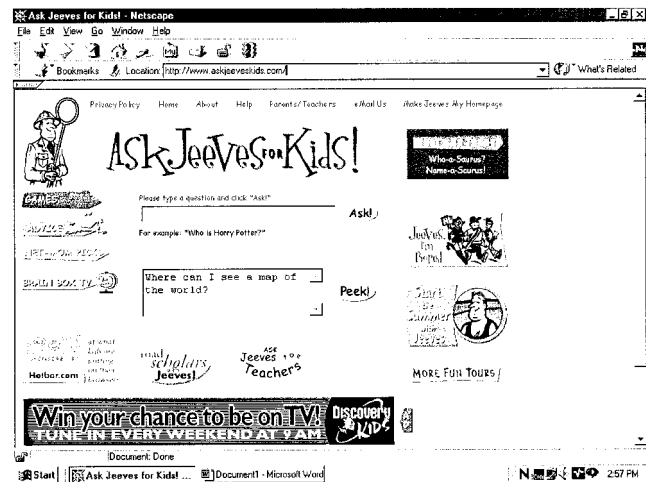


FIG. 1. Ask Jeeves for Kids.

Ask Jeeves for Kids (<http://www.ajkids.com>). Ask Jeeves for Kids (see Fig. 1) is a children's version of the Ask Jeeves portal. Like its parent, its purpose is to allow users to find answers by entering natural-language questions. Its database is compiled and regularly updated by research staff who search the Web for answers to likely questions. A search query window is prominently located in the upper-center of the opening screen; users are asked to "please type a question and click 'Ask.'" It does not offer advanced search features such as Boolean or proximity operators, nor does it provide a directory of subject headings (except for a few "Fun Tours" on topics like Mythology or Pets). In response to their question, users are presented with a short list of questions by Ask Jeeves for Kids from which they must select the closest to their own. They are then directed to a single site deemed likely to contain the answer. Links are also provided to "metasearch partners" such as Education World, although these sources typically provide less relevant answers than Ask Jeeves itself. An option to check spelling is provided via a radio button. If users do not locate any interesting hits they are given the option of formulating a new search question in a query window at the bottom of the page. Users are also given an opportunity to try a question that some other user is currently seeking to answer (in the screen shot shown in Fig. 1, the question concerns finding a map of the world). Animation is not employed on the interface, although still images are to be found.

KidsClick! Web Search

(<http://sunsite.berkeley.edu/kidsclick/>). KidsClick (Fig. 2) was created by a group of librarians in the Ramapo Catskill Library System (Middleton, NY) "as a logical step in addressing concerns about the role of public libraries in guiding their young users to valuable and age appropriate Web sites." To be catalogued by KidsClick, sites must be "entertaining or enlightening" to K-7 kids (more detailed selection criteria are provided on the site itself). A query search window is prominently displayed on the upper center

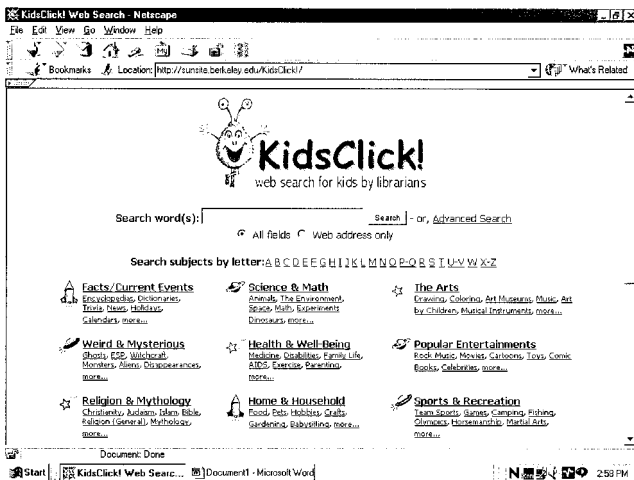


FIG. 2. KidsClick.

of the opening page. Radio buttons can be used to search all fields or Web addresses only. The search engine accepts keyword searches and allows truncation and Boolean operators. An Advanced Search (accessed via a link) allows a search on all fields, subjects, titles or descriptions, as well as by reading level and illustration level. Listings of hits include a brief description, reading, and illustration levels, and a subject category (as assigned by the indexer); clicking on the subject retrieves all other pages that have been assigned the same subject. A dictionary can be used to check spellings. If no matches are made, users are asked to enter a new search, and links are provided to other children's portals. The directory is organized hierarchically (based on the Dewey Decimal Classification) using terms and categories likely to be familiar to young people (such as "Weird & Mysterious," "Science & Math," and "Sports & Recreation." The letters of the alphabet are also displayed; by clicking on any letter users can browse the subjects that have been indexed under that initial letter. The sites included in the dictionary are the same ones as searched by the search engine. The interface is relatively plain and simple and does not employ animation.

Lycos Zone (<http://www.lycoszone.com>). The stated aim of Lycos Zone (Fig. 3) is to make the Web a "family-friendly experience" to children between the ages of 3 and 12. It offers both educational and entertainment content from 16 providers as well as guided access to external Web sites. A small search query window is provided on the upper-center of the opening screen. No advanced search features such as Boolean operators or truncation are provided. A directory of subjects, organized principally by school subjects such as History, Math, or Geography, is accessed via a link on the main screen from "Homework Zone" (there are also several other zones such as Games and Fun, and Homework is not the most prominently displayed). Sites are selected by editors and educators to support the elementary school curriculum. The site employs colorful graphics and animation,

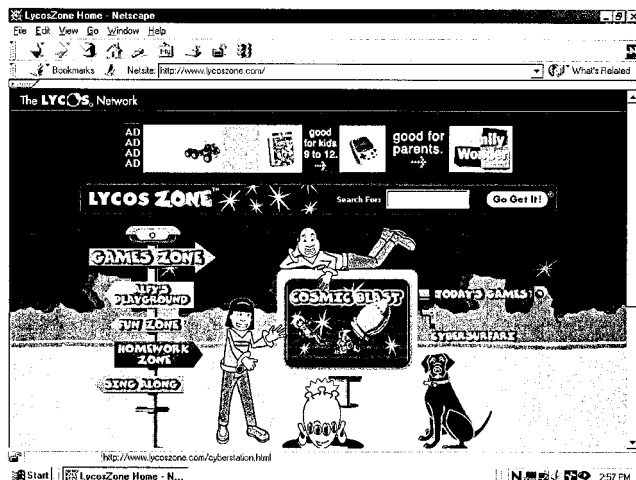


FIG. 3. LycosZone.

and these change for the various zones. Selection of a subject from the directory takes the user to external sites whose interfaces, of course, are quite different (the Lycos-Zone banner is the only reminder that one is still on the site).

Yahooligans! (<http://www.yahooligans.com>). *Yahooligans!* (Fig. 4), a part of Yahoo! Inc, is a browsable, searchable directory of sites selected by experienced educators for children aged between 7 and 12. The search box is displayed in the center of the screen. The directory is organized hierarchically under six main categories that are oriented towards young users. Most categories, such as "Science & Nature," or "School Bell"—it includes, languages, arts, math, social studies, etc.—are targeted at educational searches, but one category is "Computers & Games." Searches can be carried out using keywords, but advanced search features are unavailable. *Yahooligans!* offers a very colorful interface with both graphics and animation.

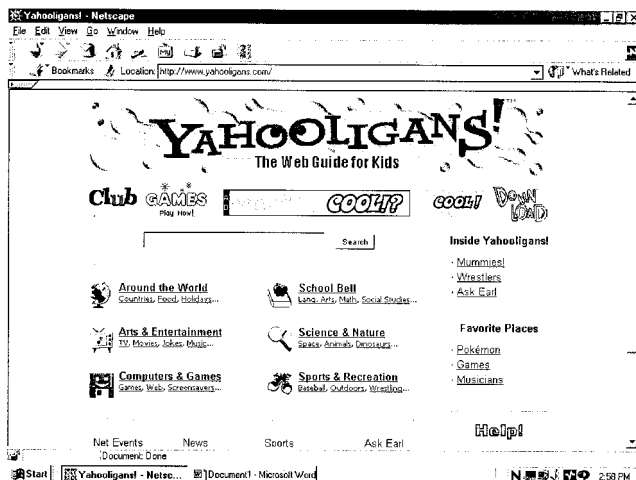


FIG. 4. Yahooligans!

Focus Groups

Focus groups as a user-focused research instrument have a long history, and have been a mainstay in private sector marketing research. More recently, however, social scientists and educators have grasped their potential, and they are now used in many and varied environments. Fuccella, Pizzoloto, and Franks (1999), for example, list the focus group as one technique used by IBM to gain user feedback on Web site design.

Vaughn, Schumm, and Sinagub (1996) define a focus group as an informal assembly of target people whose points of view are requested to address a selected topic. The assumption is that people are valuable sources of information about themselves. The goal of the focus group is to elicit the perceptions, feelings, attitudes, and ideas of participants about a selected topic. Focus groups are an instrument of qualitative research, and do not generate quantitative information that can be projected to a larger population. The objective is to promote group interaction to obtain a range of opinions, and participants are encouraged to express their own points of view rather than strive towards an artificial consensus. Focus groups are best used when conducting exploratory research and that they can provide verification in interpreting data that might otherwise be only conjecture.

A considerable amount of literature exists on focus groups, and the major methodological guidelines are widely shared (Vaughn et al., 1996). It is recommended that groups are kept small, though opinions differ somewhat on the precise numbers; minima can be as low as four and maxima around 12, with an optimum generally recommended of between 6 and 10. The number of focus groups used will be influenced by the purpose of the study, but it is unusual to have only one, and typically between two and four are employed. Traditionally (and widely) it is recommended that the participants be strangers to each other, though now there are dissenting voices (e.g., Krueger, 1994). The session should be held in a comfortable room, and ideally away from the workplace. If the session is to be audio or video taped, participants should be informed ahead of time. Even when taping is used, supplementary note taking is also recommended. Both refreshments and rewards are recommended for adults as well as children.

The purpose must be carefully refined, perhaps resulting in a list of information wanted or not wanted from the focus group. Ideally, the use to which the group output will be put should be determined ahead of time, as well as the outcomes required for the group to be successful. A map of the proceedings from start to finish should be planned as carefully as possible, including an introduction, warm up, question and answer period, wrap up, and closing statements.

The moderator's role is seen as being critical to success. He or she must set the scene for the ensuing session as well as control the proceedings (as unobtrusively as possible) without influencing outcomes. As Krueger (1994) expresses it, the moderator should create a "permissive environment"

that nurtures different points of view. Whenever possible an assistant should also be present to operate any taping equipment, take notes (something the moderator should not do), identify and direct the moderator (unobtrusively) to anyone who is being excluded from the discussion, and to deal with any external interruptions.

It is widely agreed that focus groups can be used with children (see, e.g., Barbour & Kitzinger, 1999; Krueger, 1994; Stewart & Shamdasani, 1990; Vaughn et al., 1996), although not with the very young (below six generally). Indeed, as Vaughn et al. (1996) state, children may provide more spontaneous responses than some adults. In the case of children, however, group size should be less—around five or six—the length restricted to around 1 hour (for children between the ages of 10 and 14), and the participants in any one group be no more than 2 years apart and of the same sex. Stewart and Shamdasani (1990) emphasize that the moderator's role in establishing a relaxed atmosphere is especially important. Krueger (1994) recommends that the focus group take place outside of institutions run by adults, and that it is better if the moderator is closer to the age of the participants.

Four focus groups were used to gather feedback from children about Web portal interfaces to elaborate design criteria for children's Web portals.

The Students

Twenty-three children aged between 10 and 13 participated in the study; 12 were girls and 11 boys. Several families with a son or daughter in this age range and Internet access from their homes were identified by the researchers (through direct or indirect contacts) and invited to participate in the study. In a focus group no attempt is made to establish a representative sample of a wider population; the only requirements were a balance overall of girls and boys who had previous experience of seeking information on the Web.

The purpose of the focus group was explained to the parent (in all cases, the mother), and she was asked if she was willing to host a focus group in her home. She was also asked to consult her son/daughter to see if they were willing to participate and if they would invite five friends also to attend. Only two negative responses were received (one occasioned by an imminent departure on vacation). Formal consent letters were then sent to all the parents and all the children.

The students were divided into four focus groups: six girls were in each of Groups 1 and 3; five boys were in Group 2, and six boys in Group 4. The children in Groups 1 and 4 lived in a middle-class suburb of Montreal; the boys in Group 2 lived in the city, and the girls in Group 3 lived in a small town outside of Montreal.

All the students had prior experience of using web portals, but none had used the four children's portals selected for investigation in this study.

The Setting

Three of the focus groups were held in the home of one of the children in that group. The only requirement was the availability of a quiet room in which to hold the session, and a computer with Internet connections. None of the homes had high-speed cable connection. The other focus group was held in a meeting room at the mother's place of employment, where high speed access was available.

The Moderator

The same group moderator was used for all four groups. To prepare for the role, which he had not played before, he not only studied the literature on focus groups, but met with an experienced, professional moderator. An outline script for the sessions was prepared, and several mock sessions played out within the research team. A second person also participated in each focus team to take notes and help with any problems. For three of the focus groups the same assistant was present. Both that assistant (but not the replacement in the fourth group) and the moderator were in their mid/late 20s.

Search Questions

The four search questions were selected from the Social Studies (Canada) section of Startribune's Education resources Homework Help Web site (<http://www.startribune.com/education/homework.shtml>). This site offers 24-hour help to children who have homework questions which they have been unable to answer, and publishes lists of the educational questions submitted, along with the grade level of the requestor (in most cases). A short list of random questions submitted by grade-six students (the median age of the students in our study) was compiled in early June 2000. It included both open and closed questions. These questions were then searched by the researchers on the four portals, and any question that could not be answered by at least one portal was rejected (interestingly, this did lead to the rejection of quite a few questions). This process was continued until two open and two closed questions had been identified for use in the focus groups:

- (1) I need to know about the geography and history of Quebec City.
- (2) What are the five tallest buildings in the world, and where are they?
- (3) I need to do a report on tigers.
- (4) Why did the pharaohs want to build pyramids?

Questions 1 and 3 are open ended, and questions 2 and 4 are closed.

Procedure

The four focus groups met, respectively, on 18, 21, 22, and 28 June, 2000. Each session lasted approximately 1 hour, followed by refreshments. The children were given

name badges to identify them. The moderator and assistant also wore name badges (first names only were used).

The sessions began with a brief explanation of why the focus group had been convened and what was going to happen. It was explained that the purpose was not to test the participants but to get their feedback on the interfaces they were about to use. They were asked what they liked or did not like about each portal, what suggestions they could make to improve them, and how they compared one against another.

Each participant drew numbers from a hat; this determined the sequence in which the children took their turn at the keyboard and mouse. In the first focus group, a draw was also made for the order in which the four portals would be examined. In subsequent groups the order was rotated to ensure that no portal was searched first in more than one focus group. A different search question was tried with each portal in any one focus, and by the end of the four group sessions, each of the four questions had been tried with each portal.

The procedure for each portal in each focus group was to use it to find information relating to one search question. Although for any one portal only one child was "at the controls," all the children were encouraged to participate both in the search and in the commentaries which accompanied it. The moderator prompted, where necessary, responses without influencing their actual content. In some cases, especially with the boys' groups, it was necessary to refocus the group on the task in hand, although in general the participants were actively engaged in the exercise and needed little prompting. He also ensured that everyone's viewpoint was heard. At the end of the session the moderator invited final comments and evaluations from all participants, and answered any remaining questions. This was followed by pizza, and all the students were given a free movie pass to thank them for their help.

Data Analysis

The four focus group sessions were captured on audiotape using a desktop microphone. This seemed to cause no consternation on the participants' part. The audiotapes were subsequently transcribed for analysis. The assistant also took written notes.

The focus group transcriptions were independently analyzed by two of the researchers. The data gathered from each of the four groups was first categorized by portal. Then for each portal, the data were examined to establish respondents' opinions on several topics: first impressions of the portal (considered important, as this may well influence whether a user remains with a portal rather than immediately looking elsewhere); features that were liked; features that were disliked; and suggestions for improving the portal.

Portal Evaluation

Any concerns of the research team that young users would find it difficult to examine and evaluate Web portals

were quickly assuaged. In fact, the users in all four groups readily shared their likes and dislikes of the portals as well as their suggestions for improvements. These are presented below, portal by portal. For any user audience, and perhaps especially for children, first impressions are important. A site that does not attract initially might not be given a second chance. For this reason, the users' initial reactions to each portal have been separated from their later comments.

Ask Jeeves for Kids

First Impressions. First impressions on Ask Jeeves for Kids were relatively muted except from Group 1, which thought it colorful, bright and catchy: "It makes you want to look at it," as one member said. The greater level of enthusiasm from Group 1 might be explained by the fact that it was the only group to view this portal at the outset of the session. In contrast, Group 4 thought it a little confusing for kids. One boy commented negatively on the absence of subject categories.

Likes. Further exposure to Ask Jeeves for Kids did not engender much more enthusiasm. A few students thought it was easy to use and that it gives more direct access to information because it does not retrieve "thousands and thousands of sites on one thing." They found it easy to enter questions in natural language. A minority also liked being offered a choice of questions by the portal in its attempt to clarify the user's initial question, although they thought more questions were needed properly to achieve this. One group approved of the opportunity to link to other "meta-search partners" if the initial Ask Jeeves results prove unsatisfactory. Several students expressed some enthusiasm for the use of color and graphics, and one boy in Group 2 particularly liked the Jeeves character, but further use elicited generally negative comments on all these points.

Dislikes. The dislikes were more frequently expressed and more widely shared, especially by the two boys' groups. One boy was even moved to comment, "There is no best part." The major criticism was focused on the unique retrieval approach adopted by Ask Jeeves for Kids. Although the idea of entering a natural language question in general was greeted positively, the response of the portal to this initial question was widely criticized and provoked frustration. Most of the students would have preferred an immediate answer in the form of a list of matching sites rather than being presented with a set of new questions from which to choose. Some users commented negatively on the absence of subject categories (the only portal of the four not to offer this alternative).

The interface design also drew its fair share of criticism. An excess of white space was considered boring; there was simply not enough use of color and graphics to attract support. The Jeeves character himself also drew fire for his plainness, and at least in one case for his maturity: "it should be like his grandson or something if it's for kids."

Suggestions for Improvement. The suggestions are very much in keeping with the dislikes as described above. A short answer to the initial question should be provided immediately, with links to other information, rather than a list of questions. A different solution to the same problem was to have Jeeves reply immediately to that effect if an answer cannot be found, and only then to pose other questions that might lead to information of some relevance. Some boys proposed that Jeeves be replaced by a younger person, while the girls went further by suggesting instead a dog. The background should be more colorful, and a games zone should be included.

KidsClick

First Impressions. Within each of the groups, first impressions on KidsClick diverged. Despite the fact that it is the least dramatic portal in terms of color, graphics, and animation, some initial comments were very positive; it is cool, interesting, and it looks nice. Others, however, were less enthusiastic, emphasizing the relative dullness of the interface and the absence of games, typified by "it doesn't look like much fun," or the damning "Web search for kids by librarians." A more charitable first impression was that "when it doesn't have color it kind of looks boring, but it doesn't mean it necessarily is." Its URL also is too long.

Likes. KidsClick certainly had its supporters. Respondents from all the groups commented positively on the categories offered and the use of letters of the alphabet to designate search categories. Many also liked the icons alongside the categories. The links to other children's portals in case of zero hits on KidsClick was also commented upon positively. Some children liked the descriptions that accompanied the hits, which helped "sift" through the retrieved information. The alien figure on the first screen, despite lack of animation, was quite popular, and the absence of advertisements was universally approved. In general, KidsClick was appreciated for its clarity and its focus on information finding rather than entertaining: it was considered a good portal to use for school assignments. As one said, "This is a more like down to earth, very serious Web site."

Dislikes. Although its information retrieval effectiveness was appreciated, for many of the kids in all the groups this could not fully overcome its drabness. It simply was not considered attractive or fun to use by its target audience, leading many to say they would not return to it. The opportunity to search by clicking on a letter had its critics ("useless, no-one would want to do that"). The cluttered and crowded layout of results was found to be confusing. For some, there were too many pages of hits (this comment was provoked by three pages with a total of 20 hits), but for others there were not enough hits (a discrepancy likely caused by the different search questions tried on the portal

by the different groups). Space was not well used, and there was no background other than a blank white screen.

Suggestions for Improvement. The most obvious way to improve this portal, in its users' opinion, was to redesign the interface to add more graphics, some animation, and bright colors everywhere; it needs "more oomph in it." For example, the alien might jump around when a hit is found. It should include more "fun stuff" in addition to school-related content. The icons next to the categories should better reflect those categories. It was also suggested that a bigger type font be employed, and that the portal's name be put in bigger letters using a different font. Links should be provided to metasearch partners (as in Ask Jeeves for Kids). Hits should be limited to between 10 and 30—opinions differed on the precise number—especially if they are not classified (a comparison here was drawn with Yahoo!). One suggestion was to display the results in two columns to reduce scrolling, but another was to limit hits to no more than five per page, which would potentially increase scrolling. The keywords in the retrieved hits should be highlighted. The search button could be relabeled "Click It" or something more fun instead of "Search word(s)."

LycosZone

This portal elicited the biggest disagreements both within and between groups, with both strong supporters and detractors.

First Impressions. First impressions were very positive. The children liked the colors, the graphics—especially the alien and the dog—and the animation, such as the dog's wagging tail and the blinking people in the background. One even commented, "if you're kind of bored or something and don't really know what to do it looks like a pretty good site to go." The boys were somewhat less enthusiastic; although they conceded its very colorful look, they considered it "kind of young." The Game and Fun Zones were appealing to many, although some did doubt whether such a playful site would be a suitable place to look for information.

Likes. This portal gathered a lot of praise for its well-organized screen layout—the results are easy to read and the categories were well spaced. It was easy to find information, and the categories were well planned and just the right number. All groups liked the graphics and animation, and most appreciated the Games Zone and the alien animation. It was described as cool and hip, and was generally found easy to use.

Dislikes. Despite general acclaim, not everyone agreed with the girl who said she liked everything about LycosZone. The opening screen was very good, but subsequent screens were considered less eye catching. Although the

bright colors were appreciated, there were differences of opinion as to whether the actual colors worked well together (especially red on a blue background). It is interesting to note one study has suggested girls are more aware of color than boys (Passig & Levin, 2000). One group found it difficult initially to find information until they spotted the Homework Zone, but then "it wasn't hard." As someone said, "I guess you just have to look a little." The categories were not considered as good as those on KidsClick. The group including several older boys was the most critical, some going so far as to say that they would not use it for a school project. There were too many buttons, too many links, and too many advertisements. For some, too much effort was required to find information; as one boy put it, it is "not a lazy man's Web site." Not everyone appreciated the mix of information seeking and games on the portal, saying they would rather go to dedicated sites for games (although others especially liked this).

Suggested Improvements. Very few suggestions for improvement were made, but consistency in the use of graphics across all the pages (and not just the homepage) was raised, as well as multiple columns of displayed hits (as also proposed for KidsClick) to reduce scrolling.

Yahooligans!

First Impressions. First impressions of Yahooligans! were mainly positive. The name of the site, itself, clearly displayed in a large banner, was a hit from the outset. For most of the students it was cool, with good use of bright colors and graphics. Someone also commented, positively, that it looks like Yahoo! The use of the Pokeman figure indicated that the site designers were up to date with kids' fashions. A few negative impressions were also garnered, however; for some it was only suitable for younger kids, and, for a few it was too plain (especially its use of a white background) and needed yet more color. The presence of advertisements was immediately condemned.

Likes. The descriptions of retrieved sites were praised for their usefulness, and the numbering of the hits made them easy to re-find (although a few users were confused by the purpose of this numbering). The inclusion of games alongside information seeking, as with LycosZone, was generally popular—after the information has been retrieved, the games can be played (and the games were "neat"). It was a fun site to use, with lots of color (the green slime and the character's animated eyes were especially popular) and some animation. The screens were easy to read, and the information was well-organized under the right number of categories (six) that are clearly displayed on the screen. At least some thought it easy to find information using Yahooligans! One group also commented upon the download capabilities, which were easy to use. A lone girl even was positive about the advertisements on this portal!

Dislikes. Some criticisms were made of the retrieval capabilities, and especially the categories (liked by others); more categories, for example, would have provided greater specificity in searching. It took a long time to work through the category hierarchies, one student said, although he still thought it faster than entering a keyword search. The icons alongside the categories did not always reflect their content; the television icon, for example, was considered too narrow to denote the Arts & Entertainment category. For some the screen was not bright enough; they would have preferred a colored (even multicolored) background instead of white, more animation and sounds. An interesting comment was made by one girl that if the use of bright colors succeeds in catching your attention too well it may distract attention from the actual results. The font size should be bigger. The older boys thought Yahoo!igans was aimed at a young audience of 6 to 8 years' old and was too childish for them, although the girls in one group thought it should be made less complicated.

Suggested Improvements. Some of the boys in particular liked the design concept behind Yahoo!igans—its lively use of color and animation, and mix of information seeking and games—but felt that its realization was not quite right for them. This led them to suggest different interfaces for different age groups, and especially different cool zones (a pornography zone, e.g., was suggested for the older users!). A proposal was also made to include background music, although it was conceded that this could become boring after a while.

Portal Comparisons

At various points in the focus group sessions the participants offered comparisons between two or more of the portals. These are reviewed group by group.

The girls in Group 1 had no reservations in unanimously voting LycosZone their preferred portal. Opinions on the worst portal were mixed, but Ask Jeeves for Kids was least popular among the group, receiving three votes for last place, followed by Yahoo!igans! with two votes and KidsClick with one. They were evenly divided in placing the other two portals in second or third position. They reacted very positively to LycosZone's use of color and animation, and found it easy to use. The combination of a fun site with an effective site for finding information was its major virtue for Group 1. As one girl summed it up, "you have fun stuff but you also have like homework stuff for research and stuff that you actually need." To an extent, its playful design did undermine its credibility as an information retrieval tool; one girl commented that "it's very eye-catching, but I don't know if you can find as much information on it, it looks more for play." Nevertheless, its visual appeal won the day. KidsClick was found to be very direct, but just too dull to compete in popularity with LycosZone. Its recognized information-seeking virtues were just not enough for this user

group. Yahoo!igans! and Ask Jeeves for Kids each had its good and bad sides, "and so it just kind of equals out." They seemed agreed that typing a question on Ask Jeeves for Kids was easier than "writing words," but this advantage was cancelled by the drawback, in their opinion, that it didn't give them the answers they sought. An easier search process, in other words, is of little use if the retrieved information has low relevance. The more serious orientation of Ask Jeeves for Kids also was commented upon; as one girl said, it is better "if you're looking for school stuff and information, but if you're looking for fun stuff, you know if you just want to fool around, then it's not very good—it's more of a school site."

The boys in Group 2 all preferred Yahoo!igans! but were divided on the worst portal, although a majority picked Ask Jeeves for Kids. They thought that Ask Jeeves for Kids would be good for "young kids," but not for them (aged 11 and 12), and several said that they would prefer to use the regular Ask Jeeves portal than the kids' version. They were unenthusiastic about the Ask Jeeves for Kids approach to query negotiation, criticizing its method of asking other questions instead of giving the answer. KidsClick was considered the most effective for finding information but, as for the girls in Group 1, this was insufficient to place it in top position—it was judged last in terms of its graphics. Despite its lack of graphic attractiveness, the boys considered KidsClick also as suitable only for much younger children: "it wouldn't interest people older than six" was one comment. LycosZone lost points for its overt playfulness. It was rated an interesting design, but not as effective for finding information as either KidsClick or Yahoo!igans! The strong support for Yahoo!igans! was based on its design as well as its information retrieval capabilities. The boys liked the fact that more effort had been made by its designers to create an attractive product.

The girls in Group 3 were unanimous both in their choice of favorite portal—LycosZone—and worst portal—KidsClick. The remaining two portals were placed either in second or third place by equal numbers. The members of this group did not offer clear reasons for their ratings.

The unanimous favorite of the boys in Group 4 was Yahoo!igans!, and all but one rated Ask Jeeves for Kids last. KidsClick did better with this group, four out of the six boys putting it in second place (although one rated it worst). Ask Jeeves for Kids was criticised not only for its design but for its query negotiation; responding to a user's question with another question rather than an answer was roundly rejected. Yahoo!igans!, in this group's opinion, had the best design and would be their choice to find information quickly.

It is interesting to note that in choice of best portal, there was unanimity among the girls across Groups 1 and 3, and among the boys across Groups 2 and 4, but that the girls and the boys made different choices: for the girls, LycosZone was top, whereas for the boys it was Yahoo!igans! This unanimity did not extend to choices of worst site, although Ask Jeeves for Kids tended to fare worse with the boys and

TABLE 1. Information-seeking strategies.

Questions	Ask Jeeves for Kids	KidsClick	Lycos Zone	Yahooligans!
1. Geography and history of Quebec City	Sentence	Directory	Phrase Search Phrase Search Word Search	Phrase Search Phrase Search Word Search
2. Tallest 5 buildings in the world	Phrase	Word Search	Directory Word Search	Word Search
3. Tigers	Word	Word Search	Word Search Directory	Directory
4. Why pharaohs built the pyramids	Sentence	Word search	Directory	Word Search

KidsClick with the girls. This point will be discussed further below.

Information-Seeking Strategies

The primary purpose of this study was to gather user feedback concerning the interface design of Web portals. This includes user reactions to the various search modes available on one or more of the four portals used in the study. The children were asked to comment on them, and additionally the focus group moderator and his assistant observed (and the latter noted) the actual search steps undertaken. Table 1 summarizes the observed steps undertaken by the groups to find an answer to each of the four questions. It must be emphasized, however, that it was not our primary intention to investigate the information-seeking strategies selected nor to evaluate the information retrieved. Nevertheless, it is worth noting these steps and commenting briefly, if with circumspection, upon them. Three of the portals provided both keyword search engines and directories, while the fourth (Ask Jeeves for Kids) accepted natural-language queries.

Even though Ask Jeeves for Kids accepts complete sentence queries, in fact only two of the group exploited this capability, in each case by entering the question exactly as given to them. The remaining two groups tried a phrase (“tallest buildings”) or a word (“tigers”). The likely reason for these variant approaches is the relative ease in questions 2 and 3 of extracting key words from the initial search questions; in questions 1 and 4, however, this task is more difficult. It is interesting to speculate whether keywords can be easily identified from complete sentence queries only when the number of probable keywords is less than three.

Although the remaining three portals provide both keyword searching and directory selection approaches, Table 1 indicates that in general searching was more popular, but in no case to the exclusion of directory use. Directories were most exploited on Lycos Zone, perhaps because the search box was not prominently displayed in its interface. It offers also the only example of switches between the two information-seeking modes; in one case an unsuccessful directory browse was replaced by a search, and in a second it was the search that was unsuccessful and the directory that found answers. There is little consistency between search

and directory in the way any particular question was explored across the four portals, which suggests that the chosen strategy was influenced by the portal’s design (whether the interface layout or the top-level directory choices deserves further investigation). Word searching proved more successful than phrase searching.

Design Criteria

The focus group participants themselves explicitly offered some design suggestions for Web portals targeted at young users, and many more ideas emerged from their critique of the four portals used in the sessions. It is helpful to categorize the emerging design criteria under four headings: goals, design, architecture, and personalization.

Goals

Should a kids’ portal focus narrowly upon either an educational or an entertainment goal, but not try to combine both in the same interface; or alternatively, is it a good idea to focus more broadly on both these goals so that users can choose one of them or both within any given session? The focus group members themselves sent mixed messages on this matter. Motivation is an important factor in determining whether users persist in using software, return to the software on a second occasion, and recommend that software to their friends. Furthermore, motivation may be especially important in the case of young users (Arnone & Small, 1999). To the extent that entertainment opportunities in a Web portal increase motivation, the pursuit of the twin goals should be considered positively. For some in the focus groups, the approach adopted by a portal such as LycosZone, which offers both a Homework Zone as well as a Fun Zone, works well, and is strongly recommended. They found the entertainment opportunities attractive and, on occasions at least, considered that entertainment could offer a welcome temporary diversion from the search for information. The two most popular portals overall—LycosZone for the girls and Yahooligans! for the boys—also are the only two that do address entertainment alongside educational goals. At the same time, an entertainment option may distract educational users from the task in hand. As one boy said, if people are looking for information, they are not

interested in games, and visa versa. Despite this reservation, on balance, it seems advisable to include entertainment options alongside educational options in any web portal designed for users in the 10 to 13 years age bracket.

Visual Design

Design suggestions were implicit in the comments made across all groups about the relative merits of the screen displays used in the four portals. Lots of color in both the background and foreground, interesting graphics, and especially use of animation were widely advocated. Despite adverse comments about some of the portals being too childish in design, none of the students argued for a simpler design motif. Nor did they compare these four children's portals adversely with the regular portals that all of them had encountered previously on the Web; whether boys or girls, and whether at the younger or older age end of the spectrum represented in the focus groups, they appreciated dramatic and eye-catching designs. KidsClick, the most conservative in design of the four, was universally criticized on this count. It was rated as boring, with its plain white background and absence of animation. In contrast, the two most adventurous in terms of colors, graphics and animation, LycosZone and Yahoo!igans!, were the most popular. They certainly had opinions about the suitability of individual color combinations, graphic displays and animation effects, but their suggestions were focused upon improving these features rather than eliminating them.

The problem facing designers, then, is not to decide whether bold interfaces should be offered; rather, it is to determine exactly what constitutes, through a child's eyes, a successful design. Here, a number of suggestions can be made:

- (1) Name—The Portal's name is important in winning users' attention at the outset. It should be a fun name (Yahoo!igans was the most successful) as well as, ideally, having some relevance to the task in hand (here KidsClick is the winner). The name should be prominently displayed on the screen, and not (as in the case of LycosZone) lost among other graphics. A related issue is the predictability and memorability of the portal's URL. In this respect, KidsClick (<http://sunsite.berkeley.edu/kidsclick!>) gets a low rating.
- (2) Color—the children in the focus groups not only abhorred white, empty space on the screen much as nature abhors a vacuum, but they disliked the use of white as a background color in any circumstances. Although designers often urge that page sizes should be adjusted to fit available windows, thereby avoided excessive white spaces, the use of white background and white space as segment separators is widely recommended (Nielsen, 2000). The children were attracted by colorful backgrounds as well as bold, colorful foregrounds. Designers here face two challenges. First, the children themselves disagreed on what constitute attractive color schemes and on the degree of brashness that is desirable. Here personalization is a possible solution

(see below). Second, many of the children's comments on color combinations run counter to widely recognized guidelines for the use of color in interfaces (see, e.g., Galitz, 1997; Mandel, 1997) as well as contradicting the results from experimental studies (at least with adults) on screen readability, where dark colors superimposed on a light background are recommended (Muter, 1996).

- (3) Font—somewhat surprisingly, several comments were made about fonts—especially the need for larger font sizes (it is interesting that young as well as old users should be troubled by this).
- (4) Graphics—universally popular, especially when presented as characters (see below).
- (5) Animation—again, universally popular. The only criticism leveled at any of the portals in terms of animation was that they did not have enough!
- (6) Icons—if icons are used they must obviously match the concept they represent. Children may be more sensitive to the visualization of concepts than adults. Certainly, KidsClick's use of inappropriate icons was noted.
- (7) Characterization—Characters, whether graphical or animated, should appear throughout the portal (and not just on the home page), and they should exhibit different behaviors in different contexts. They should be selected so as to be immediately recognizable to users and be suitable for the target age groups. The literary reference made by the Jeeves figure used in Ask Jeeves for Kids, for example, is likely to be missed by many, perhaps most, users (even though the same character may work well for older users). Furthermore, even if the children happen to be familiar with the Wodehouse novels from which Jeeves is drawn, it does not necessarily make him suitable for their age group—the boys in one group said that they would have preferred a young character, with whom they could more easily have associated, to “help” them in their quest for information, and the girls suggested a dog to play this role. Although the Pokemon figure in Yahoo!igans was appreciated (and taken as an indication that the designers were in tune with their target audience), contemporary cult characters can quickly date; this may necessitate regular updating (and consequent loss of a long-term identification symbol).
- (8) Vocabulary—should be suitable for the target age group.
- (9) Layout—Screens should be clearly laid out so that information can readily be identified. There is growing evidence (see, e.g., Bilal, 2000; Large, Beheshti, & Breuleux, 1998) that children, at any rate, are influenced in their use of retrieval features by their relative degree of prominence on the screen. KidsClick, for example, was criticized for its cluttered layout of results.
- (10) Advertisements—the inclusion of advertisements will generate almost universal opposition.

Information Architecture

- (1) Directness—a portal to be used by school students to find information for projects must search quickly and

directly, and require as little effort as possible. KidsClick scored well here because of its directness, whereas Ask Jeeves for Kids was widely criticized for its indirectness.

- (2) Keyword versus natural-language searching—any possible attractiveness of natural-language querying compared with keywords is likely to be outweighed if this entails lengthy clarification of the information request through presenting the user with a series of questions (as in Ask Jeeves for Kids). In any case, when it was relatively easy to identify key words or phrases, the children preferred them to complete-sentence queries. The kids in the focus groups in general encountered relatively few problems in formulating both single-word and multiword keywords, though the single word queries proved more successful.
- (3) Subject categories—categories were popular with the users (although for the test questions used in this study categories were less used than keyword searches), and should be available alongside keyword search facilities. Ask Jeeves for Kids was criticized for its omission of categories (in her study of kids using Yahoo!igans!, Bilal (2000) also found that they used both keyword searching and subject category selection). Categories were best appreciated that were related to school curriculum areas. The kids disliked navigating through multiple levels within category hierarchies. LycosZone was criticized for this fault, whereas KidsClick and Yahoo!igans were much more acceptable in this respect (a detailed study of subject categorization for children's portals is badly needed; it was beyond the remit of this particular research). Most, but not all, of the participants liked the ability to click on a letter to search for a concept, and this should be offered alongside a search box and formal categories.
- (4) Metasearch links—within the two boys' groups there was support for links to external search engines (metasearch links) in cases where the portal itself could not return any hits, or the hits were judged unsuitable by users.
- (5) Display—interesting suggestions were also made about the display of retrieved information. Some users expressed the opinion that the number of displayed hits be sharply restricted, and in numerical terms between 10 and 20 sites seems to be most popular. On the other hand, one group argued strongly against this, saying either that they wanted as many as possible, or that how many are wanted depends on the individual circumstances and cannot, therefore, arbitrarily be determined beforehand by the portal. Short, informative summaries of the content of retrieved pages should be provided, and it should be possible easily and quickly to download retrieved information. Output ranking is as important for young as older users, but this may also involve result categorization. An example was the search for information about tigers (as animals), where several of the portals retrieved information about the Detroit Tigers baseball club, and ranked these hits higher than those on the mammal.
- (6) Help facilities—Bilal (2000) argues for better help facilities, and especially context-sensitive help, on portals designed for young users. It is noteworthy that none of

the focus group participants raised the issue of on-line help. This is in line with earlier findings from a study of grade-six students using regular search engines (Large et al., 1999), where in 78 separate search sessions extending over 2,041 minutes the students only accessed help on one occasion. Although it might seem logical to request good on-line help from portals, little use is likely to be made of it in practice.

- (7) Spell checking—automatic checking for errors in keyword entry does seem a good idea even if relatively few children in practice seem to make mistakes (Bilal, 2000; Large & Beheshti, 2000). In the focus group sessions spelling mistakes were rarely a problem, though, of course, when acting as a group it is much more likely that at least one member will spot an error than when working alone at the keyboard. Fidel et al. (1999) do report a higher level of spelling errors in their study of a small group of somewhat older high school students.

Personalization

To accommodate individual preferences, strategies and experiences, as well as differences between age groups and genders, designers may want to offer opportunities for Web site personalization. Several adult portals already allow personalization; given the evident sophistication of many younger users (as amply demonstrated in the evaluations provided by the focus groups) this should be extended to kids' portals. Such personalization may well act as a motivator, although it could as well act as a distracting element. Careful thought must be given not only to the default design but also to the extent of personalization that will be permitted. On the basis of this study, the most obvious area is color—both of the background and foregrounds. At least one study has reported different preferences between boys and girls for color use in interfaces (Passig & Levin, 1999). Another possibility might be to permit users to select from a variety of images and animations; there is good reason to believe, on the basis of this study, that reactions to both are also age and gender dependent.

Discussion

Of critical importance to this study was the extent to which relatively young people would be able to examine and then critique web portals. An earlier study by Large and Beheshti (2000), where children aged 11 and 12 had been interviewed after spending a considerable amount of time seeking information from the Web for a class project, had failed to elicit many comments from the children as to how the Web might be improved. Fidel et al. (1999) reports a similar inability of somewhat older students to offer criticisms beyond a desire for faster response times. Any such misgivings were quickly allayed. With little need for prompting, the members of all four focus groups were able to critique the four portals and then to make suggestions for improvements. The actual setting created by a focus group seems important here. Interaction within the group stimu-

lates an exchange of ideas, and although some kids were more forthright than others, all had their say. Focus groups, after all, are widely employed just because they generate discourse that might be absent when applying other methodologies. It is likely also significant that the children's attention was focused on a detailed examination of just four portals; this is less daunting than being asked how the Web as a whole might be made more effective.

A widely shared (but not universal) recommendation to include strangers in a focus group was not followed in this study. In part, the decision to unite a group of friends in each group was taken on logistic grounds. It was simpler to organize group meetings in a home rather than bring children (and probably also their parents) to the university, and preferable to meeting in a school, as focus groups in settings that are formal for the participants are not recommended, as they tend to inhibit discussion. It would have been difficult to collect a group of strangers together in the home of one member. In fact, there is every reason to think that with children, at any rate, the discussions would not have been so free and relaxed had they not already been friends. Furthermore, the need to restrict the session to no more than an hour (strongly recommended for focus groups involving children) gave little time to break the ice.

Were the children subject to peer pressure in their comments? This is an inherent danger in all focus groups, whether comprising children or adults. There was a certain measure of uniformity in opinions, especially concerning favorite portal, but equally many instances where opinions differed.

The portals were not used to answer real information needs posed by the children. Instead, they were given questions (though questions genuinely posed by their peers) to encourage exploration of the portals. This was not a formal usability study, where the children are observed using a software product (this methodology has already been applied by two of the researchers, as reported in Large & Beheshti, 2000 and Large et al., 1999). The intention was to provoke discussion, and in this it worked. The methodology adopted allowed opinions to be collected, which can be placed alongside data from a growing number of usability studies (many mentioned in this article).

The focus group participants clearly indicated their interest in Web portals designed for younger users. Although all had previously used regular "adult" portals, they did not dismiss at all the idea of children's versions. What attracted the focus group participants to the kids' portals were their use of color, graphics, and animation, and many of their criticisms concerned their insufficient or ineffective use of such devices rather than their elimination as being too childish. Some participants thought that one or other of the portals were more suitable for younger children, but their remedies for this would be different graphical devices or animations rather than a resort to adult portals. Undoubtedly, all children cannot be grouped into just one user category. Rapid developmental changes inevitably demand different approaches for different age groups (accepted

overtly by most children's Web portals that target specific age groups). Adolescents much beyond the age of 13 are far less likely to be attracted by the kinds of portals viewed in this project, and children much younger than 10 may have problems in coping with keyword searching and perhaps even subject category selection.

The focus group results add one more piece to growing research evidence that children may approach Web searching somewhat differently according to their gender. In this case, the favorite portal was quite different, depending upon gender. Although we should be wary about reading too much into any one result, certainly a gender effect requires further investigation. It may be, for example, that Web site design criteria, particularly in terms of screen design, should differ according to the gender as well as the age of users.

Conclusions

This exploratory study sought to establish through focus groups the reactions of typical users to four existing Web portals in terms of their first impressions, likes, dislikes, and suggestions for portal improvements. The analysis of comments made in the group sessions point to four key areas for designers of portals intended for young users: goal diversification, visual design, information architecture, and personalization.

In general, it seems preferable to include on a Web portal some entertainment distractions as well as clearly identified routes to information retrieval. The two avenues should be clearly distinguished on the home page, and the retrieval option should be given at least as prominent a position in the interface as the entertainment option.

A range of issues needs to be considered when determining the visual appearance of the portal. Foremost among these are use of attention-grabbing colors (background as well as foreground), and both meaningful and imaginative icons, graphics, and animation. It may be necessary to question some of the more conservative guidelines, for example on color use, that have regularly been recommended for adult users. Any such devices should not only appear on the home page as an attention grabber but should be applied throughout the interface. Careful attention should be given to the portal's name, and the URL should be easy to remember. Portals that seek revenue through advertisements must expect a negative response from their young users.

The focus group members asked for quick and direct access to information. If this can be reconciled with natural-language query systems, then young people might prefer this to keyword searching (although our small sample did not encounter major problems in keyword formulation). But if natural-language queries can only be "understood" by the system after extensive follow-up questions, users are likely to express impatience. In any case, our users strongly expressed a desire that subject categories supplement either natural-language or keyword searching. Opinions were rather more divided on the virtues of searching by clicking

on letters of the alphabet, but a majority was in favor of also including this third option. This method can circumvent the need to navigate complex vertical hierarchies.

Despite their youth, the focus group participants had interesting thoughts about displaying search results. They liked short but accurate descriptions to accompany lists of retrieved sites, appreciated output ranking, and mostly disliked extensive scrolling.

Neither help nor spell-check facilities figured on the list of desirable portal features. There is growing evidence to suggest that youthful users are no more inclined to avail themselves of on-line help than their elders. Unless novel ways can be found to bring users' attention to help screens, it is probably not worth a lot of effort to develop them. Despite the silence on spell-checking, it would seem a useful feature, if not as an automatic response, at least as an option to be activated by the user. It seems likely that children working alone at the workstation will be more prone to spelling mistakes than when working in groups (as in the focus groups).

The possibility for users to personalize such things as color choices, and even graphical devices or animations, is worth exploring further. This might cope to some extent, at least, with age and gender differences as well as individual inclinations.

Mandel (1997), in his book on interface design, reminds us that "the best interface is the one that lets users do what they want to do, when they want to do it, and how they want to do it." This applies to Web portals as much as to any other software product. Children are not small adults, and this obvious fact is recognized in many arenas: one of them should be interface design. The design criteria elaborated here for a children's Web portal are intended as a step in this direction. The researchers next intend to develop several prototype portals incorporating these criteria for testing. The ultimate objective is to elaborate a matrix that will permit portal designers to incorporate just those design features that will optimize portal efficiency through personalization for any given user group.

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