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## Research Report

# Enhancing Digital Access to Learning Materials for Canadians with Perceptual Disabilities: A Pilot Study

*Christina Lockerby, Rachel Breau, and Biljana Zuvela*

DAISY (Digital Accessible Information SYstem) Digital Talking Books represent an advance in learning technology for those who are blind, visually impaired, or print-disabled. Digital Talking Books created with the DAISY standard have the capacity to combine human or synthetic voice narration with digitized text, offering the advantages of electronic publishing and improved navigation capabilities. When a DAISY book is played using DAISY-playing hardware or software, the reader may move directly to a heading (for example, a chapter title or subsection heading) or to a specific page, depending on the access points included when the book is produced.

DAISY is the latest innovation in the evolution of Talking Book technology. Beginning in the early 1930s with long-playing records and changing to analog cassettes in the mid-1970s, Talking Book technology remained fairly consistent until the 1990s, when Talking Books on compact disk, which incorporated the DAISY standard, were developed (DAISY Consortium, n.d.; Majeska, 1988).

Since the development of the DAISY standard, there has been little direct testing of Digital Talking Books with consumers in Canada. To address this dearth of research, the Canadian National Institute for the Blind (CNIB) Library for the Blind secured funding from the Office of Learning Technologies,

Human Resources and Skills Development, Canada, to carry out a three-year study of user preferences and needs regarding DAISY Talking Books on CD.

Before describing the findings of the CNIB study, two previous usability studies should be mentioned. In 2001, Recording for the Blind & Dyslexic, an organization that provides Talking Books to people with perceptual disabilities, evaluated the ways in which Digital Talking Books were used by school- and college-age students who had a range of visual and print disabilities. This research identified students' preference for using a stand-alone player as opposed to using a computer equipped with software for reading, recommended that the navigation levels--the headings that allow direct access to particular points in a book--be more "user-friendly," and demonstrated users' preference for digital over analog books. (Recording for the Blind & Dyslexic, 2001).

In another usability study, Morley (1998) studied adults with visual impairment (those who were blind or had low vision) who read and navigated DAISY books with a program called "DAISY Playback Software"--the only software available for playing DAISY books on a computer at the time of the study. Participants were asked to complete a series of tasks (for example, "Let's skim through the main chapter headings to see what this book contains"). Results indicated that the software was easy to learn, but that tasks associated with completing more complex navigation options, such as making one's way through headings, were more difficult to execute.

## Method

### *Participants*

A total of 56 adults from across Canada took part in the project; they included both men and women, adults (aged 18-59) and seniors (aged 60 and older). These individuals had different perceptual disabilities, such as legal blindness (20/200 or worse

visual acuity or field restriction to 20 degrees or less), visual impairment (20/70-20/200 visual acuity), and/or a print disability as a result of a learning disability or a physical disability that prevented or inhibited them from reading regular print. Table 1 shows the sample demographic by disability category, age category, and gender. The project administrators also served as trainer-observers for this study, and were librarians with backgrounds in working with people with disabilities or providing training in adaptive technology.

A variable assumed to affect participants' performance in reading DAISY books was their level of technological skills. Asked to rate their own skill levels, 19.6% of participants reported having weak technological backgrounds (that is, little or no prior computer experience), 41.1% said they had average skills (that is, able to carry out basic computer functions, such as word processing and e-mail), and 39.3% rated themselves as strong in this area (that is, able to carry out more complex computer functions, such as Internet and database searching).

Because the number of study participants who were print-disabled or print-disabled and blind was quite low (only two in each category; see Table 1), the observations reported below, regarding the tasks themselves, apply only to the 52 participants in the level of disability categories of blind and visually impaired.

Participants were selected by project administrators from the clientele of the CNIB Library, CNIB Québec Division, Montreal; CNIB Newfoundland-Labrador Division, St. John's; Vancouver Community College in British Columbia; Calgary Public Library in Alberta; and Oakville Public Library in Ontario. Table 2 shows the distribution of participants by site. Each of the six partner sites has a long history of serving adult learners with perceptual disabilities within their communities.

## APPARATUS

Stand-alone players (that is, the Victor Reader Pro, which was later succeeded on the market by the Victor Reader Classic Plus) and a copy of the DAISY-playing software (that is, Victor Reader Soft) were placed at each site for use throughout the training and testing phases. (Note: The manufacturer of both the players and software is HumanWare Group.) In addition, the CNIB Library produced and distributed copies of three of the six different types of DAISY books, which included a variety of fiction and non-fiction titles, to all the sites.

The six types of DAISY books are Type 1, audio with title element only (that is, no navigation points included); Type 2, audio with navigation control center (NCC) only--this includes the marked-up text files that provide access points within a book; Type 3, audio with NCC and partial text or index; Type 4, audio, NCC, and full text; Type 5, full text, NCC, and some audio; and Type 6, text and no audio.

DAISY book Types 2, 3, and 4 were used for both training and testing purposes, as they feature full audio and structure; Type 4 books also incorporate full text. Types 1, 5, and 6 books were not used, as they either did not have significant navigation capabilities (Type 1) or could not be read by blind or visually impaired participants using a stand-alone player because the books had only partial or no audio (Types 5 and 6).

## Participant training and testing

Prior to the training and testing, participants provided their consent, allowing the project team to use their data for purposes related to the research. Preparation at the six sites included a mixture of one-on-one training between a project administrator or trainer-observer and the participants, as well as group training sessions. In most cases, training and testing for both playback methods took place over the course of two days.

The testing involved completing a series of tasks using the

stand-alone player and using the software with a computer, from checklists developed by the project team, adapted from user manuals created by HumanWare Group. For analytical purposes, the tasks were grouped into three categories: navigation of book, which included tasks related to moving to the different access points within a book (for example, "Navigate by heading level"); operability of book, which included tasks that controlled playing a book (for example, "Play" or "Stop"); and operability of player or software, which included tasks required to operate the playback equipment (for example, "Turn on the player" or "Load the software").

Quantitative data were gathered via a five-point rating scale on which participants indicated how easy or difficult they found each task to be. The scale ranged from 1 = easy to 5 = difficult. The time taken by each participant to complete each task was also recorded by an observer during the testing, and was used as a measure of how well a participant performed a task.

Qualitative data were collected from questionnaires and interviews to gain further information on how participants read DAISY books. Pre- and post-testing questions included participants' expectations of DAISY, impressions of the DAISY learning technology and player or software, and their thoughts on the social, educational, and economic impact of DAISY.

## Results

The data analysis consisted of descriptive statistics using Statistical Package for the Social Sciences software. Numeric test scores for one site, which included 10 participants, were excluded because testing methods were inconsistent with the other sites. (It should be noted that numeric data were calculated based on the remaining 46 participants only.)

It was determined that the majority of participants were able to complete the checklist of tasks or tests using both playback methods (player and computer with software), even if they had

difficulty with some of the tasks. (It should be noted that some participants did not complete the test with both the stand-alone player and the software.) In particular, participants demonstrated that although they were able to navigate a DAISY book, the mean amount of time taken to complete the navigation of book category tasks (9.7 seconds) was longer than the mean amount of time taken to complete the operability of book (6.9 seconds) and operability of player or software (6.2 seconds) tasks.

Observation of participants' performance on individual tasks revealed that participants who were blind required a shorter mean time for completion of the "Navigate by heading level" task on the player (13.7 seconds) than did those who were visually impaired (46.8 seconds). However, when completing the same task using the software, visually impaired participants had a shorter mean amount of time (15.2 seconds) than did participants who were blind (22.9 seconds).

The level of technological skills of participants influenced performance on tasks. Table 3 focuses on the navigation of book category tasks, and demonstrates how technological skill affected the mean amount of time taken to complete each task using the player and software with a computer.

As anticipated, those with weak technological skills took the longest to complete the navigation of book tasks. Interestingly, participants with strong technological skills took longer to complete 64% of the navigation of book category tasks than did those with average technological skill sets. Although this finding needs further study, one explanation is that pre-existing knowledge of commands required to operate adaptive technology may have interfered with the learning of new commands needed for DAISY, thus affecting the speed with which they completed these tasks.

## QUALITATIVE FINDINGS

Participants were asked to provide their expectations for the

player and the software prior to testing. Following the testing, participants were then asked if their expectations were "met," "exceeded," or "not met." Approximately 65% indicated that their expectations were met regarding the player, while 16.3% stated that their expectations were exceeded. There were no participants whose expectations were not met for the player. The remaining participants had no expectations or did not answer the question. Regarding the software, 63.3% of participants reported that their expectations were met, followed by 8.2% whose expectations were exceeded. Only 4.1% of participants indicated that their expectations for the software were not met, while the remaining participants did not have expectations or did not answer the question.

In general, participants found DAISY books fairly easy to use, especially "with training," as mentioned by some. While the "easier" tasks that allowed users to move through the audio, such as "Fast forward" and "Rewind," were completed without problems, some participants had difficulty grasping the concept of a book being structured into levels comprised of chapter headings, subsections, paragraphs, and phrases. Part of the confusion may rest with the terms used to describe the levels. One participant commented on this during her test, saying she found some terms, including *element* and *levels,* to be "too confusing." Another point that participants made concerned the amount of electronic text, in addition to the amount of audio, featured in the different types of DAISY books. While participants who were blind were not able to see the text on the screen when using Victor Reader Soft, they could still make use of the "Find text" feature that would allow them, for example, to locate a specific word in the book. Some participants indicated that full-text books, with the most extensive navigation capabilities, were the most beneficial.

The feedback concerning the quality and operability of the Victor Reader Pro playback device showed that more than half of participants (52%) assessed it as being easy to use and

indicated that the device is of good quality. Nearly 40% of participants found the Victor Reader Soft software to be of good quality and easy to use. About 33% of participants indicated that training is necessary to help explain the levels of a book, and that operating the software on a computer requires more practice time for remembering controls.

Participants generally had a positive view of the social, educational, and economic impact of the new reading technology. In particular, one participant remarked that DAISY allowed "easier and faster access to different sources of information," including current events. Other comments suggested that the system's improved navigational capabilities would be of particular benefit to students. However, many participants had reservations about the cost of the players and indicated that this might prohibit them from acquiring the technology. Participants also mentioned the advantage of the fact that more than one book can be recorded onto a single CD.

## Discussion

Participants demonstrated that although they were able to navigate DAISY books, they had some difficulty understanding the structure and levels inherent in the DAISY format. This finding is consistent with those of the earlier DAISY usability studies (Morley, 1998; Recording for the Blind & Dyslexic, 2001), in which subjects also expressed some confusion about the terminology used in the navigation of a DAISY book.

Preferences of participants for using the player rather than using the software on a computer was indicated by the small percentage (4.1%) who indicated that their expectations of the software were not met. This finding could be based on some participants' familiarity with the use of a stand-alone player, rather than using software to read books on a computer.

## Conclusion

By exploring the experiences of participants with DAISY Talking Books, this study not only discovered how people who are blind, visually impaired, and/or print-disabled read DAISY books, but also identified participants' perceptions of DAISY as being particularly useful in their educational, professional, and social lives. Specifically, participants noted the usefulness of DAISY technology with regard to educational and work-related materials, as it allows students and working-age adults to move more easily within a textbook or reference manual, and gives them the option of placing bookmarks throughout a document. Participants saw advantages, as well, in the fact that more than one book can be recorded onto a single CD, and in the digital media's superior navigation and sound quality when compared to analog cassettes. Many participants mentioned that, as a result of this project, they will continue to use DAISY books to ensure better access to the information they require.

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***Christina Lockerby, M.L.I.S.,*** *library fund development coordinator, National Fund Development, Canadian National Institute for the Blind, 1929 Bayview Avenue, Toronto, Ontario, Canada, M4G 3E8; e-mail: <christina.lockerby@cnib.ca>.* ***Rachel Breau, M.L.I.S.,*** *collections and music librarian, CNIB Library, Canadian National Institute for the Blind; e-mail: <rachel.breau@rogers.com>.* ***Biljana Zuvela, M.Sc.,*** *researcher, Research Department, Canadian National Institute for the Blind; e-mail: <beba011@yahoo.com>.*

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