



eLearning and Postsecondary Students with Visual Impairments

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Abstract. This presentation highlights results from two studies carried out over the last three years which included postsecondary students who self-identified as either being totally blind (n=29) or having low vision (n=139). The first study looked at the accessibility of eLearning in Canadian colleges and universities. The second examined the information and computer technology needs of postsecondary students with disabilities and how adequately these were being met both on and off-campus. CD-ROM tutorials used in class or labs and live online voice-based chat were identified as the least accessible forms of eLearning by students who were totally blind and those who had low vision, respectively. Training on the use of computer technologies provided at school was identified as inadequate by students who are totally blind. Other areas, such as the extent to which the technology is up-to-date and technical support adequacy were seen as only somewhat or moderately meeting needs of both groups.

Keywords: eLearning; college and university students; information and computer technologies; accessibility, universal design

1. Introduction

In 2006, the Adaptech Research Network <www.adaptech.org> completed a three-year study investigating the accessibility of eLearning to students with various disabilities enrolled at Canadian colleges and universities. This study defined eLearning broadly to include all information and communication technologies (ICTs), such as PowerPoint, CD-ROMs and the Internet that professors use in their classroom, hybrid and online courses. In a separate study, we inquired about computer technologies (general use and assistive) that postsecondary students with disabilities used as adaptive aids both on and off-campus. We also asked them to rate the extent to which funding, technical support, and training around these technologies were meeting their needs. Both empirical studies were carried out in English and French to capture a truly Canadian picture.

2. Accessibility of eLearning Study

This study began with a set of 22 key informant interviews consisting of: students with various disabilities, faculty, individuals who provide disability-related accommodations on campus, professionals who support/implement eLearning on campus, and vendors of eLearning materials to the higher education community. The aim of the key informant interviews was to gain a broad perspective about areas such as: the eLearning technologies currently used on Canadian campuses; the specific accommodations involving eLearning provided by campus-based disability service providers; and identification of concerns of the stakeholders involved in eLearning.

After completing the key informant interviews, web-based surveys were developed and administered to samples of participants representing the following four stakeholder groups: college and university students with disabilities who have taken at least one course in the last three years where the professor used some form of eLearning; college and university professors who have taught at least one student with a disability during the last three years in a course where they used some form of eLearning; staff who provide disability-related services at Canadian postsecondary institutions; and individuals who support/implement eLearning at Canadian postsecondary institutions, including VPs and managers of distance education and instructional technology departments, persons who train faculty to use technology, and designers and developers of eLearning on

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campus. Survey questions were based on data collected during the key informant interviews. The questions were primarily closed-ended and used Likert scaling (e.g., strongly disagree to strongly agree).

The survey for students with disabilities collected data including: demographic information; impairment / disabilities information; adaptive hardware/software used; accessibility ratings of eighteen specific types of eLearning (e.g., course web pages, PowerPoint in the classroom); and benefits, problems and solutions interacting with eLearning.

2.1 Most Accessible Forms of eLearning

Table 1 shows the top five most accessible forms of eLearning according to the 28 students who self-identified as having low vision and the 5 students who said they were totally blind.

Table 1
Most Accessible eLearning to Students with Visual Impairments In Rank Order

Rank	Most Accessible - Students Who are Blind	Most Accessible - Students with Low Vision
1	Course-related files in Word, PowerPoint, etc.	Course-related files in Word, PowerPoint, etc.
2	eMail	eMail
3	Course web pages	WebCT, Blackboard, other course/learning management system
4	Web-based threaded discussion forum / bulletin board	Live online chat (e.g., MSN Messenger)
5	WebCT, Blackboard, other course/learning management system	Course web pages

2.2 Least Accessible Forms of eLearning

Table 2 shows the top five least accessible forms of eLearning according to the 28 students who self-identified as having low vision and the 5 who said they were totally blind.

Table 2
Least Accessible eLearning to Students with Visual Impairments In Rank Order

Rank	Least Accessible - Students Who are Blind	Least Accessible - Students with Low Vision
1	CD-ROM tutorials used in class or computer labs	Live online voice-based chat (speaking and listening)
2	Online content that uses Flash	Online content that uses Flash
3	PowerPoint presentations viewed online using a browser	Web-based lectures or presentations
4	Videoconferencing	CD-ROM tutorials used in class or computer labs
5	Live online chat (e.g., MSN Messenger)	Online tests, quizzes, exams or other forms of online evaluation

3. Study on Information Technology Accessibility for Postsecondary Students with Disabilities

This study involved the development of a brief, psychometrically sound web-based instrument. Questions were completed by 1441 Canadian college and university students with disabilities. The final instrument will be a companion to a scale which we previously developed and validated for use by campus-based disability service providers (Fossey, Asuncion, Fichten, et al., 2005). Data collected included: demographic information; impairment/disabilities information; computer technologies used; and Likert-scaled (strongly disagree to strongly agree) items asking students to rate how well their computer-related needs were being met on and off - campus in areas such as technical support, training, and accessibility of school web pages.

3.1 Computer Technologies Used

Table 3 shows the most popular types of computer technologies used by the 115 students with low vision and the 24 students who self-identified as being totally blind. Not surprisingly, software that enlarges what is on the screen and software that reads what is on the screen were the most used by each group respectively.

Table 3
Adaptive Computer Technologies Used by Students in Rank Order

Rank	Students who are Blind	Students with Low Vision
1	Software that reads what is on the screen	Software that enlarges what is on the screen
2	Scanning and optical character recognition (OCR)	Software that improves writing quality
3	Refreshable Braille display	Software that reads what is on the screen
4	Software that improves writing quality	Large screen monitor
5	Alternative mouse	Scanning and optical character recognition (OCR)
		Alternative mouse
		Dictation software
		Adapted keyboard
		Refreshable Braille display

3.2 Other findings

Table 4 provides views of how adequately computer technology needs are met on and off-campus for totally blind and low vision students in general, and specifically when it comes to: the extent to which the technology is up-to-date and the adequacy of technical support and training. Scores range from 1 to 6, with higher scores indicating that needs are better met.

Table 4
Mean Scores of Students

Questionnaire Item	Who are Blind	With Low Vision	Difference
In general, my computer technology needs at my school are adequately met	4.57	4.37	0.20
In general, my computer technology needs at home are adequately met	5.26	4.87	0.39
At my school, computer technologies are sufficiently up to date to meet my needs	3.87	4.42	-0.55
The technical support provided at my school for computer technologies meets my needs	3.64	4.09	-0.45
The availability of technical support when I am not at school meets my needs	3.61	4.15	-0.55
Training provided by my school on how to use the computer technologies meets my needs	3.47	3.97	-0.50
Training available off campus on how to use computer technologies meets my needs	3.62	3.53	0.09
My personal computer technologies are sufficiently up-to-date to meet my needs	5.04	4.62	0.43

4. Implications

To improve the experience of students who are totally blind when they take courses that include some form of eLearning, faculty and other professionals involved in eLearning at colleges and universities should avoid (or at a minimum, be prepared to provide an accessible alternative to) using CD-ROM tutorials in class or labs, Flash-based content, and PowerPoint presentations that require viewing through a browser. Students with low vision indicated that: live voice-based chat (speaking and listening), online content using Flash, and web-based lectures and presentations were the three least accessible forms of eLearning. These, therefore, are especially likely to pose challenges. For both groups of students, consider providing off-line copies of files such as PowerPoint presentations; allow students to submit work via eMail; and ensure that the same course web pages and content, including those available in WebCT and other course management systems, are available without the use of Flash. It goes without saying that to maximize inclusion for all learners, implementing principles of universal instructional design up-front would help address many of these issues, or at the very least have these identified early in the semester. Once a course has already begun, time to problem-solve accessibility issues can adversely impact on the student's ability to successfully complete the course.

As seen in Section 3.2, students who were either totally blind or had low vision expressed somewhat or moderate levels of agreement with the statement that, in general, their on and off-campus computer technology needs were being adequately met in a number of areas. This in no way implies that schools should not continually strive to improve upon what they have in place. That being said, one area identified as both an on and off-campus issue by students who were totally blind as well as by those with low vision was around training provided on how to use computer technology. To support these students' success, it is recommended that colleges and universities, along with rehabilitation centers, identify and assess what training they currently provide to students with visual impairments on the use of computer technologies and act upon any gaps, especially those that are identified by the end-users themselves.

References

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