Meeting the eLearning and the Computer and Information Technology Needs of Postsecondary Students with Visual Impairments

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Abstract. This presentation focuses on how to best meet the information and computer technology needs of college and university students with visual impairments. The recommendations are based on two empirical studies conducted by the Adaptech Research Network, in collaboration with our partners, concerning the views of Canadian college and university students with visual impairments. Our studies evaluated problems and solutions related to the accessibility of eLearning in Canadian postsecondary education and the extent to which the information and computer technology needs of college and university students with visual impairments are met both on and off campus.

Keywords: visual impairment; college and university students; eLearning; information and computer technology; problems and solutions

1. Introduction

eLearning and the extensive use of computer and information technologies on campus can promote the inclusion of students with disabilities. It can, however, also create new barriers. The Adaptech Research Network <www.adaptech.org> examined problems and solutions related to the accessibility of eLearning and of computer and information technologies needed and used on campus. Two studies involving students with visual impairments at Canadian universities and junior/community colleges were conducted. The first looked at the problems experienced by these students while using eLearning and at how these problems were resolved. The second study explored issues related to how well the information and computer technology needs of college and university students with visual impairments are met both on and off campus.

2. eLearning Problems and Solutions

For the present study, eLearning was defined broadly to include all information and communication technologies, such as PowerPoint, CD-ROMs and the Internet that professors use in their classroom, hybrid and online courses. Two hundred and twenty-three Canadian postsecondary students with disabilities were asked to indicate, via an online questionnaire, three key problems they had encountered using eLearning. They were also asked to indicate how each of these was resolved. Five of the students indicated they were totally blind and 25 that they had low vision. Their responses were categorized using a coding manual consisting of 28 problem and 18 solution categories.

2.1 eLearning Problems

Figure 1 shows the eLearning problems reported by students with visual impairments. The inaccessibility of websites and course management systems proved problematic for all students who indicated they were totally blind, but was substantially less so for students with low vision. Both groups of students with visual impairments complained about the inaccessibility of course notes and materials, including those in PDF format.

They also indicated that the lack of needed adaptive technology was problematic, as was their own lack of knowledge about how to use eLearning effectively. Time limits for online exams and the inaccessibility of PowerPoint and data projection during lectures posed problems for students who were totally blind, while technical difficulties and a lack of technology and software required for home access were problematic for students with low vision.
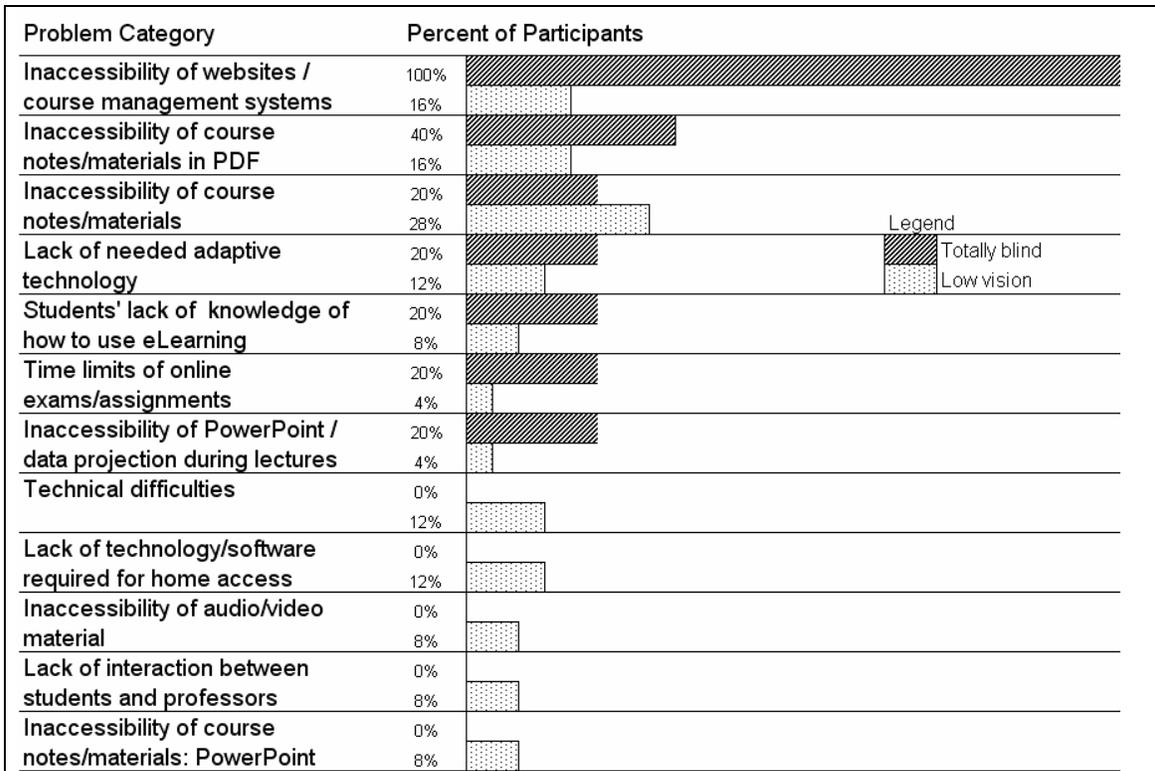
Problem Category	Percent of Participants
Inaccessibility of websites / course management systems	100% / 16%
Inaccessibility of course notes/materials in PDF	40% / 16%
Inaccessibility of course notes/materials	20% / 28%
Lack of needed adaptive technology	20% / 12%
Students' lack of knowledge of how to use eLearning	20% / 8%
Time limits of online exams/assignments	20% / 4%
Inaccessibility of PowerPoint / data projection during lectures	20% / 4%
Technical difficulties	0% / 12%
Lack of technology/software required for home access	0% / 12%
Inaccessibility of audio/video material	0% / 8%
Lack of interaction between students and professors	0% / 8%
Inaccessibility of course notes/materials: PowerPoint	0% / 8%

Legend: Totally blind / Low vision

Fig. 1. Percentage of students reporting each problem category.

2.2 eLearning Solutions

Figure 2 shows the solutions to the eLearning problems reported by students with visual impairments. This indicates that the most common solution to eLearning problems is that these remained unresolved; this was indicated by 52% of students with low vision and 40% of students who were totally blind! The most commonly cited solutions came in the form of alternate formats, more time and effort devoted by students, and non-eLearning solutions (e.g., writing an exam at a different time from the rest of the class). Assistance from professors and the use of technology helped resolve the problems of some students. Students who were totally blind also indicated that they obtained assistance from a campus disability service provider, friends, classmates, or an eLearning specialist. Students with low vision indicated that they solved problems by obtaining and/or using adaptive computer technologies.

3. Meeting Students' Information and Computer Technology Needs

In a second study, we administered an online questionnaire to 1441 Canadian college and university students with disabilities. One hundred and fifteen of them self-identified as having low vision and 24 as being totally blind. Students were asked to rate how well their computer-related needs were being met on and off campus using a six-point Likert scale (1=strongly disagree to 6=strongly agree).

Table 1 contains mean ratings of students who indicated they were totally blind or had low vision for questionnaire items about how adequately their computer technology needs were met on and off campus. Scores range from 1 to 6, with higher scores indicating that needs are better met. Results show that needs of students who are blind were consistently less well met than those of students with low vision. In general, students with low vision indicated that their needs were reasonably well met in most areas surveyed, with the exception of the availability of adaptive computer technologies in both specialized and general use computer labs. Students who were totally blind also had problems in these areas as well as with the accessibility of the library's computer

system, distance education, and professors using eLearning for tests and exams. Course materials in electronic format, the school's web pages, and interactive online academic services were generally rated as meeting the needs of both groups of students.

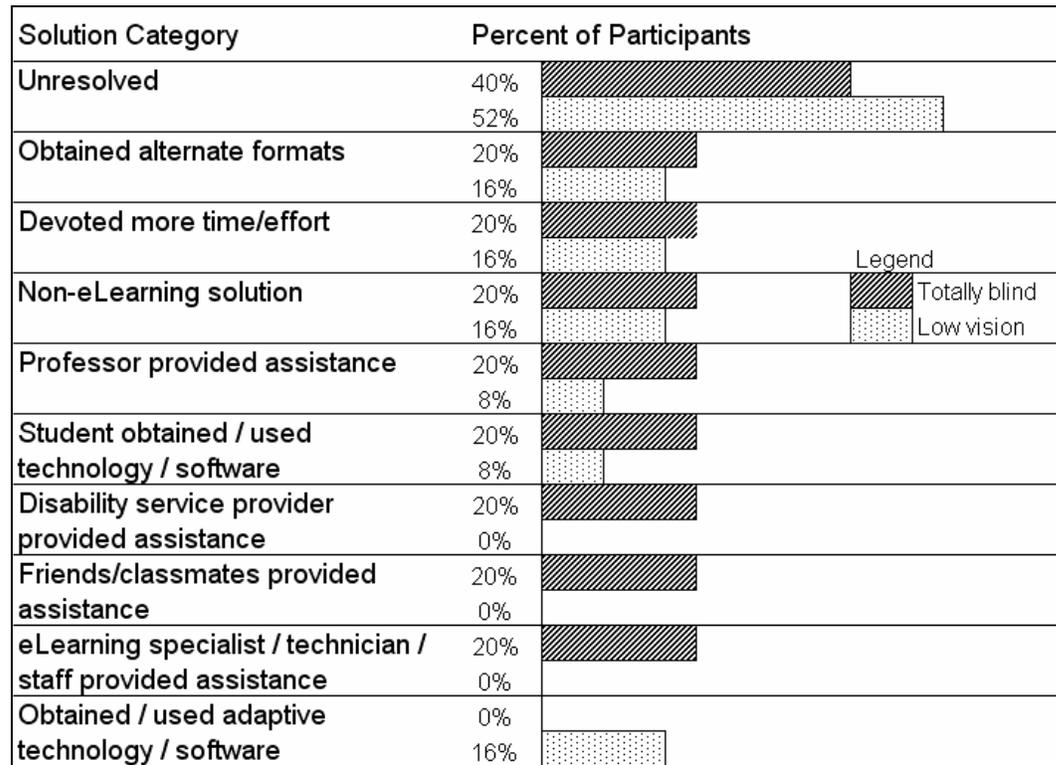| Solution Category	Percent of Participants	
Unresolved	40% 52%	
Obtained alternate formats	20% 16%	
Devoted more time/effort	20% 16%	Legend
Non-eLearning solution	20% 16%	Totally blind / Low vision
Professor provided assistance	20% 8%	
Student obtained / used technology / software	20% 8%	
Disability service provider provided assistance	20% 0%	
Friends/classmates provided assistance	20% 0%	
eLearning specialist / technician / staff provided assistance	20% 0%	
Obtained / used adaptive technology / software	0% 16%	

Fig. 2. Percentage of students reporting each solution category.

Table 1
Mean Scores of Questionnaire Items Rated by Students - Higher Scores Indicate that Students' Needs are Better Met

Questionnaire Item	Students: Blind	Students: Low Vision	Difference
The availability of electronic format course materials meets my needs (e.g., Word, PDF, MP3)	4.54	4.61	-0.07
My school's web pages are accessible to me	4.35	5.12	-0.77
My school's interactive online services are accessible to me (e.g., registering, financial aid applications on the web)	4.09	5.20	-1.11
When professors use eLearning, it is accessible to me (PowerPoint in the classroom, course notes on the web, CD-ROMs, WebCT)	3.77	4.65	-0.88
There are enough computer technologies in my school's specialized labs/centres for students with disabilities to meet my needs	3.62	3.85	-0.23
The accessibility of the library's computer system meets my needs (e.g., catalogues, databases, CD-ROMs)	3.30	4.71	-1.41
Distance education courses offered by my institution are accessible to me	3.19	4.37	-1.19
I have no problems when professors use eLearning for tests and exams	2.94	3.99	-1.05
The availability of computer technologies in my school's general use computer labs meets my needs	2.10	3.57	-1.47

4. Implications

As eLearning and information and computer technologies have become commonplace in postsecondary education, their accessibility to students with visual impairments must be ensured. Our research has shown that while certain aspects of ubiquitous forms of eLearning, such as websites/course management systems and course notes/materials are frequently accessible to students with visual impairments, these can also pose significant and important academic problems which are often unresolved. Or, if problems are resolved, this is done through the student putting in more effort or through non-eLearning means, such as having the student perform an alternate assignment or with the help of a friend or classmate.

Students with visual impairments, especially those who are totally blind, must have better access to needed adaptive computer technologies as well as to better training on using these in the academic environment.

Improving the accessibility of eLearning through universal instructional design and providing needed technology and training to students with visual impairments, especially those who are totally blind, will result in fewer unresolved problems and will equip students with visual impairments with the skills they need to succeed in an increasingly technology-driven world.