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USING INFORMATION AND COMMUNICATION TECHNOLOGIES TO IMPROVE COLLEGE SUCCESS FOR STUDENTS WITH LEARNING DISABILITIES*

Recent documentation shows that learning disabilities (LDs) are the most common disabilities among Quebec's college and university students (Fichten *et al.*, 2003; Roberge and Dubois, 2008; Bonnelli, Ferland-Raymond, and Campeau, 2010; Mimouni and King, 2007).

For example, in our recent studies of Quebec college students with disabilities (Fichten *et al.*, 2006), the most common disability—noted by almost 50% of the sample of 300 students registered to receive disability-related services from their school—was LD, with or without attention deficit hyperactivity disorder. Clearly, LDs are a major issue in Quebec's colleges.

DEFINITION AND DESCRIPTION OF LD

Although definitions of LD are varied, there is reasonably good agreement among experts that LD is related to academic performance characterized by low reading, writing, and/or mathematical skills, despite sound cognitive ability (Wolforth and Roberts, 2010).

A specific type of LD, known as dyslexia, is manifested in reading difficulties related to reading accuracy and speed that result in comprehension difficulties (Couston, 2006). It is the most common LD everywhere, including in Quebec's French-language colleges (Mimouni and King, 2007). Dyslexia often co-occurs with physical and sensory disabilities (Fichten *et al.*, 2006) as well as with other forms of LD, such as problems with written language (e.g., spelling and written expression), oral language (e.g., listening, speaking, and understanding), and mathematics (e.g., computation and problem solving). Individuals with dyslexia may grasp only part or none of the meaning of what they read; they often avoid activities that require reading. Some students submit papers that are difficult to understand due to poor grammar and/or spelling as the result of issues unrelated to their mother tongue, IQ, or educational background.

Many high-school students are unaware they have an LD and experience problems only when they enter college or university, where reading loads get heavy and students are expected to do substantial amounts of writing. Although well known in the English speaking world, LD is generally under-recognized by French-speaking college and university students (AQICESH, 2010) as well as by their parents and teachers.

A recent concern with "emerging populations" has received considerable attention from Quebec's Ministère de l'Éducation, du Loisir et du Sport (MELS) (Bonnelli, 2010) and from the Fédération des cégeps (2007). This group includes postsecondary students with LD, attention deficit hyperactivity disorder, and psychiatric disorders. This concern has resulted in a series of pilot projects; college-based LD experts, such as Lacasse (2009), have recently presented their findings on LD and information and communication technologies (ICTs). In addition, MELS funded an innovative collaboration focusing on inclusion of individuals with disabilities (*Comité interordres – Intégrer les nouvelles populations en situation de handicap aux études supérieures : mission possible !*) and commissioned a major research report on LD in colleges (Wolforth and Roberts, 2009; 2010).

INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs)

Research reports and pilot projects have shown that there are both specialized and general-use ICTs that can help students with LD succeed (Rousseau, 2010). Nevertheless, there is no comprehensive list of such ICTs. When mention is made about ICTs for students with LDs, the most popular software cited—and often the only one mentioned—is *Antidote*, which is intended for the general population. *Antidote* incorporates French dictionaries and grammar-related writing guides. It applies primarily to writing rather than reading problems. Since reading problems are the most common form of LD, *Antidote* offers few advantages for some students.

The extent to which ICTs help postsecondary learners with disabilities is heavily debated in the scholarly literature. Definitive answers are unavailable because of methodological and conceptual difficulties. Research tends to be purely applied, reflecting the development of the field and the need for immediate practical solutions. This is also the case in the present research, where we explored the views of 58 Quebec experts about ICTs that can improve academic success among college students with LDs.

METHOD

During the 2009–2010 academic year, we interviewed 58 experts knowledgeable about both LDs as well as ICTs for students with LDs: 25 postsecondary disability service providers,

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14 "power-user" college students, 6 community-based individuals, 5 college professors, 5 vendors, and 3 ICT specialists. We used a structured interview: 30 were conducted in French; 28 in English.

RESULTS AND DISCUSSION

ADVANTAGES AND DISADVANTAGES

The following figures show that the main perceived advantage of using ICTs for students with LDs is to support academic success: ICTs could improve the quality of students' work and allow them to acquire the skills and techniques needed for learning. The experts also noted, however, first and foremost, that ICTs cost too much. Other common disadvantages were technical problems and the need for students to put in extra effort to learn how to use the software.

FIGURE 1 ADVANTAGES OF USING ICTS FOR STUDENTS WITH LEARNING DISABILITIES

Supports success	76 %
Independence / Autonomy	38 %
"Levelling the playing field"	31 %
↑ Confidence ↑ Motivation ↓ Stress	29 %

FIGURE 2 DISADVANTAGES OF USING ICTS FOR STUDENTS WITH LEARNING DISABILITIES

Expensive	34 %
Technical problems / Incompatibilities	34 %
Time consuming / Extra effort to learn	34 %
Negative perceptions of ICT users	29 %
Over-reliance on technology	29 %
Lack of training / Information	26 %
Difficulty obtaining services	12 %
Reluctance to use technology	12 %

ICTS THAT CAN BE USEFUL TO STUDENTS

Figure 3 provides a list of ICTs noted by participants. The Adaptech Research Network website and Chauvin *et al.* (2010) give brief descriptions of many of them.

The most popular category of helpful tools is multipurpose general-use and specialized ICTs, such as *Microsoft Office*, and sophisticated adaptive products, such as *Kurzweil* and *Wynn*. These products can read text aloud, render paper documents into editable digital text, highlight key concepts, and the like.

FIGURE 3 TYPES OF ICTS NEEDED BY STUDENTS WITH LEARNING DISABILITIES

Multi-purpose software	
Kurzweil	45 %
Microsoft Office	28 %
Wynn	19 %
Médialexie	17 %
Smartpen	3 %
Writing software	
Antidote	47 %
Writing and correction software	41 %
WordQ	29 %
Dictation software	
Dragon Naturally Speaking	43 %
Dictation software / Voice recognition	19 %
SpeakQ	5 %
MacSpeech Dictate	3 %
Reading software	
Screen reading software / Text-to-speech	38 %
ReadPlease	12 %
ClaroRead	5 %
Word highlighting features	3 %
Hardware	
Computers / Laptops	36 %
Digital recorders	16 %
Cell phones / Handheld / PDA	10 %
Organizational software	
Inspiration	36 %
Concept mapping tools	5 %
Spark-Space	5 %
Scanning	
C-Pen	9 %
Scanners with OCR software	9 %
OpenBook	3 %
E-learning and social media	
Digital course materials / Ebooks	5 %
Online courses notes	5 %

Software that assists students in writing, including *Antidote* and *WordQ*, were also popular. *Antidote*, as mentioned earlier, is excellent general-use grammar and spelling software, but is available only in French. *WordQ* is bilingual word-prediction

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software that assists students with spelling by giving them choices from a list of words after they begin typing a word. *Dictation* (voice recognition) software was also seen as useful, with *Dragon Naturally Speaking* the most frequently mentioned.

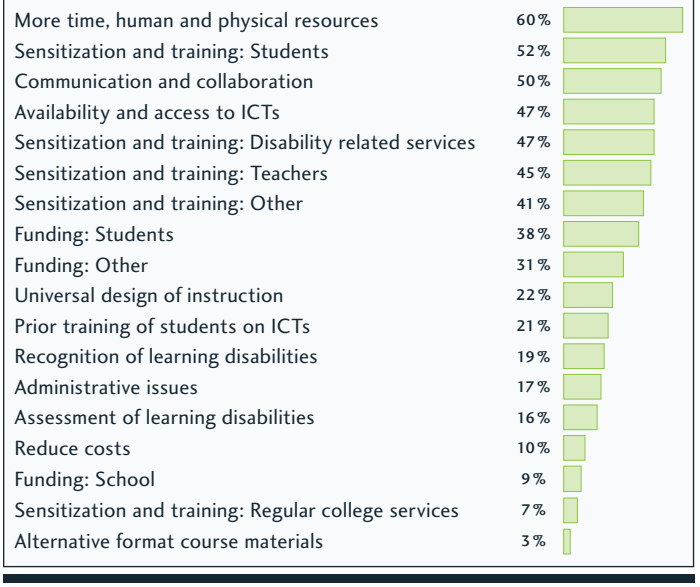
Text-to-speech software, which reads digital text aloud (e.g., *ReadPlease 2003*), was also popular. This type of software allows students to listen to their course materials. Some even allow saving the voice file to MP3 (e.g., *Balabolka* freeware) which they can then take with them on an MP3 device.

Laptops and other lightweight devices and scanners with optical character recognition (OCR; converts paper documents into digital text) were also frequently mentioned as was mind-mapping software, such as *Inspiration* (helps organize ideas graphically).

ICT related improvements for students and college disability service providers

Figure 4 shows that "more" was the most popular suggestion for improvements: more time (e.g., for ICT training), more space at the college (e.g., more specialized computer labs), more human assistants, and more funding. Sensitization and training for students, disability service providers, teachers, and other college staff were also common recommendations. To better assist students with LD, the experts also noted the need for more communication and collaboration among stakeholders: within the college, between colleges, and among high schools, colleges and ICT resource centers. Universal design of instruction was also mentioned (Burgstahler, 2005; Meadows, Prud'homme, and Lamontagne, 2010). This states that good instruction (a) takes into account the needs of all individuals and (b) that planning for accessibility should be incorporated from the inception of course planning. This is better known among English than French-speaking professors.

FIGURE 4 SUGGESTIONS FOR IMPROVEMENTS FOR STUDENTS WITH LEARNING DISABILITIES AND DISABILITY SERVICE PROVIDERS



Who carries out specific functions? Who should do so?

In a series of task-related questions, we asked: "Who shows students with LDs how to use needed ICTs? Who helps teachers use ICTs that can be helpful to students with LDs? Who helps troubleshoot accessibility-related problems with LD-related ICTs? Who ensures that the school's ICTs are accessible before selection or purchase?" and "Who ensures that the school's ICTs are accessible for assignments and exams for students with LDs?" In short, the disability related services office was seen as being the most appropriate for carrying out these tasks. The single exception was, "Who helps teachers use ICTs?" for which regular college services were seen as the most appropriate resources. Nevertheless, interviewee responses showed that many felt that someone other than individuals associated with disability related services ought to take responsibility for some of these tasks, or that other college personnel needed to work in collaboration with disability service providers.

RECOMMENDATIONS

An archival study based on over 40,000 Dawson College students showed that (a) the first semester grades of students with LDs who received disability-related accommodations did not differ significantly from those of non-disabled students, and (b) that students with LDs graduated at the same rate as non-disabled students, although they took an extra semester to do so (Jorgensen *et al.*, 2005).

We make the following recommendations from the view of trying to make college more satisfying for students with LDs and improving their academic success.

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Try out different types of ICTs

An important accommodation for students with LD is using ICTs both at school and at home (Fichten *et al.*, 2006; Wolforth and Roberts, 2009, 2010). Our experts' answers also suggest that ICTs offer many advantages in helping students succeed. An inventory of helpful ICTs, based on suggestions from our experts, is available on the Internet (Fichten *et al.*, 2010). It can provide a starting point for thinking about which ICTs can help students with different types of LDs. In many cases, there are free demo versions of the software for students and for disability service providers to try.

The Adaptech Research Network provides a listing of free and inexpensive ICTs that could be helpful, along with information about where the software can be obtained, what it costs, and whether it works in French, English, or both languages[1]. To help with training, we have made several 5-minute videoclips about how to use popular ICTs that can assist students with LDs[2].

Research reports and pilot projects have shown that there are both specialized and general-use ICTs that can help students with LD succeed.

Advocate for better support for ICTs for students with LD at college

Because Quebec's Ministère de l'Éducation, du Loisir et du Sport's current guidelines for funding LD-related ICTs—either for student off-campus use or for the college itself—are open to different interpretations, students often have no access to needed ICTs. In addition, college ICT support/help lines should be required to have at least minimal information on LD-related ICTs and their problems.

In spite of the important advantages of ICTs for students with LDs, it should be pointed out that ICTs don't help some students and that software cannot replace the support provided by humans.

Promote universal design of instruction

Universal design of instruction principles should be popularized in colleges, and the various ICTs that can help students with LDs should be made available to ALL students: what helps "emerging populations" can also help other students. These ICTs may be useful to many groups, including students whose first language is not the language of instruction, those who learn more easily by listening than by reading, and those who are visual organizers.

Advocate for better training for students, disability service providers, and faculty

Students, as well as disability service providers and faculty, need better training and more opportunities to learn how to use specialized ICTs. Students with LDs rarely receive training on ICTs before entering college, making their first year especially difficult. Both high schools and private tutoring/remediation centres could help by teaching students how to use needed ICTs before they enter college.

Fight negative perceptions about students with LD and about their use of needed ICTs

Both negative perceptions about the abilities of students with LDs as well as the assumption that their use of needed ICTs is tantamount to cheating must be addressed whenever encountered. Teachers, fellow students, and even some students with LDs themselves often hold such negative beliefs. Yet, as recently noted by Me Nancy Bergeron of the Fédération des cégeps at the 2010 Collège Montmorency Pedagogical Day, the student and the accommodations recommended for him or her by the college's office for students with disabilities, including ICTs, should be considered a "package" that, for the purposes of evaluation, should simply be thought of as always belonging together.

College services need to take over responsibilities from disability service providers

Finally, virtually all activities related to ICTs and students with LDs were viewed as carried out by campus disability service providers. More diffuse responsibility for these, most notably by the colleges' regular academic and computing services, was seen as desirable. Collaboration among these groups and disability service providers is a necessary key to success.

[1] [http://www.adaptech.org/downloads]

[2] [http://www.YouTube.com/user/AdaptechResearch#p/]



CONCLUSION

Ensuring that the ICT-related needs of students with LDs are being met must become an urgent priority for the Ministère de l'Éducation, du Loisir et du Sport, college administrations, and tutoring/academic support/remediation centres. This is likely to result in more motivated and self-assured students who are less stressed, whose academic work is of better quality, and whose college experience is more satisfying. Access to the needed ICTs will equip students with LDs with the skills needed to succeed in the ICT-intensive world of school, work, community, and leisure.

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