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**Access To College For All:**

ITAC Project - Computer and adaptive computer Technologies in the Cegeps For Students With Disabilities  
Final Report Presented to PAREA

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**EXECUTIVE SUMMARY**

**Abstract**

Results of three empirical studies which investigated the computer and adaptive computer technology needs and concerns of the following groups are presented: cegep students with various disabilities, cegep professors, and individuals responsible for providing services to cegep students. Key findings about the current situation in Québec's cegeps are highlighted and recommendations are made to guide decision making to ensure "access to college for all."

**Objectives**

The overall objective of this research was to provide information needed to ensure that recent advances in computer, learning and adaptive technologies in the delivery of postsecondary education and training reflect the needs and concerns of 3 groups: cegep students with disabilities, the professors who teach them, and the individuals responsible for providing services to cegep students with disabilities.

Our goal was to provide an empirical basis for decision making. In particular, the information we gathered will help inform current practice in the acquisition and administration of computer technologies in the cegeps. We plan to disseminate recommendations based on our findings to help ensure that emerging technologies and innovations in the delivery of postsecondary education are accessible to students with disabilities. In the endeavour to ensure full access to a college education for students with disabilities we are guided by the spirit of, "A part... égale" (OPHQ, 1984), the "1992 Forum" (Dufour, 1992) and the recent evaluations by the OPHQ's "États généraux sur l'éducation" and "État de situation de la thématique des services éducatifs et de la formation continue" (Allie & Hébert, 1998; OPHQ, 1995).

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***In conducting the research, we wanted to answer the following questions***

- What educational and social goals of cegep students are met by computer technologies (e.g., submitting term papers by e-mail, during extremely cold temperatures being able to freely "move" about on the internet for students with limited mobility)?
- What are useless but popular computer technologies? What are shortsighted economies (e.g., use of obsolete equipment by students with disabilities)?
- How do systemic variables interact with individual differences to facilitate or hamper the use of computer technologies (e.g., availability of free internet access for students, provincial programs that provide subsidised computer technologies)?
- What aspects of the technologies do computer user students with various disabilities consider particularly useful (e.g., laptops used by students who are blind, computerised library access)? How are these used (e.g., in class for note taking, from home via a modem)?
- How do professors see the use of computer technologies affecting the nature of teaching at the cegeps, especially as it impacts on students with disabilities?
- What could professors do to improve the electronic accessibility of their courses for students with different types of disabilities?
- What would computer user students, non-users, cegep personnel who provide services to students with disabilities, and professors put on their "wish lists" for an ideal computer mediated teaching and learning environment that is accessible to students with all types of disabilities?
- What are the characteristics of cegeps which meet the computer and adaptive computer technology related needs of their students with disabilities?
- Do regional differences play a role in the availability of computer technologies for students with disabilities?
- Does the number or proportion of students with disabilities in the college affect the availability of computer and adaptive computer technologies on campus?
- Do anglophone and francophone students with disabilities have equal access to computer and adaptive computer technologies?
- How well informed are personnel who provide services to students with disabilities in the cegeps about which computer and adaptive computer technologies might be helpful?
- How well do the current province-wide programs and systems which make computer and adaptive computer technologies available to students and to cegeps meet their needs?

**Methodology**

This research lasted two years (Fall, 1998 - Spring, 2000). During this time we conducted a series of three studies with the help of our Advisory Board in collaboration with the following organizations.

- l'Association québécoise des étudiants ayant des incapacités au postsecondaire (AQEIPS)
- The National Educational Association of Disabled Students (NEADS)
- The western Québec group of personnel who provide services to cegep students with disabilities: Service d'aide à l'intégration des élèves (SAIDE) at Cégep du Vieux Montréal
- The eastern Québec group of personnel who provide services to cegep students with disabilities: Le Services aux étudiants handicapés du Cégep de Sainte-Foy
- The Canada-wide professional organization of postsecondary personnel providing services to students with disabilities [Canadian Association of Disability Service Providers in Post-Secondary Education (CADSPPE)]

In Study 1, carried out in 1999, we conducted focus groups which included 60 participants: 21 cegep students with different disabilities (9 anglophones and 12 francophones), 25 individuals responsible for providing services to cegep students with disabilities (5 anglophones and 20 francophones), and 14 cegep professors (7 anglophones and 7 francophones). Separate unilingual focus groups were held for each of the 3 categories of participants. Groups were held in Montréal, Québec (Sainte-Foy), and Trois Rivières.

In the same year we also carried out Study 2. Here, 76 college students with disabilities (21 anglophones and 55 francophones) completed a written survey which dealt with a variety of computer related issues.

In Study 3, carried out in 2000, we conducted structured telephone interviews with 46 individuals responsible for providing services to cegep students with disabilities (6 anglophones and 40 francophones) from "public" cegeps from both the eastern and western sectors of Québec. This included 22 cegep service providers from large cities (Montréal, Québec, Hull) and 24 from Québec's outlying regions.

## Highlights of the Findings

### *How computers are used in the cegeps*

- While there is substantial interest in using computer technologies in the classroom, progress in this area in the cegeps is only in the initial phases of development
- There is wide variation among professors in the extent of computer use: discrepancies seem to be related to program and discipline, with heavier use in the sciences and engineering technologies than in arts and the social sciences
- When computers are used, the most popular applications are word processing (Word), spreadsheets (Excel), PowerPoint, and the internet, with students being expected to word process assignments and to carry out research using the internet
- Professors indicated that at present the cegeps have limited equipment available both to professors and to students: computer labs are crowded, opportunities to hold classes in computer labs are few, availability of equipment for classroom demonstrations is limited, and classroom demonstrations have multiple technical difficulties
- A common educational use of computers by professors is to put course outlines and course notes on a web page
- Professors are concerned about the cost of upgrading software and hardware in computer labs on a regular basis, given the short usable life of computers - between 3 and 5 years
- Although some professors attempt to use up-to-date instructional design principles when integrating computers into their courses, this is not typical
- Professors are concerned that there is an overemphasis on technology and an underemphasis on pedagogy
- In the next 5 years professors generally see more of the same, except faster, better, and cheaper technologies; there was little mention of interactivity, communities of learners, construction of knowledge, distributed learning, or other current concepts in educational technology
- Some professors noted that pedagogical practices which are useful for students with disabilities are good pedagogical practices in general (e.g., being more organized with lecture notes, spelling names and difficult words when writing these)

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### ***Students with disabilities in the cegeps***

- In comparison with colleges in the rest of Canada, cegeps have substantially and significantly smaller proportions of students with disabilities (i.e., a 10 fold difference: 1/2% in Québec compared to 5-1/2% in the rest of Canada); this was true of both French and English cegeps, although English cegeps had a slightly larger proportion of students with disabilities than French cegeps
- French cegeps in large cities and cegeps in the regions generally did not differ, but where they did, the differences in computer and internet use and attitudes favored the city cegeps
- There were substantial and significant differences between the number of students actually receiving services in the cegeps and the numbers that were "officially" recognized by the provincial Ministry of Education - three times as many students were actually receiving services compared to the numbers which appeared on the "official" lists that determine funding for the cegeps
- Discrepancies between actual and "official" numbers occurred in both French and English cegeps and cannot be explained by the presence of students with learning disabilities in English cegeps
- There is growing concern expressed by the disability service providers in the cegeps about the need to accommodate the computer related needs of students with learning disabilities; although the need is greater in the English sector, it is increasingly evident in the French sector
- Key problems for both students and cegep service providers include: the high cost of computer technologies; network, hardware and software compatibility problems created by popular adaptive computer technologies; poor training opportunities both for students and service providers; failure to inform professors about topics related to electronic access for students with disabilities in computer courses geared to faculty; inadequate funding and computer support services to meet future needs

### ***Computer use by students with disabilities***

- Virtually all students with disabilities in our studies (more than 90%) use computers, mainly IBM compatibles, both at home and at school, an average of 9 hours per week
- The overwhelming majority (more than 80%) of both francophone and anglophone students use the internet, mainly for research and personal e-mail (about 2/3 of students use this at home and 2/3 at school) for an average of 6 hours per week in addition to time spent on a computer
- Almost half of the students had more than 1 impairment
- About 1/3 of students needed adaptations to use a computer effectively (e.g., software that enlarges what is on the screen, adapted mouse), although not all of them used these - the reason: lack of availability and cost
- There was a clear tendency to "cross-use technologies" (i.e., technologies intended for students with one type of disability used by students with a different disability)
- Within the variables investigated, both age and sex were only minimally associated with computer related views and experiences

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### **Computer related services for students with disabilities**

- Students with disabilities are generally enrolled in arts and social science programs; computer use in courses in these disciplines is not extensive
- Cegep service providers indicate that, at present, computer related services are only a moderate priority for them
- Most cegeps (more than 3/4) had some type of computer or adaptive computer technologies for students with disabilities on campus
- Service providers report that students often come to school with their own computer equipment, and that most generally need no further computer related services
- Computer related services are not organized systematically - cegeps with fewer students typically proceed on a case by case basis - an approach which many service providers feel meets the current needs of students with disabilities
- Very few cegeps have multidisciplinary computer access committees and individuals responsible for providing services to cegep students with disabilities are rarely consulted when campus-wide computer and information technology infrastructure decisions are made
- When they experience difficulties with students' computer related concerns, professors generally ask either the students themselves or the service providers for assistance
- The provincial computer loan programs which provide computer equipment and information to individual cegeps for on-campus use (run by the SAIDE at Cégep du Vieux Montréal and le Services aux étudiants handicapés du Cégep de Sainte-Foy) received outstanding evaluations from the individuals responsible for providing services to cegep students with disabilities
- Most cegeps do not loan equipment to students for home use
- Both students and service providers expressed concerns about being poorly informed about what technologies are available and about new developments
- Many service providers are unfamiliar with adaptive computer technologies
- Knowledgeable service providers are self-taught: they try it out at home, learn from the students, check out the web, call on each other, etc. - there is no time for courses or conferences
- Some factors which are important to the overall adequacy of an institution in meeting the computer related needs of students with disabilities include: funding, access to adaptive computer technologies, internet access, technical support, factors related to faculty, and expertise of service provider

### **Computers for off-campus use**

- Computers used off campus were primarily purchased by students and their families; less than 1/3 of students used a government program to help them acquire computer technologies for home use
- Individuals responsible for providing services to cegep students with disabilities expressed the need for students with disabilities to be able to get subsidized computer technologies for home use more easily
- Students with disabilities and cegep service providers are both concerned about problems students have upgrading computers they use at home because some government subsidy programs do not provide upgrades

- Although government agencies and programs provided up-to-date equipment, there were serious problems noted with lengthy delays, limited choice, poor provisions for upgrading, inadequate training, restrictive admission criteria, and exclusion of students with certain disabilities as well as of students with "less severe" major functional limitations
- Both students and individuals responsible for providing services to cegep students with disabilities were exceptionally poorly informed about the nature and availability of government and rehabilitation agency programs to assist students with acquiring computer technologies for off-campus use - in particular, students with hearing impairments were not taking advantage of available programs
- Students who had no computer at home wanted to have one; those with no portable equipment wanted this; those who needed adaptations and did not have these wanted adaptations; and students who had no internet access from home wanted access
- The high costs related to acquiring, maintaining, and updating computer technologies were the most important and common issues noted by students (both computer users and non-users), service providers, as well as professors

## **Conclusions**

Results of the three investigations converge on the following: cegep programs which enroll large numbers of students with disabilities (i.e., arts and social sciences) are not yet heavily computerized. Computer related services constitute only a moderate priority for individuals responsible for providing services to cegep students with disabilities. There is, however, increasing use of computer technologies in the cegeps and there is concern over inadequate funding for computer and adaptive computer technologies and computer related services, both for on-campus and off-campus use. Individuals responsible for providing services to cegep students with disabilities wish that students were better equipped for college level computer experiences. In particular, service providers lament the restrictive access to government and rehabilitation agency subsidy programs for students with disabilities. They also noted that the cegeps are providing services to many students whose disabilities are simply not recognized by the government for funding purposes. This is certainly true for students with learning disabilities, both in English and French cegeps, but is also true for students with a large variety of other disabilities (e.g., chronic medical conditions, psychiatric impairments). Another key finding was that although these exist, many students and service providers were simply not aware of available funding programs which could help students acquire computer technologies for off-campus use.

The vast majority of cegep students, regardless of sex, age, location, program of study, or type of disability, can and do use computer technologies in the context of their studies. The number and nature of the advantages that computer technologies had for participants show how critical computers are to the success of students with disabilities.

The high cost of acquiring and maintaining computer technologies was the single most important and common issue noted by all three groups of participants. The majority of students who had computer equipment at home indicated that they or their families had paid for these. Students indicated that they did not take advantage of a government program to help them obtain a computer or adaptive technologies because they did not know these existed. The solution to the problem is obvious: organizations, programs and agencies that provide money, loans or computer technologies to students with disabilities need to do more effective "outreach." More broadly based information dissemination to better inform students (in alternate formats), financial aid officers, and cegep personnel responsible for providing services to students with disabilities about available opportunities is clearly needed.

Since about 1/2 of the students in our sample had two or more impairments/disabilities, the need for adapted work stations which can accommodate the needs of students with various disabilities seems necessary. There was a pronounced trend for students with one kind of disability to use technologies intended for students with a different type of impairment. For example, screen reading software, large screen monitors, and scanners used in conjunction with optical character recognition software are used not only by students with visual impairments but also by students with learning disabilities. Dictation software is used both by students with learning disabilities as well as by students with problems using their hands or arms. Multiple uses of adaptive technologies seems to be an important development, and the increasing number of accessibility features built into widely available mainstream products are of considerable interest to students with disabilities. Nevertheless, recent developments in sophisticated adaptive technologies have underscored the increasing need to ensure that different types of adaptive equipment be able to work together. This is an important issue because there are compatibility problems among various adaptive computer technologies. In particular, the video card requirements of magnification software, the heavy hardware and training demands of dictation programs, and compatibility problems between dictation and screen reading technologies pose difficulties. Compatibility with Windows NT is rapidly becoming a priority.

Computers are technologies that are enabling - that allow students with disabilities to prepare for and to participate in the knowledge-based economy of tomorrow. To plan for the future rather than catch up with the past we recommend that the broadest based consultations take place at cegeps and organizations and agencies which provide equipment and training for students with disabilities. Such consultations must involve students, who, of course, are ultimately the end-users. The complexity of the issues suggest that diverse sectors of the cegep community need to collaborate to ensure that computer-based teaching materials and resources are accessible to students with different impairments. In this regard, we recommend that multidisciplinary computer accessibility advisory committees be constituted in the cegeps, with representation, at a minimum, by students with different disabilities, by professors, by those responsible for providing computer related services to cegep students with disabilities, and by someone from computer support services as well as administration. Such committees could benefit from the expertise of academic computer staff, adaptive computer technology specialists, librarians, audio-visual specialists, and rehabilitation professionals, among others. Creative partnerships and alliances are urgently needed.

In addition, we suggest better coordination and collaboration between cegep disability service providers and provincial agencies, programs, and departments which are responsible for providing equipment subsidies and computer and adaptive computer technologies to students for off-campus use. This would allow for better coordination and better information dissemination about what is really required to meet the forthcoming computer related needs of students with disabilities.

As we write this report, planning for campus-wide information technology purchases and computer infrastructure improvements in the cegeps are actively proceeding. The needs of students with disabilities are simply overlooked in much of the planning until it is discovered, often much too late, that the expensive new campus-wide technology is inaccessible. This is not done through malice but through lack of forethought. Designing for accessibility always results in better, less expensive, and more timely solutions than retrofits. Implementing accessibility features in the initial design of a system results in fewer design, construction and legal expenses. It is important to ensure that the needs and concerns of students with all types of disabilities are represented in planning decisions from their inception. Data to guide decision making and specific recommendations concerning what could be done to ensure full access to the new computer and information technologies in cegep education for all students are included in this report. In particular, we provide concrete, practical recommendations for:

- professors and educators
- individuals responsible for providing services to cegep students with disabilities
- government, agencies and organizations that help students obtain computer technologies.

## **Contact Information**

For additional information and the full report, consult the Adaptech web page or contact one of the principal investigators.

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