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The use of the masculine is for ease of reading. No discrimination is intended.

We wish to thank the Centre de recherche interuniversitaire sur la formation et la profession enseignante, the Canada Research Chair on information and communication technologies (ICTs) in education as well as MATI Montréal, whose financial support has made this large survey possible.

Current version: 0.81

Note: This report is available only on the Internet on a number of sites such as the Web site sondagetic.org/cegeps. Please send any comments directly to bruno.poellhuber@umontreal.ca.

Acknowledgements

We thank the network of ICT respondents (REPTIC), whose collaboration has been essential in carrying out this project.

Also, a thank you to all people who made this survey possible as well as to all those who participated in it.

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1 Survey context

We live in a society that in a number of ways is today centred on information. Technological and information competencies are becoming increasingly significant in the labour market and in society as a whole. Information and communication technologies (ICTs) have become a major aspect of our daily life. Far from being a mere fad, they now constitute essential tools. How do students in Quebec college educational institutions position themselves within this new reality? How do they compare to their American and European neighbours?

ICT use at the college level is not without raising serious discussion. In the Cegeps, the postsecondary educational institutions created in Quebec some 45 years ago, technologies provide a great number of advantages in teaching and research; but they also pose major challenges. For example, the pressure to invest in ICTs forces Cegeps and colleges to make difficult choices. It even happens that institutional priorities are at times undermined. Today it is up to the whole community of Quebec postsecondary educational institutions to conduct a self-examination on issues such as the imposition of compulsory purchase of laptops, tablet PCs, interactive whiteboards; or indeed the introduction of online courses.

1.1 Objectives

In North America, the past years have been marked by a considerable incursion of ICTs into teaching. The 60 million PowerPoint presentations that take place each day in universities and colleges show quite well that from now on postsecondary teaching and ICTs will be cohabiting daily. The Cegeps are caught up in a technological maelstrom that involves pressing questions. What are the competencies of our students in using ICTs? What uses do they make of ICTs in the academic context and elsewhere? Do ICTs really contribute to the acquisition, development, and maintenance of competencies and the basic skills of literacy and numeracy? Do they necessarily succeed in the enrichment, enhancement, and application of learning? Do they contribute to the acquisition, maintenance, and development of competencies? This research project is an attempt to provide some answers to these questions.

Furthermore, while ICT use by postsecondary students is regularly studied and followed up in a number of member countries of the Organisation for Economic Co-operation and Development (OECD), information available to us about our Quebec clientele is sparse and fragmented. For example, in the United States the EDUCAUSE Center for Applied Research (ECAR) carries out a huge annual survey of university undergraduates (ECAR Study of Undergraduate Students and Information Technology, 2009). The Pew Research Center also conducts targeted studies with American college and university students with its Pew Research Center's Internet & American Life Project (Jones and others, 2008). These surveys present an up-to-date portrait of student technological habits and constitute a foundation for various types of research and analysis (the Horizon reports, for example) that in turn

provide a base for institutional orientation and decision making. No initiative of this kind exists for Quebec college students. The purpose of our project is to make up for this absence.

More specifically, the objectives of this project are the following:

1. draw up a portrait of how Quebec college students use ICTs and Web 2.0 tools
2. identify and better understand the uses, competencies, attitudes, advantages, and challenges inherent in ICTs as seen by these students

1.2 Importance of information competency for postsecondary students

ICTs, as we have said, are now an integral part of the social and academic life of a large number of learners and trainers. In fact, from now on, they turn first of all to the Internet to find information related to their studies (Karsenti, Raby, and Villeneuve, 2008; Kuiper, Volman, and Terwel, 2005). Meanwhile, the quantity of data available on the Web continues to increase exponentially (Lyman and Varian, 2003). Do these people possess the information competency needed to access the knowledge-based society? To put it another way, are learners and future teachers able to identify information they need (1) to find it, (2) to evaluate it, (3), and (4) to use it effectively?

Based on various points of view, notably those of the American Library Association (1989) and of Owusu-Ansah (2003), it is possible to define the concept of information competency in a more pedagogical or techno-pedagogical context. The concept designates the whole set of competencies needed for the learner or trainer to be able to clearly identify the information desired 1) to search for it, 2) to process is effectively, 3) and to make ethical and legal use of it for purposes of teaching, 4). Table 1 presents some examples related to each of these components of information competency.

Table 1. Examples related to components of information competency

ELEMENTS	EXAMPLES
Identification of the information desired	Formulate an information problem. Identify the information needed to solve the problem.
Search for the information	Identify how to find the information. Locate/find the information. Access the information. Retrieve the information.
Processing the information	Evaluate the information. Select the relevant information. Use the information. Communicate the information. Create information. Integrate the information into your knowledge.
Ethical aspects of the information/Legal aspects of the information	Know and comply with the rules regarding plagiarism. Understand the economic, legal, and social aspects of access to information and of its use.

Actors involved in college teaching are as well concerned about questions related to the development of information competency. For example, a working group formed by the ICT respondents of the college network (REPTIC) has developed the ICT profile of college students. This profile describes the skills students should have acquired by the end of their college education, whether following a career or pre-university program. (ICT respondents network, 2010). They understand the elements connected not only to information competency but also to technological competency. A number of studies are underway related to this issue.

1.3 Arrival of Web 2.0 and the social media

It is, in fact, necessary to emphasize the importance of Web 2.0, on the one hand, in the modes of access to knowledge; and, on the other hand, in the ways of constructing your knowledge (with others), of sharing it, of developing it, and indeed of carrying it with you. Web 2.0 offers a range of dynamic and constantly changing tools that are able to increase social interactions, to organize them, to categorize them, and to filter them. Thus it turns out that the new technologies—with Facebook, YouTube, Wikipedia, Twitter, RSS, and Skype in the lead—and the ways of doing associated with them will be called upon to play a major role among current and future postsecondary students.

Yet despite the fact that Facebook is highly popular and that mediatized discussion represents young people of the new generation as being “digital natives” (Prenski, 2001), we know very little about college student use of the social media. Better knowledge of these practices would be a first step in the potential teaching applications of these tools.

This report is based on our first statistical analyses. Having situated the inquiry in its context, we now present the research methodology we used and our main results, grouping them in seven sections:

1. general profile of respondents
2. ICT access
3. ICT use
4. Use of social networking sites
5. student technology preferences
6. student technological skills
7. information search and the information competencies of students
8. inherent aspects of ICTs and teaching covered by the survey
9. data dealing with communication (with ICTs) between students and teachers
10. impact of ICTs on teaching and learning

We end this report with a brief conclusion, recommendations, and the presentation of further research paths.

2 Methodology

This section of the report presents the subjects of the online inquiry as well as the way in which the survey was designed.

2.1 Participants

Participating in this research were 30,724 college students (10,446 men and 20,278 women) with an average age of 20. This represents 17.2% of all students attending Cegep or a college educational institution in DEC programs in regular day education.

2.2 Type of study

We conducted an online survey of the whole student population enrolled in the regular sector in a Quebec college educational institution. Data obtained were enhanced by group interviews conducted in Montreal with a variety of students.

2.3 Development of the inquiry questionnaire

The inquiry questionnaire appears in the appendix. In order to prepare it, we first of all reviewed all questionnaires produced 2005–2010 dealing with various aspects of ICTs. We decided to limit our search in this way because rapid changes in ICTs meant that there was a risk of questions being outdated, given that a number of tools might no longer be in use. Earlier, we had produced a list of key words, in English and French, especially connected to computer science (*computer*, *Internet*, etc.), to its use (*habits, access,* etc.) and to the effects of ICTs (*feeling of ICT competency).* After that, we selected our research tools, which were mainly databases (AACE, Dissertations & Theses, Emerald, ERIC, Informaworld, Wiley, etc.) and scientific journals. In addition, we used the scientific search engine Google Scholar, mainly to harvest questionnaires produced as doctoral theses. Finally, we carried out a more general search with Google in order to make a list, among others, of questionnaires designed by organizations producing statistics (Statistics Canada, etc.). This inventory produced a body of 14 questionnaires which then served as the base for creating the questionnaire for our study.

Content of the questionnaires selected was first of all divided into the question categories we wanted to ask the students. The first category dealt with personal information of respondents (sex, age, level of studies, area of studies).The second involved ICT use under various aspects, that is, ICT tools owned, access to ICTs and to the Internet, personal use of ICTs (communication, seeking information, diversion, informal self-instruction, consumption, work, as well as time spent on these activities), and academic use (communication, seeking information, learning, as well as time spent on these activities). The third category dealt with the perceived impact of ICTs, notably on learning and the feeling of ICT competency; and the

fourth dealt with the challenges related to ICTs, such as obstacles to their use. The fifth and final category involved attitudes such as satisfaction and preferences in regard to ICTs.

The questionnaire we produced after completing the inventory repeats or adapts a good number of questions from the ECAR surveys (Kvavik and Caruso, 2005; Smith, Sallaway, and Caruso, 2009), which in our view represent excellent and quite exhaustive instruments for collecting data on ICTs among postsecondary students. Furthermore, their surveys were conducted with quite large samples (more than 30,000 respondents in 2009), which satisfies the objective of our study, that of seeking the participation of the greatest possible number of Quebec Cegep students.

As well, we often turned to questionnaires designed by Jones, Johnson-Yale, Millermaier, and Pérez (2008); and Jones, Ramanau, Cross, and Healing (2010), all quite comprehensive as well (88 questions in total for the Jones et al survey, 2008), which in fact repeat the ECAR survey elements (Jones et al, 2010). Finally, we have repeated and adapted a number of questions included in the Karsenti et al survey (2007), which was used to poll more than 10,000 Université de Montréal students—which is the largest sample ever taken by a survey on ICT use by Quebec postsecondary students.

2.4 Data analysis

Quantitative data were analyzed using SPSS (19.0) software. Qualitative data were analyzed with both QDA Minor and Excel software.

3 Results

3.1 General profile of respondents

3.1.1 Age of respondents

Average age of respondents is 20 years and 1 month (with a standard deviation of 4 years and 4 months). The median (age most often mentioned) is 19 years, and 77% of respondents are in the 16–18 age group or in the 19–20 age group, ages that approximately match the usual age of attending a college when there has been no interruption of studies. It should be noted that almost a quarter of the respondents (23%) are age 21 or older. These proportions are comparable to those for the college level student population age 21 or older, but there is a slight over-representation of the 16–18 age group and a slight under-representation of the 19–20 age group in the sample as compared to the population.

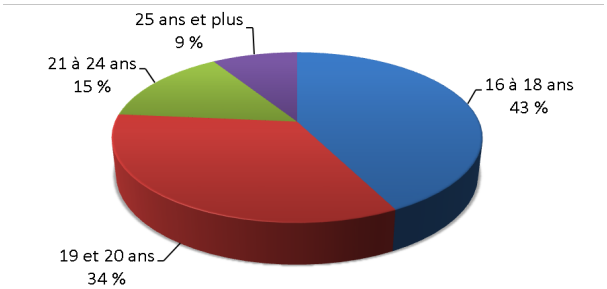

Figure 1. Distribution of respondents sample by age

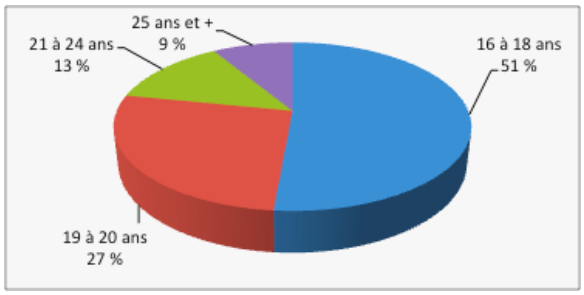

Figure 2. Distribution of respondents population by age

3.1.2 Sex of respondents

About two-thirds of the respondents were women (66%) and 34% were men, which means that women are slightly over-represented in the survey in relation to the college student population (58% women and 42% men).

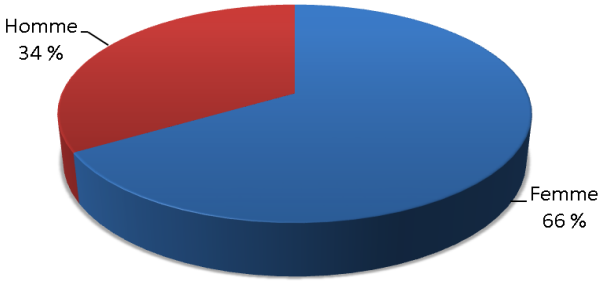

Figure 3. Distribution of respondents by sex

Poellhuber, B., Karsenti, T., Raynaud, J., Dumouchel, G., Roy, N., Fournier-St-Laurent, S. et Géraudie, N. (2012). Les habitudes *technologiques au cégep : résultats d'une enquête effectuée auprès de 30 724 étudiants.*

3.1.3 Registration status of respondents

Figure 4 shows the proportion of respondents studying full time and part time. You can see that 96% of student respondents are enrolled in full-time studies.

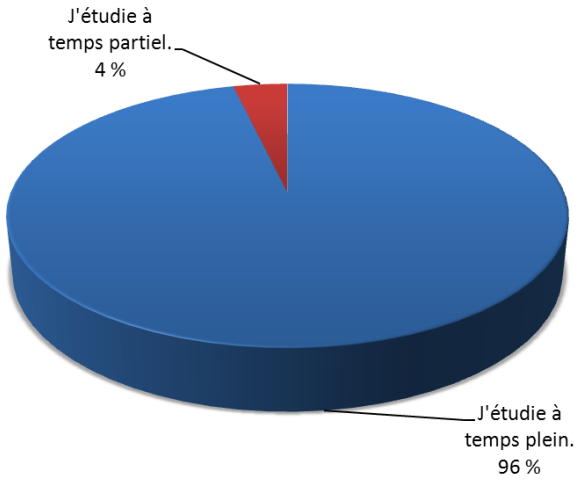

Figure 4. Registration status of respondents

3.1.4 Distribution of respondents by type of institution attended

Among respondents, 94% come from public institutions of the Cegep type and 5% from private colleges, while 1% of them study in institutions governed by ministries other than MELS (institutes, music conservatories, etc.). These proportions come very close to those of the student population at the college level, 94% of whom attend Cegeps, 7% attend private colleges, and 1% attend government institutions of the institute or conservatory type.

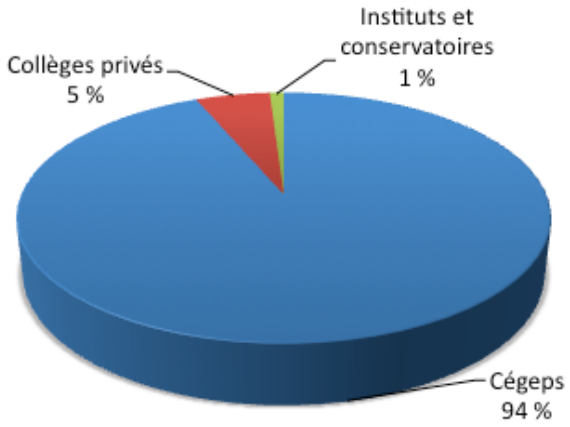

Figure 5. Distribution of respondents by type of institution attended

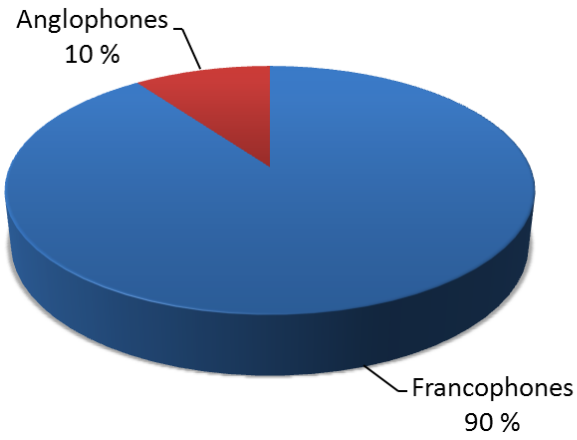

Figure 6. Distribution of respondents by language of instruction of the institution

Among respondents, 85% attend institutions where the main language of instruction is French, while 15% attend institutions in which instruction is mainly in English, compared to 84% and 16% in the reference population.

Respondents from 77 college educational institutions participated in the survey. Table 2 provides a list of these institutions.

Table 2 List of college educational institutions participating in the survey

Campus Notre-Dame-de-Foy
Cégep André-Laurendeau
Cégep Beauce-Appalaches
Cégep de Baie-Comeau
Cégep de Chicoutimi
Cégep de Drummondville
Cégep de Granby–Haute-Yamaska
Cégep de Jonquière
Cégep de l'Abitibi-Témiscamingue
Cégep de l'Outaouais
Cégep de la Gaspésie et des Îles
Cégep de La Pocatière
Cégep de Lévis-Lauzon
Cégep de Matane
Cégep de Rimouski
Cégep de Rivière-du-Loup
Cégep de Saint-Félicien
Cégep de Saint-Hyacinthe
Cégep de Saint-Jérôme
Cégep de Saint-Laurent
Cégep de Sainte-Foy
Cégep de Sept-Îles
Cégep de Sherbrooke
Cégep de Sorel-Tracy
Cégep de Thetford
Cégep de Trois-Rivières
Cégep de Victoriaville
Cégep du Vieux Montréal
Cégep Limoilou
Cégep Marie-Victorin
Cégep régional de Lanaudière
Cégep Saint-Jean-sur-Richelieu
CentennialCollege
Champlain Regional College – Lennoxville
Champlain Regional College - St-Lambert
Champlain Regional College - St.Lawrence
Collège Ahuntsic
Collège André-Grasset
Collège Bart
Collège d'Alma
Collège de Bois-de-Boulogne
Collège de Maisonneuve
Collège de Rosemont
Collège de Valleyfield
Collège Édouard-Montpetit
Collège Ellis - Campus Drummondville
Collège François-Xavier-Garneau
Collège Gérald-Godin
Collège international des Marcellines
Collège Jean-de-Brébeuf
Collège Laflèche
Collège LaSalle
Collège Lionel-Groulx
Collège Mérici
Collège Montmorency
Collège O'Sullivan de Montréal
Collège O'Sullivan de Québec
Collège Shawinigan
Conservatoire de musique de Gatineau
Conservatoire de musique de Montréal
Conservatoire de musique de Québec
Conservatoire de musique de Rimouski
Conservatoire de musique de Saguenay
Conservatoire de musique de Trois-Rivières
Conservatoire Lassalle
École de musique Vincent-d'Indy
École de sténographie judiciaire
École nationale de cirque
Institut de technologie agroalimentaire (La Pocatière)
Institut de technologie agroalimentaire (St-Hyacinthe)
Institut de tourisme et d'hôtellerie du Québec
Institut Teccart
John Abbott College
Macdonald College – McGill University
Marianopolis College
Séminaire de Sherbrooke
Vanier College

3.1.5 Geographical distribution of respondents

Figure 7 shows the overall geographical distribution of the student population at the college level (MELS, 2011), while Figure 8 shows the geographical distribution of the sample respondents in the survey. The geographical regions were created based on regrouping the administrative regions by taking as a minimal criterion the fact of having at least four institutions in a region. The Eastern Townships and Outaouais were grouped together because of the similarity of the respondents. Comparison of the two figures shows that all regions are represented, and this in proportions similar to those of the population; with the exception of the Laurentides-Lanaudière region, which is slightly under-represented, and the Eastern Townships–Outaouais region, which is slightly over-represented.

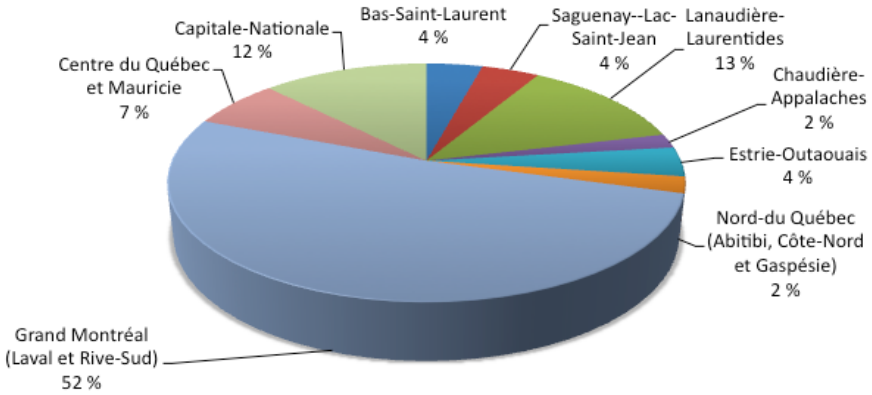

Figure 7. Geographical distribution of college students

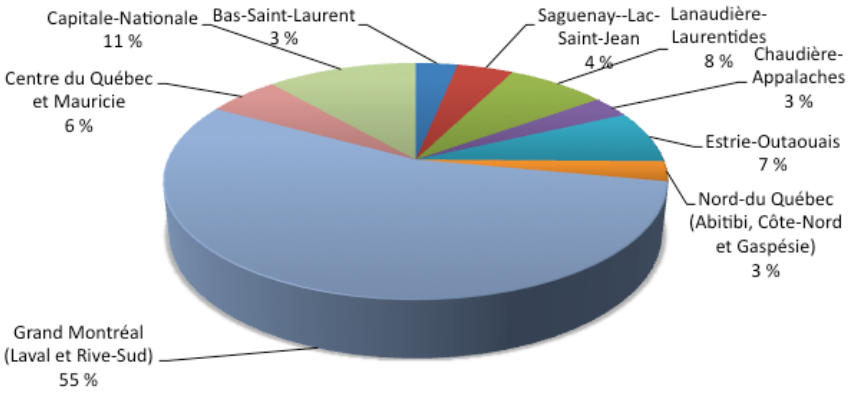

Figure 8. Geographical distribution of respondents in the sample

3.1.6 Area of studies of respondents

Half of the respondents were enrolled in the pre-university sector and 44% in the career sector. The relative popularity of special programs (transition semester or welcoming and integration semester) must be emphasized, given that 6% of respondents are enrolled in them. These numbers quite accurately reflect the proportions of the college-level student

population, of which 49% attend the pre-university sector, 47% the career sector, and 5% special programs like transition or welcome and integration.

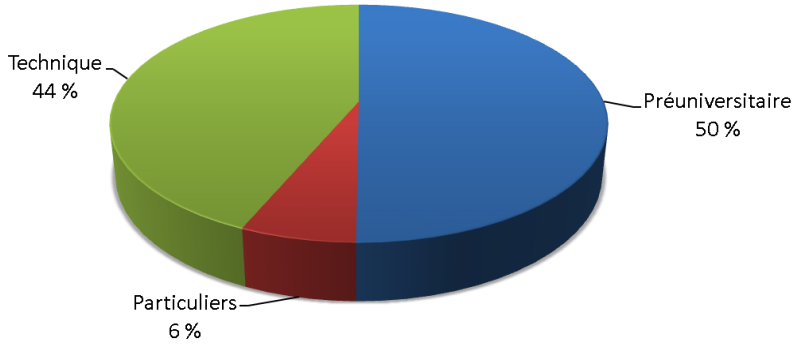

Figure 9. Distribution of respondents by sector attended

Almost half of the 10,217 pre-university respondents (47%) are enrolled in the social sciences, about one-third in pure and applied science, and 11% in arts and letters. The remaining 11% are enrolled in one of the other programs (international baccalaureate, double DEC, integrated program in the sciences, arts and letters, history and civilization, etc.).

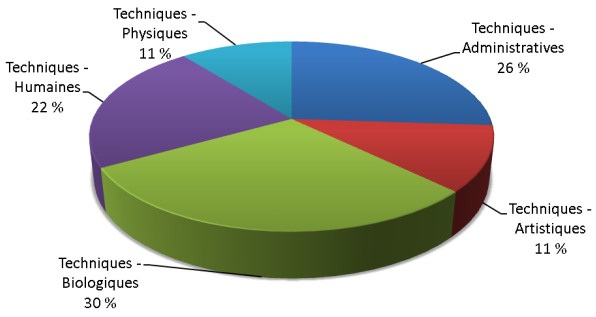

Figure 10. Career sector groups

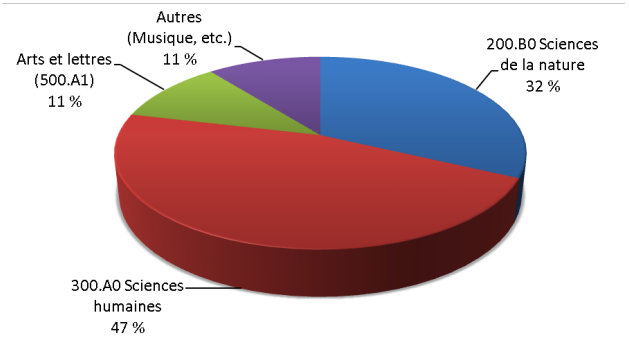

Figure 11. Pre-university programs

The 12, 710 career sector respondents attended, in order, a program belonging to the family of biomedical lab technologies (30%), administration/office technologies (26%), social science technologies (22%), arts and letters technologies (11%) or physics/engineering technologies (11%). This compares to the following percentages in the population: biomedical lab technologies (27%), administration/office technologies (22%), social science technologies (23%), arts and letters technologies (13%), and physics/engineering technologies (15%). The characteristics of the sample thus compare quite closely to those of the population, within a couple of percentage points.

Biomedical Lab Technologies

In the area of the biomedical lab technologies, the nursing program itself includes half of the 3,034 respondents (51%). The others are mainly enrolled in animal health technologies (8%), biomedical analyses (7%), diagnostic imaging/radiological technologies (7%), nutrition (6%), dental hygiene (6%), pre-hospital care (5%), or physical rehabilitation (4%).

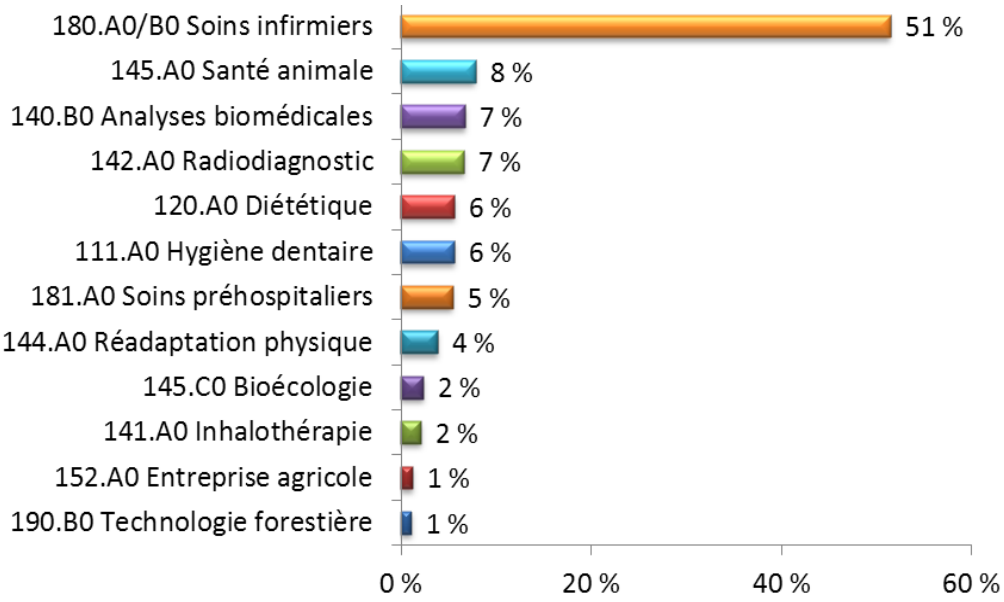

Figure 12. Distribution of the 3,034 respondents by program (biological technologies)

Management Technologies

In the area of management technologies, the three programs with the most respondents are accounting and management technologies (29%), computer science (24%), and business management (19%). They make up almost three-quarters (72%) of the 2,263 respondents of the sector.

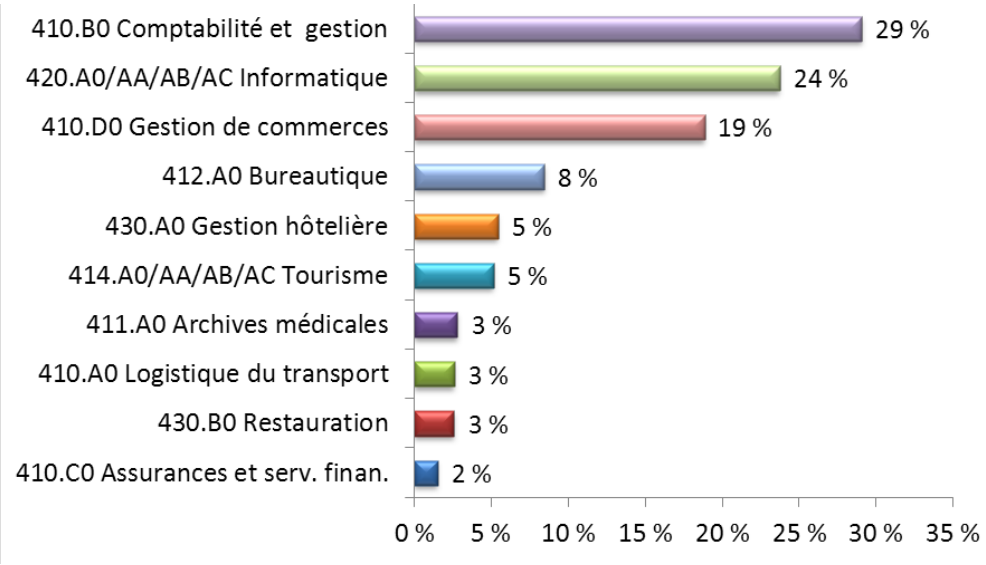

Figure 13. Distribution of the 2,263 respondents by program (management technologies)

Social Science Technologies

In the area of the social science technologies, more than two-thirds of the 2,231 respondents are enrolled in one of three following programs: special education technologies, (33%), early childhood education (22%), or social work (14%). The others are enrolled in paralegal technology (8%), police technology (7%), youth and adult correctional intervention (6%), documentation technology (5%), or recreation intervention (5%).

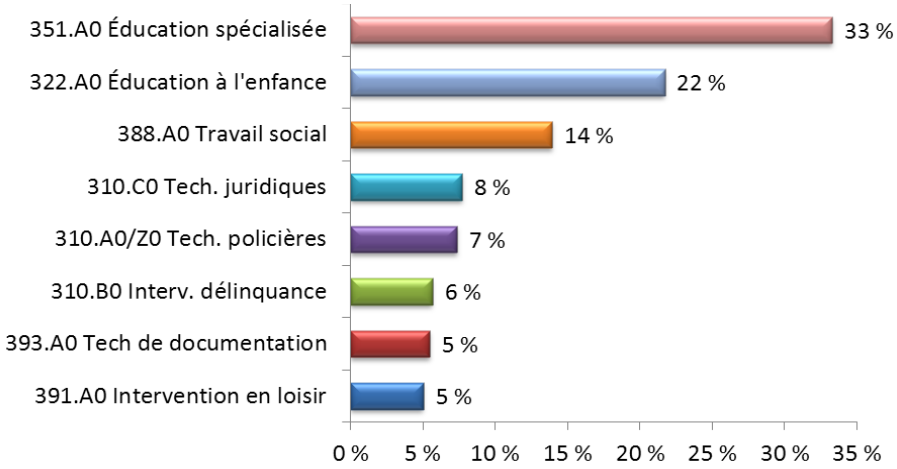

Figure 14. Distribution of 2,231 respondents by program (social science technologies)

Artistic Techniques

The 1,137 respondents in the artistic techniques sector are enrolled in graphic design (22%), interior design (20%), multimedia integration technologies (14%), 3D animation and image

integration (10%), music and song (9%), fashion marketing (7%), theatre production (6%), display design (5%), industrial design (5%) or theatrical interpretation (3%).

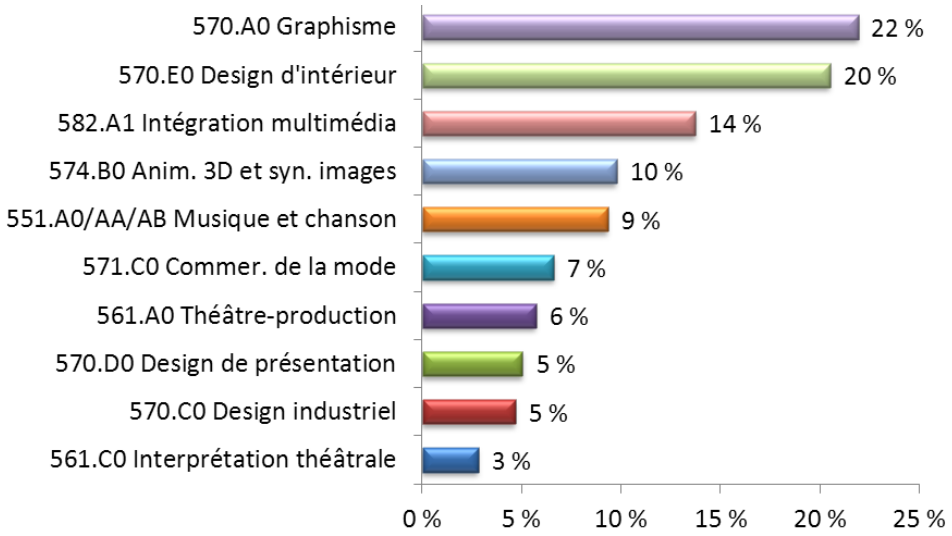

Figure 15. Distribution of the 1,137 respondents by program (artistic techniques)

Engineering Technologies

In the area of engineering technologies, the 1,092 respondents are enrolled mostly in civil engineering technologies (18%), mechanical engineering (17%), architecture (16%), industrial electronics, (15%), electronics (12%), laboratory technologies (9%), and building system engineering (4%), etc.

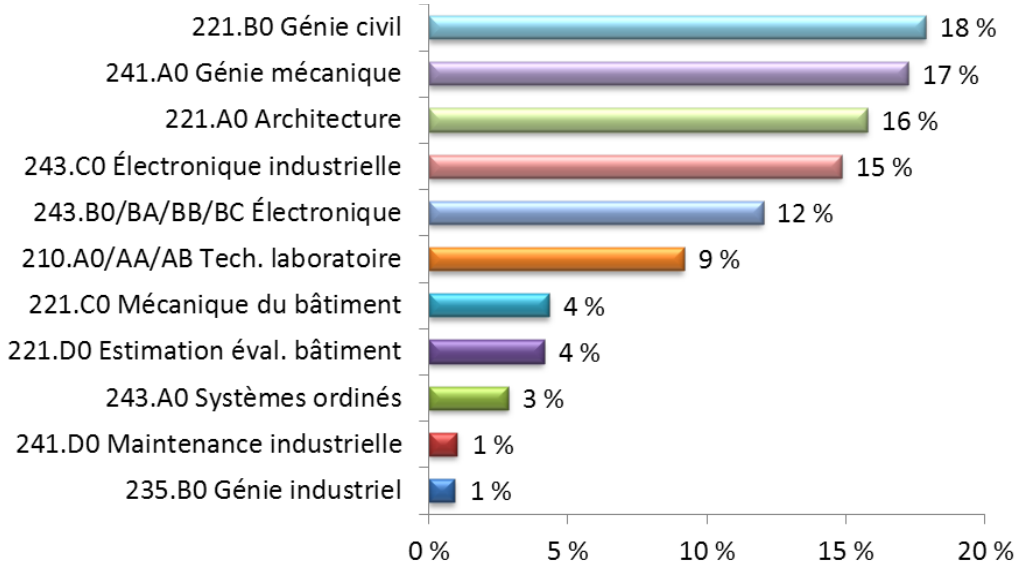

Figure 16. Distribution of the 1,092 respondents by program (engineering technologies)

3.1.7 Characteristics of the sample compared to the characteristics of the population

The sample of survey respondents is representative of the college student population for all the major socio-demographic dimensions (regional distribution, type of institution attended, area of study). In the sample of respondents, there is a slight over-representation of the 16–18 age group and an under-representation of the 19–20 age group, along with a higher proportion of women.

Access to ICTs

The first horizontal bar in the Figure 17 histogram shows the percentage of respondents who have a cell phone or other technological equipment, while the dark bar just below it shows the percentage of those using this equipment in school.

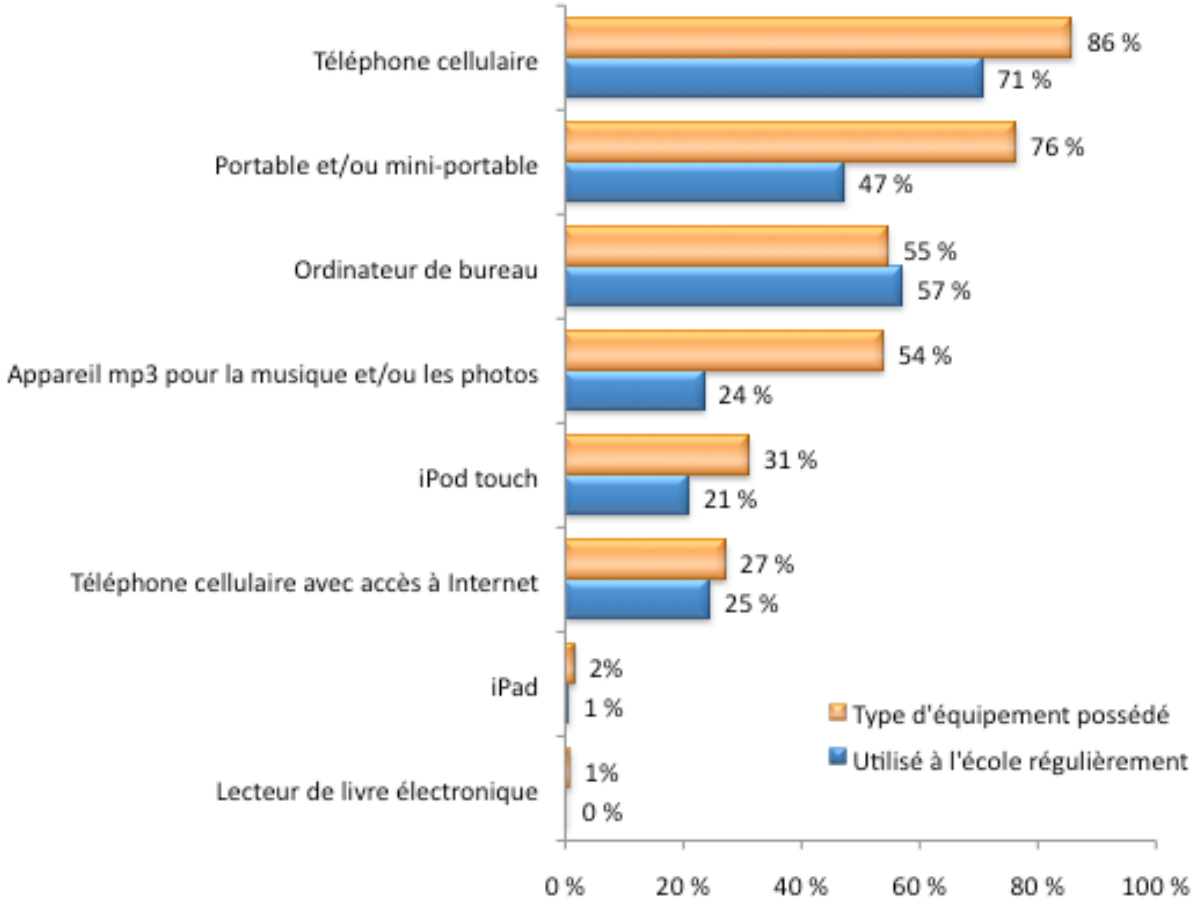

Figure 17. Equipment owned by students

It is apparent that the vast majority of students have cell phones (86%), and almost all of them use them in school. Three-quarters of them (76%) have a laptop or a mini-computer, but only 62% (47% of the 76%) use them regularly in school. Furthermore, while at the time of the survey possession of a tablet computers or e-book readers was still marginal, ownership of other peripherals with mobile access to the Internet was significant, with 27% of the students having a smartphone and 31% an iPod touch.

Figure 18 shows that three-quarters of the students (74%) have sent a text message during a class. Almost half of them have sent messages on Facebook (47%) or emails (43%) during a class. Obviously they sent messages by more than one of these means.

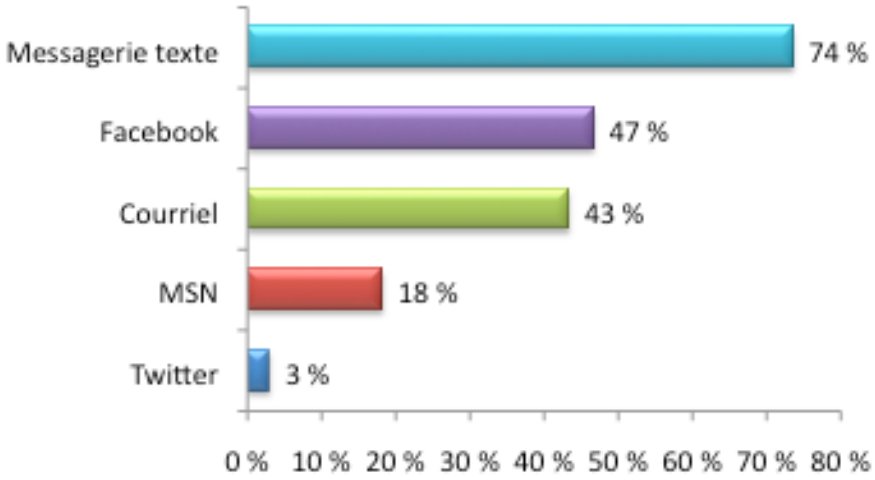

Figure 18. Use of messaging during classes

Although three-quarters of the students own a laptop, many do not bring it to school. In the interviews, they explain that a computer is too heavy, that they are afraid of breakage or theft, or that computers are available at school. Furthermore, they emphasize that teachers generally do not allow them to use their laptops in class. Students who bring their laptops to school appreciate the wireless Internet access in public areas (cafeteria, library, etc.). Given the number of students with laptops, it seems that colleges would be wise to invest in wireless network infrastructures and electrical equipment (plugs for charging computers) on its premises.

Furthermore, these data raise questions about the use of laptops and cell phones in regular classes. On the one hand, you might think that colleges could make investments enabling the use of student laptops rather than investing in new computer labs. These rates of student ownership could even make it possible to conduct laptop projects requiring each student in a program to have a laptop. On the other hand, when these devices are used in class, students use them for non-academic purposes, thereby becoming distractions and leading to problems of classroom management. A good number of students interviewed were in agreement with a prohibition of the in-class use of laptops and cell phones. For them, the temptation of sending text messages or checking Facebook was too great. Between universal in-class access and the formal prohibition of these devices, there are perhaps compromise solutions that involve targeted and guided use, in support of learning activities rather than in competition with them. These elements should be considered in teacher and student training.

Poellhuber, B., Karsenti, T., Raynaud, J., Dumouchel, G., Roy, N., Fournier-St-Laurent, S. et Géraudie, N. (2012). Les habitudes *technologiques au cégep : résultats d'une enquête effectuée auprès de 30 724 étudiants.*

3.2 Uses of ICTs

This section first presents hours of Internet use, followed by the frequency of use of various applications. Figure 19 shows the number of hours respondents spent on the Internet.

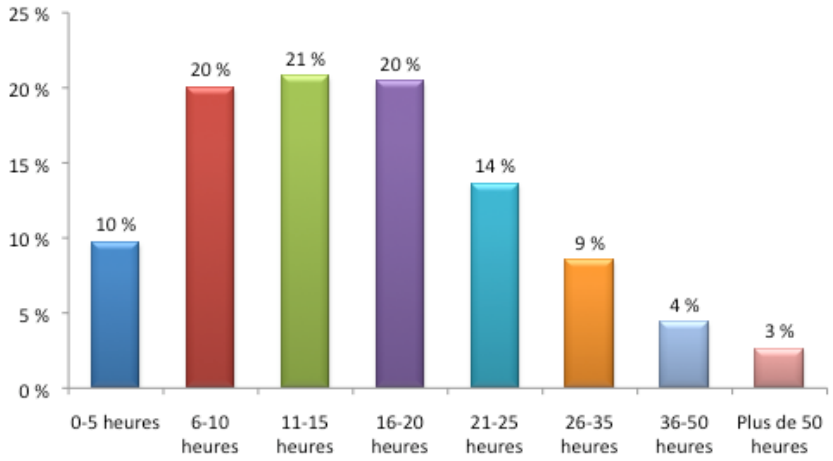

Figure 19. Number of hours spent on the Internet

College students are heavy users of the Internet: 90% of them spend an hour a day (6–10 hours/week) or more on the Net. Nearly half of the students (49%) surf more than 15 hours per week.

Figure 20 shows the proportion of students who use each of the technologies listed at least once a week. Technologies selected by less than 5% of users are not shown in this table.

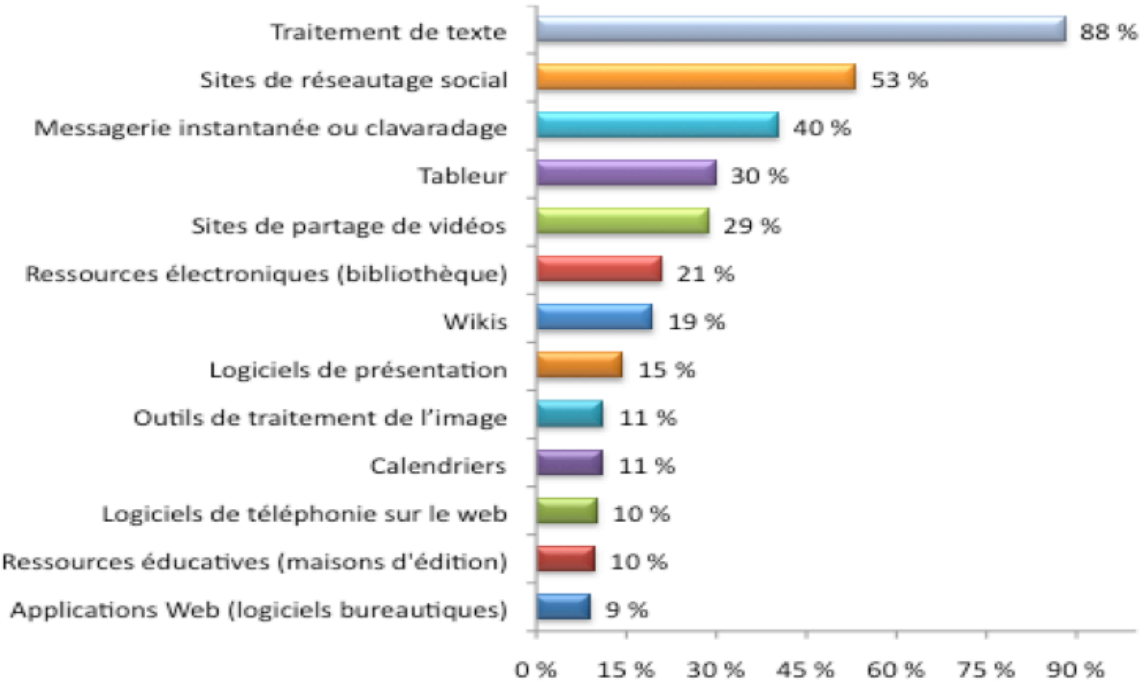

Figure 20. Frequency of ICT use

These data show ICT use that is mainly focused on word processing, the only application used on a daily basis by the majority of students.

3.3 Use of social networking sites

This section first presents frequency of use of social networking sites, data related to sites visited, reasons for visiting these sites, and profile management. It then deals with questions involving the use of these sites by teachers.

Figure 21 shows that 90% of students use social networking sites at least once a week and that 78% of them do so daily. Some 10% of the students say they are connected almost continuously.

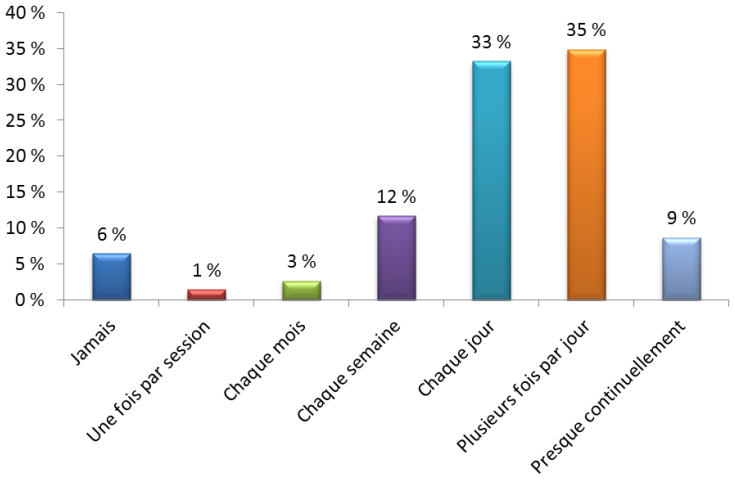

Figure 21. Frequency of use of social networking sites

Figure 22 shows that Facebook at 92% is by far the most visited social networking site. LinkedIn, a site mainly used for professional networking, is still little known by college students; even though, among Web sites most visited in the world, it was recently ranked 12th. It should be noted that Google Plus had not yet been launched when the survey was conducted.

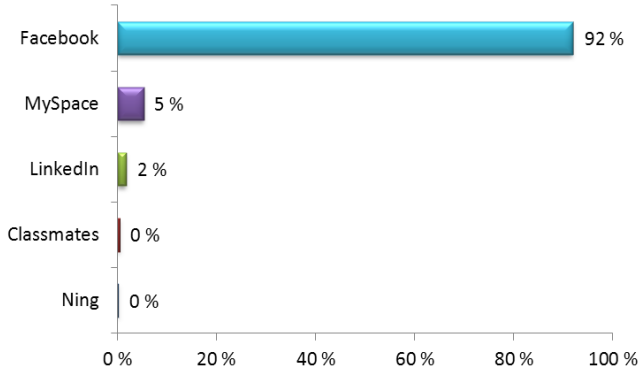

Figure 22. Social networking sites visited

We asked students about their use of social networking sites in connection with their academic life (Figure 23). More than half of them (56%) report that on these sites they discuss topics related to their courses with other students, but only 9% do so with their teachers. A third of them say that they use these sites to keep up to date with extra-curricular and social activities of their institution, which confirms the usefulness of a Facebook page for such activities.

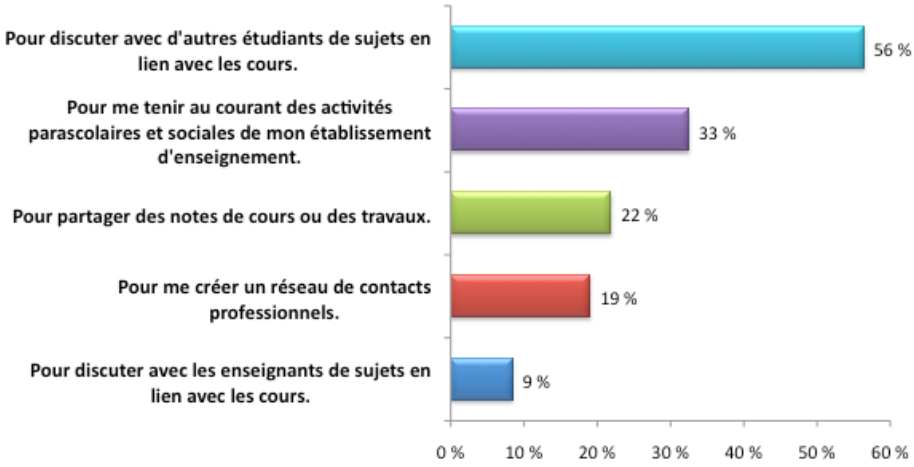

Figure 23. Reasons for visiting social networking sites

Data from the interviews confirm and clarify survey data. There is often a Facebook group for a course, one that has usually been set up by one of the students in the course. The teacher is not a participant, is not invited, and often is even unaware of its existence. The Facebook group is used for helping each other, obtaining answers to questions, and for reviewing before an exam. While Facebook is the preferred vector of communication with other students, the vector preferred for communicating with teachers is the institutional messaging system (the MOI system for example). It therefore appears that Facebook must be considered as primarily and above all a student space in which course-related discussions and activities are conducted.

Figure 24 shows that 90% of respondents place restrictions on the accessibility of the information found on their profile, and more than half of them impose a high number of restrictions. This seems to demonstrate that college students are aware of some aspects related to confidentiality of the information they place on these sites and are able to manage and control some of these aspects. However, nothing indicates how these parameters of confidentiality are managed or the reasons for managing them.

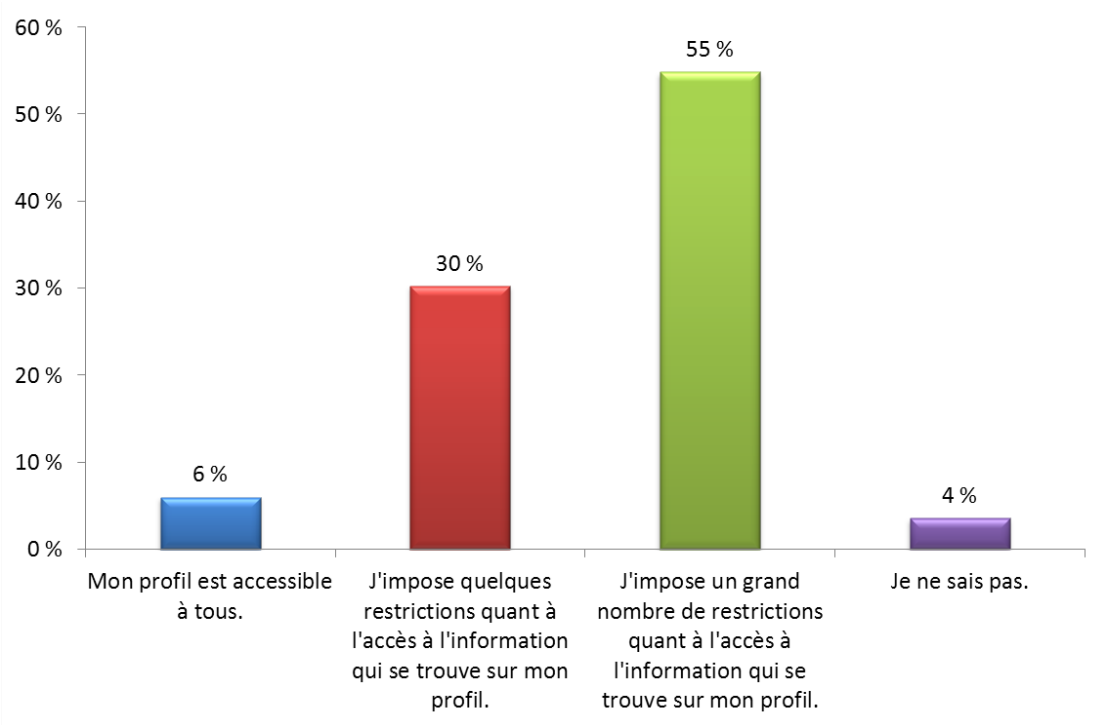

Figure 24. Profile control

Figure 25 presents the answers to the question *Have any of your current or previous teachers been "friends" or "contacts" on your social networking site(s)?*

Figure 25. Teachers acting as contacts or as friends

Some 40% of students add current or former teachers to their network of contacts or friends, while the majority (57%) do not do so.

Figure 26 presents the answers to the question *Would you like your teachers to use social networking sites more in their courses?*

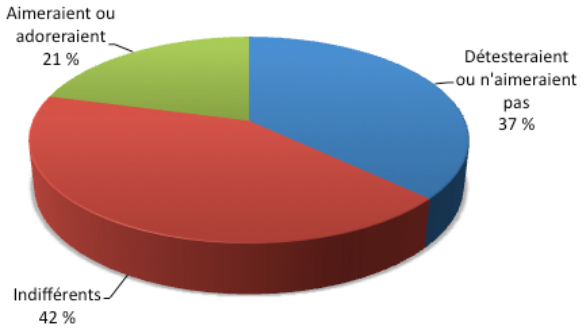

Figure 26. **Interest in the use of social networking sites in courses**

Only 1 student in 5 (21%) would like to see teachers use social networking sites in their courses, although 2 in 5 (42%) are indifferent and a similar proportion (42%) would hate it or would not like it. These data seem to show that students are divided in regard to the use of social networking sites by their teachers, much like in the responses to the preceding questions. While the pedagogical use of social media and Facebook is beginning to arouse interest and discussion in the scientific community, it seems that many students prefer Facebook to remain a space reserved for them.

3.4 Technological preferences

This section deals with the more emotional aspects of the technological preferences of students. What are the uses they like or love? Which ones do they dislike or even detest? Figure 27 shows respondents who said they liked or loved each of the uses listed.

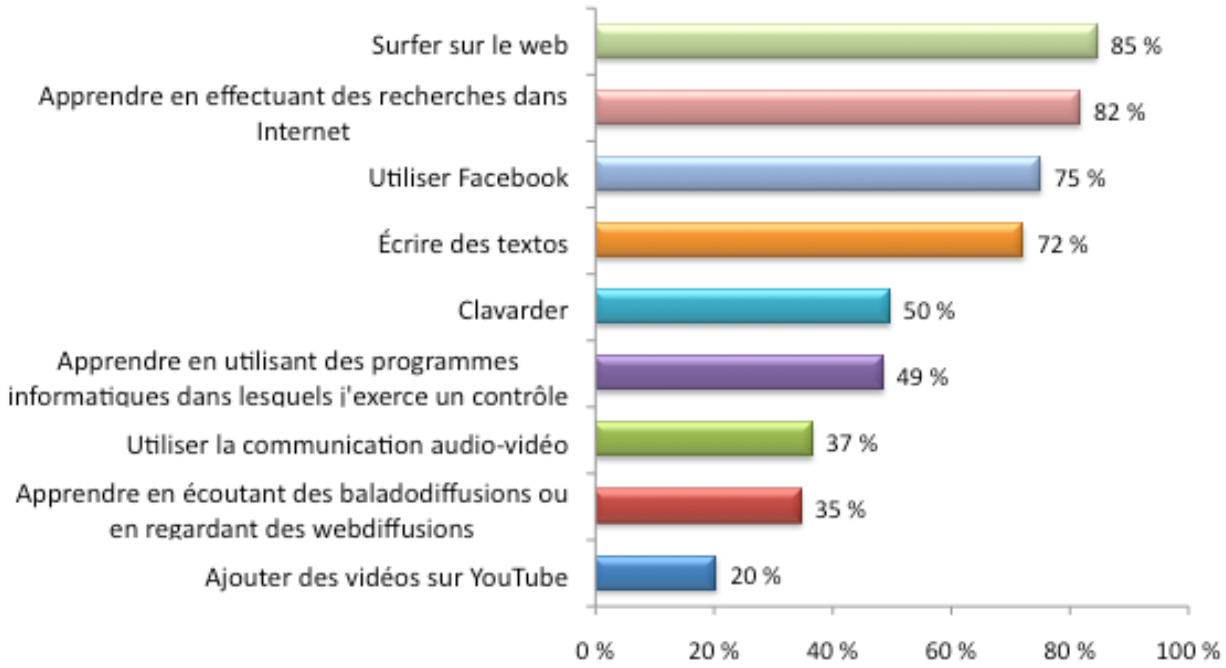

Figure 27. Preferred uses

What students like to do above all is to surf the Web. They also like to use Facebook, send text messages, or chat, which are primarily means of communicating with their friends. Furthermore, students also like a number of tasks related to learning with technologies, something that could help researchers to understand the motivational power of ICTs. A very large majority of students like to learn by conducting Internet searches (82%). Many of them also like to learn by using computer programs that they can control (49%).

Figure 28 shows the proportion of respondents who say they do not like or that they detest various types of ICT uses.

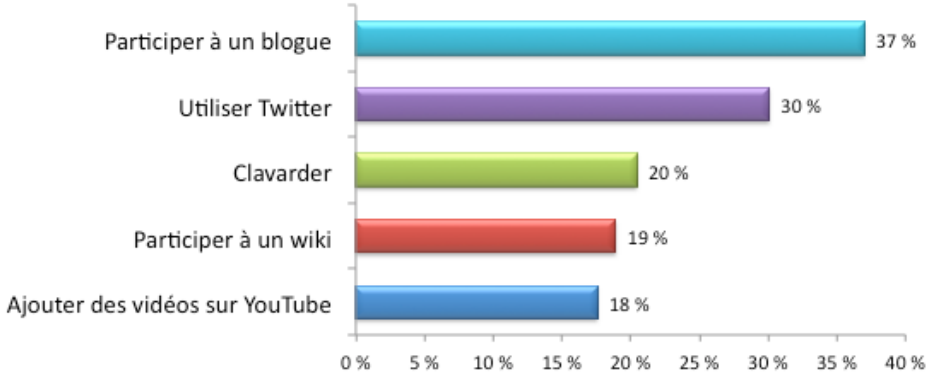

Figure 28. Disliked uses

Blog participation or using Twitter comes at the head of uses that are disliked. However, it seems that a misunderstanding of these tools could be a significant factor in explaining these responses. In fact, for a number of applications found at the top of the list, the number of students who do not understand or know about these applications exceeds the proportion of students who do not like them. For example, 36% of respondents say they are not familiar with Twitter, and 24% say they are indifferent to its use; 49% are not familiar with wikis and 25% are indifferent to their use; 18% do not know about blogs and 33% are indifferent about their use.

3.5 Technological skills

This section deals with technological skills and competencies of college students. Data on the degree of preparation for using technologies will first be presented, followed by evaluation of the level of proficiency of respondents in the various current software and social software. A typological analysis conducted on the basis of the whole set of responses to these two series of questions enabled us to place respondents in three large categories: beginners, intermediate, and advanced.

Figure 29 shows the degree of agreement with the statement *When I began my studies here, I was well prepared to use the technologies required for my courses.*

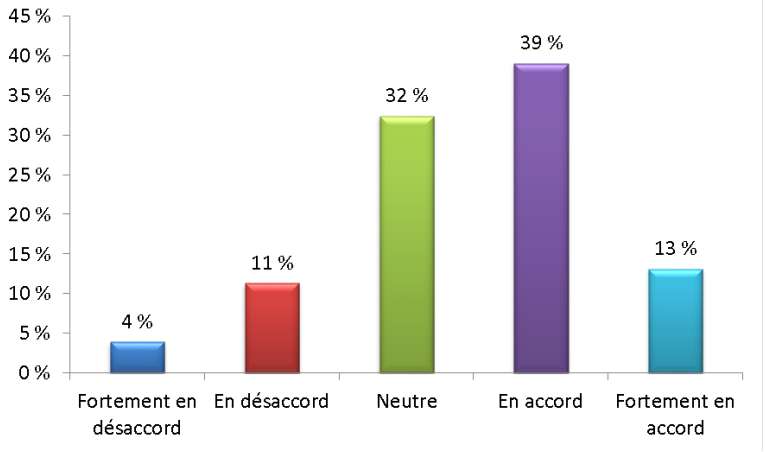

Figure 29. Preparedness for the use of technologies

Among respondents, 52% agree or strongly agree with this statement, 15% disagree or strongly disagree, and one-third (32%) remain neutral.

Figure 30 groups respondents who say they are at the intermediate, advanced, or expert level in regard to the use of each of the technological tools below.

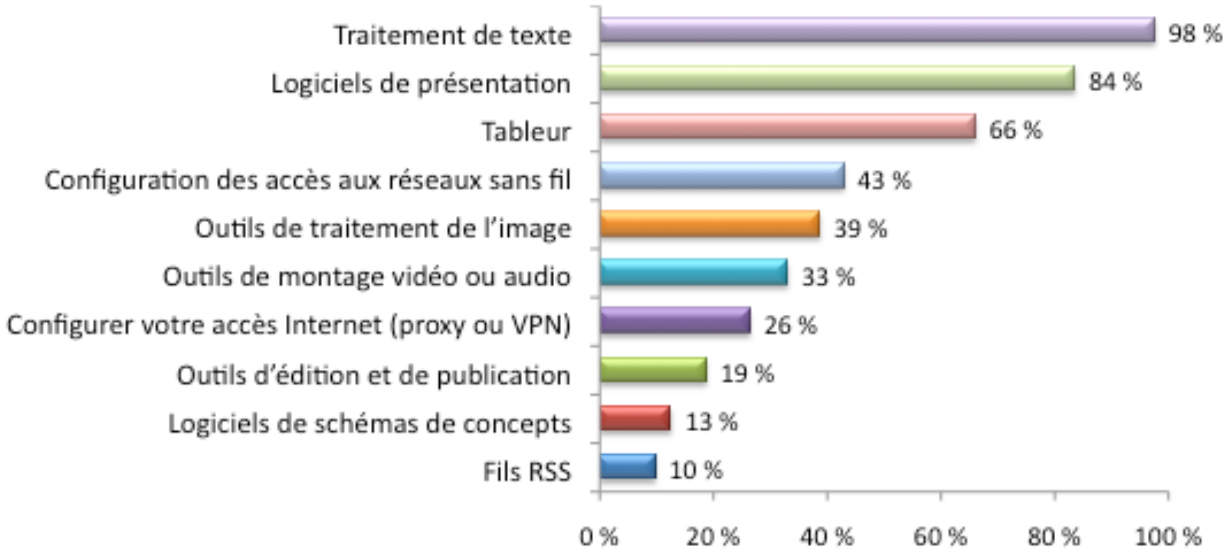

Figure 30. Technological skills: intermediate, advanced, or expert

In line with the data presented above on the frequency of use of various software (Figure 20), almost all users say they are proficient in word processing. A majority of students also say they are proficient in presentation software like PowerPoint (84%) and spreadsheets such as Excel (66%). The other tools are little known by more than half of the students.

In Figure 31, the same exercise is repeated but with the social media. Facebook and YouTube come at the top of the list. In fact, 90% of college students say they have at least an intermediate proficiency with social media, while 63% report proficiency with video sharing sites. About a quarter of them are proficient in photograph sharing sites like Flickr or blogs. The percentage of students who have a minimal proficiency in other social media (wikis, Twitter, podcasts, etc.) is below 15%.

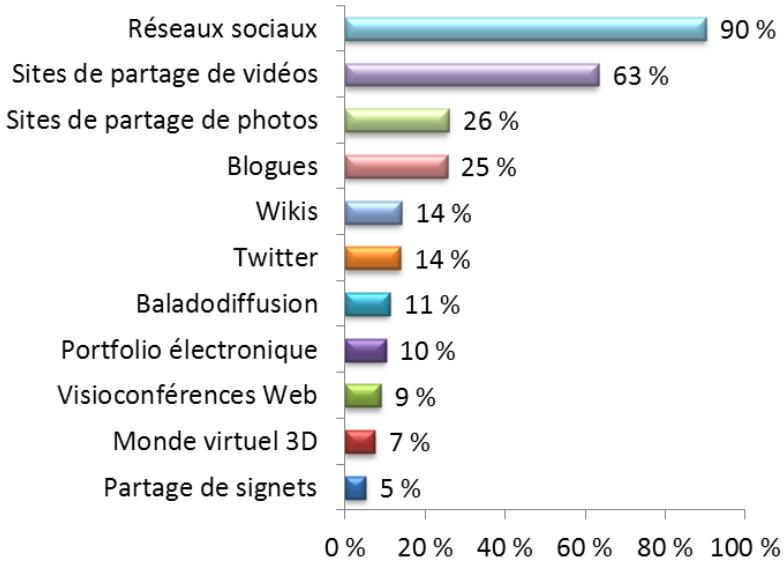

Figure 31. Web 2.0: Intermediate, advanced, or expert

Figure 32 shows the results of the cluster analysis conducted based on the two series of questions in the preceding tables, which enabled SPSS software to automatically place users in three main categories based on responses to the preceding two series of questions. Some 13% of respondents are found in the category of advanced users, 39% in the intermediate user category, and 48% in the beginner category.

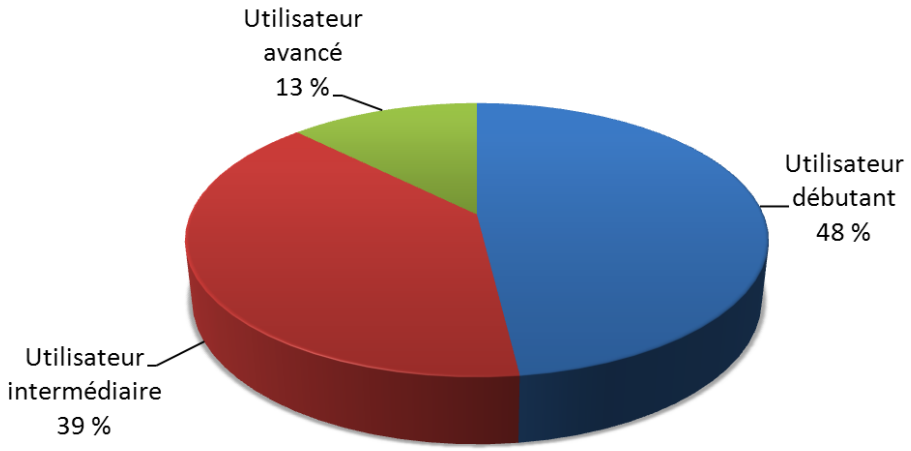

Figure 32. Cluster profile analysis

In fact, students are, in general, proficient in tools they use most frequently, traditionally involving office software: word processing, presentation software, spreadsheets. Students are also heavy users of the Internet and electronic communication. But after all, this is a matter of a relatively limited use of the gamut of available technological tools. A large number of potentially useful applications (such as concept network software, and flags or social bookmarking) are little known by a very large majority of respondents. We know that

the prevailing stereotype of young people of this generation is that of experienced users of technologies; they are digital natives (Prenski, 2001). Yet our data provides a much more nuanced portrait of students in the college network. In fact, according to the results of the cluster analysis we conducted, only 13% of the students match the profile of an experienced user with proficiency in a vast range of technological tools and social media. However, it must be noted that even respondents in the beginner category are users of Facebook, YouTube, text messaging, and electronic communication.

3.6 Information search and information competencies

Figure 33 shows the percentage of students who answered *Often* or *Very often* to the question *How often do you use the following tools to search for information for your schoolwork?*

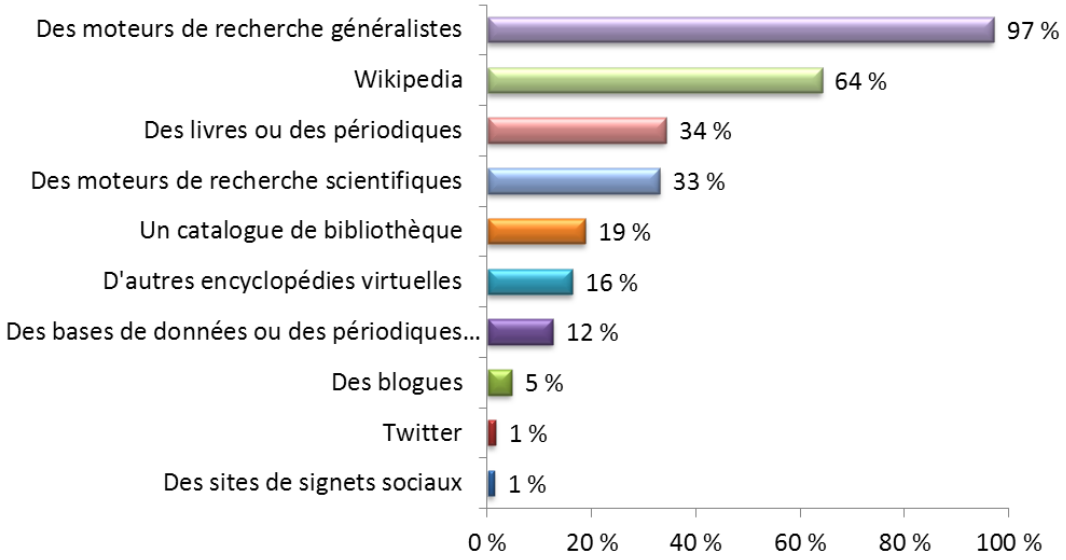

Figure 33. Tools used Often or Very often to search for information

When students are required to conduct information searches, a very large majority of them use general search engines such as Google or Wikipedia. Only a third of them say they use books or periodicals often or very often, and fewer than 1 in 5 use a library catalogue, despite the fact that an introduction to these tools is done quite systematically in the colleges. On the other hand, a third report that they use scientific search engines such as Google Scholar. The search for information is certainly becoming computerized, and students have the tendency to abandon print in favour of digital. At the same time, few students use blogs.

Interview data confirm survey data while providing some nuances. While students are heavy users of Wikipedia, they are aware that they cannot refer directly to what is written there, given that their teachers often prohibit this source. They use it as a departure point to then go to consult sources that are listed in Wikipedia. Some students report having been introduced to some tools such as Google Scholar in their courses or in library information sessions, and they appear to be using them.

Figure 34 shows the proportion of students reporting being at the intermediate, advanced, or expert levels in regard to various tasks connected to information competencies.

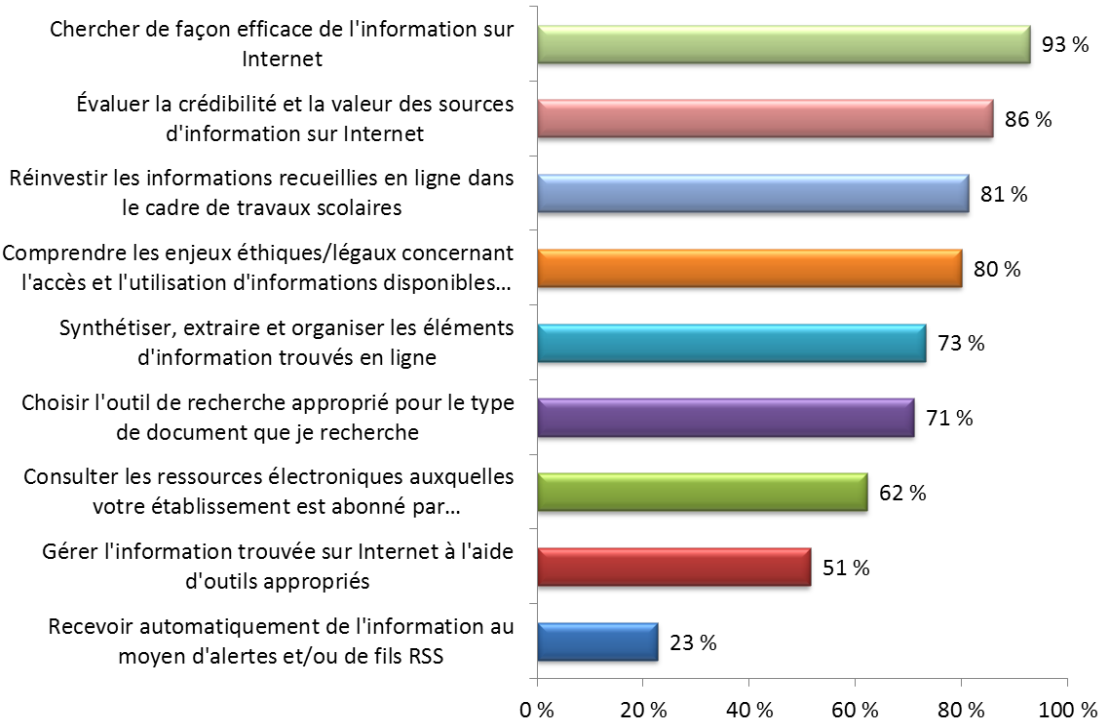

Figure 34. Information competencies: proportion of respondents at the intermediate, advanced, or expert level

A majority of respondents claim to be competent in all aspects of information competencies, except for the use of RSS feeds and automatic information alert tools. Managing information found on the Internet is also the subject of quite conflicting points of view. Overall then, students believe they are proficient in the various aspects of informational competencies. These results are in accordance with the fact that the majority of university students think they do not need training in the area (Loiselle, Basque, Fournier, and Chomienne, 2004). Furthermore, these results are in sharp contrast to the results of other studies that highlight deficiencies in the information competencies of college students who are entering university (Mittermeyer, Quirion, and others, 2003). Given that these results are self-reported rather than based on real performance, it is possible that the students over-evaluate their information competencies. Furthermore, it is not certain that the questionnaires used to evaluate information competency sufficiently measure all aspects of this competency. More qualitative research based on authentic tasks in information search would shed more light on this issue.

3.7 ICTs and teaching

This section deals with the pedagogical uses of ICTs. Students were asked about the use their teachers made of ICTs, their skills in using them, their preferences in regard to the quantity of technologies in their courses, on communication with their teachers, and on other aspects of pedagogical uses. Figure 35 shows the proportion of respondents who, for at least half of their teachers, were in agreement or strongly in agreement with the statement made.

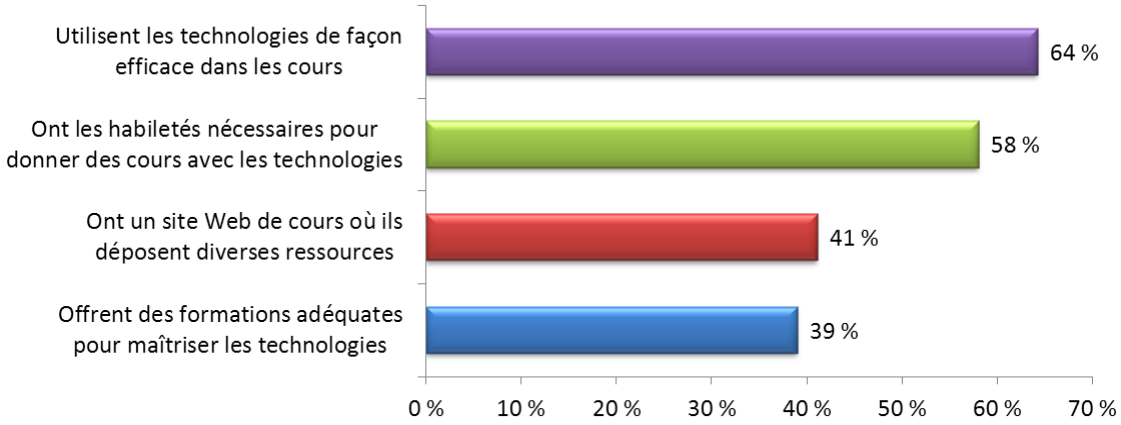

Figure 35. ICT use by teachers

Some two-thirds of the students (64%) believe that at least half of their teachers use technologies effectively in their courses. The majority (58%) also think that more than half of their teachers have the skills needed to deliver courses with technologies, and 41% believe that half of teachers or more have a course Web site where they suggest various resources. It can be presumed that in numerous cases what is involved are digital learning environments such as Moodle or LEA. Finally, 39% of students say that the majority of their teachers provide adequate training for proficiency in these technologies, which suggests that the training of students in the use of ICTs is not systematically integrated into their curriculums.

Figure 36 shows student preferences in regard to the quantity of technologies in their courses.

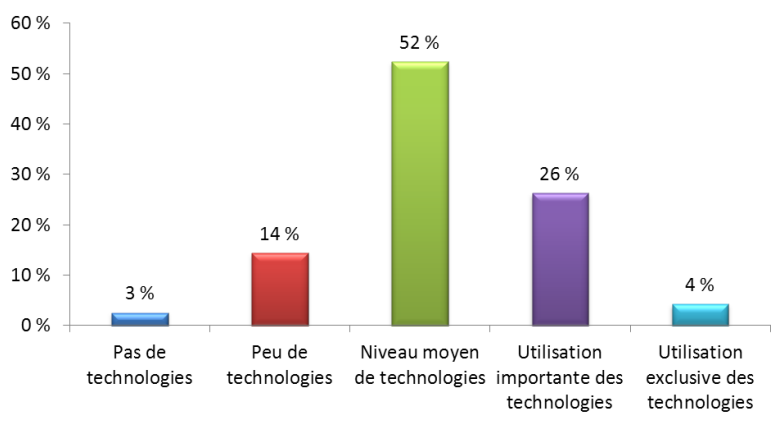

Figure 36. Preferences for courses with or without technologies

A very large majority of students prefer courses integrating at least an average level of technologies. Only 17% of students prefer courses with few or no technologies. These results are quite in agreement with results of the meta-analysis conducted by Schmid and his colleagues (2009), which shows that in the area of ICTs more is not always better and that an average quantity of technologies in courses is optimal in regard to effectiveness.

3.8 Communication with teachers

Figure 37 shows the reasons teachers take the initiative in the use of technologies in communicating with their students.

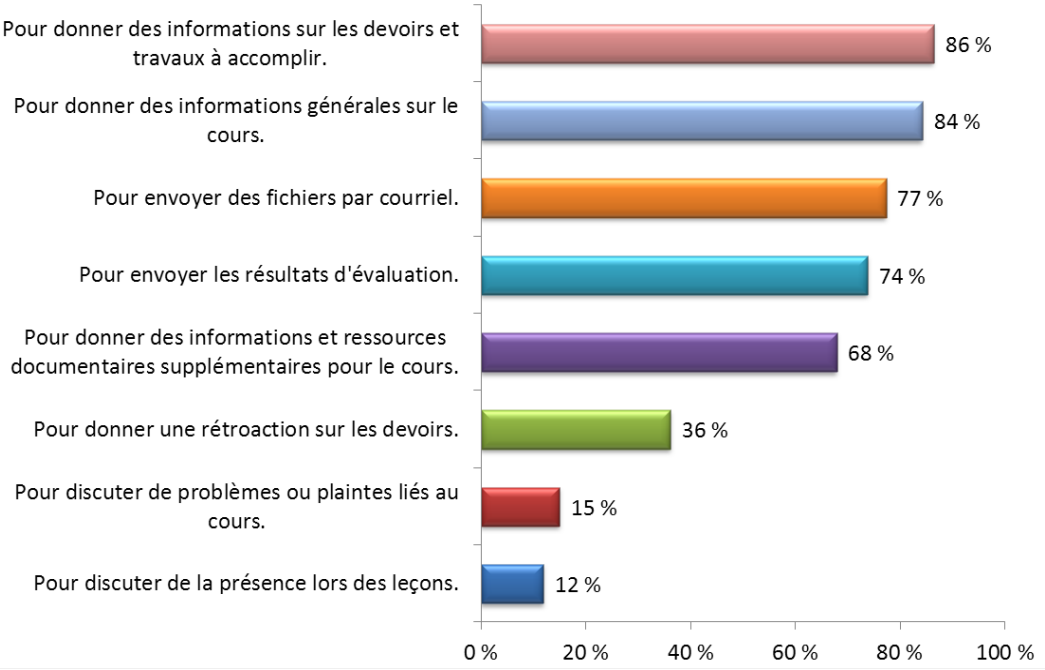

Figure 37. Reasons teachers communicate with their students

The following reasons are those most often given: provide information on homework and assignments, provide general information about courses, send files by email, send evaluation results, provide information and additional resources for the course. Even though the way the question is formulated does not make it possible to truly make a distinction between email and messaging within digital learning environments, the fact can be emphasized that these environments or computerized evaluation systems prove to be more effective than email in that they rely on a mode of communication of the one-to-many type. In addition, group interviews clearly show that institutional messaging is the means that students prefer for communicating with their teachers. Colleges should thus continue to encourage the use of this medium of communication.

Figure 38 shows respondents who reported that they communicate with their teachers at least every two or three weeks by each mode.

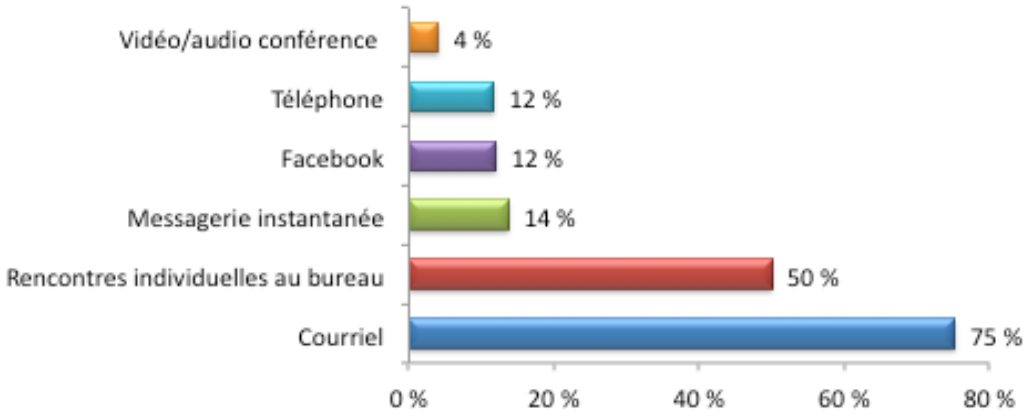

Figure 38. Means of communication frequently used with teachers

We can see that email remains the mode most used by students to communicate routinely with their teachers, followed quite closely by one-on-one meetings in the teacher`s office. We did not include institutional messaging systems in the choice of answers to this question, but in a number of cases (like that of the use of the Moodle or DECclic environment), the message transmitted or a message-sent notification are also transmitted by email. Office meetings are used by half of the respondents.

Figure 39 includes respondents who reported communicating by this means with their teachers once or twice a semester. As for the occasional communication, in this case one-on-one meetings in the teacher`s office come in first place.

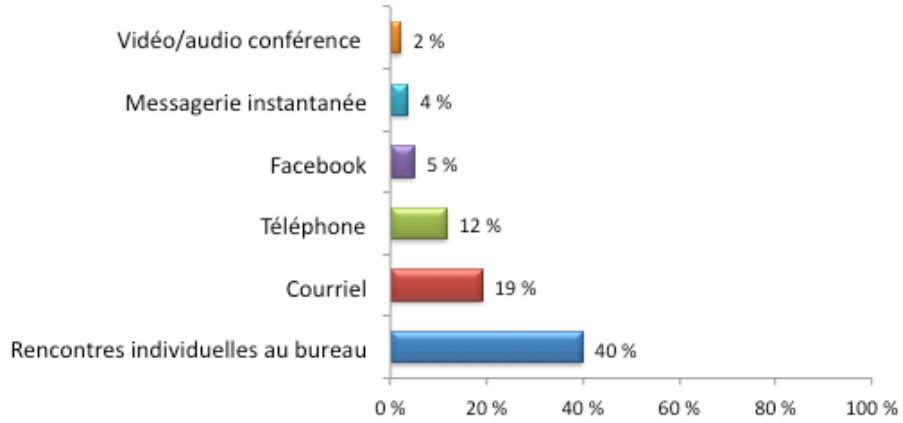

Figure 39. Means of communication with teachers used occasionally

A closer look at Figures 39 and 40 suggests that email and one-on-one meetings are almost equally popular. In total, 84% of students communicate with their teachers by email, and 90% use one-on-one office meetings. Email seems to complement rather than to replace individual meetings with teachers.
Figure 40 compares electronic communication with teachers to face-to-face communication. We asked respondents the following question: *Which of the following statements best describes your communication with teachers?*

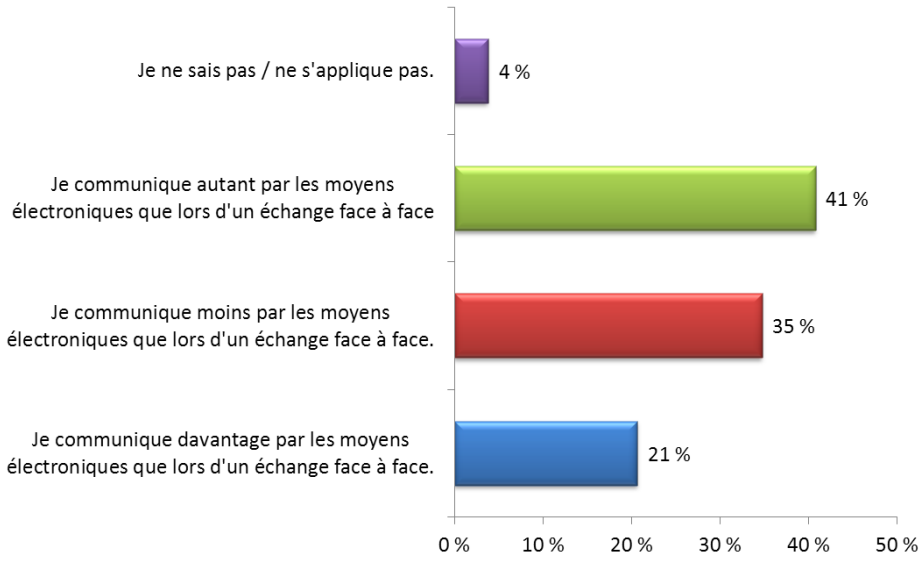

Figure 40. Comparison of means of communication with teachers

Two students out of five (41%) communicate with their teachers equally by electronic means and in person. As for the others, 35% communicate in person more than electronically, a somewhat higher percentage than the remaining 21% who communicate electronically more than in person. Even if electronic communication does not replace in-person discussion, it is nevertheless much used by students. Figure 44 furthermore shows that electronic communication with their teachers has had a positive effect on their relationship with them.

3.9 Impact of ICTs

This final section approaches the question of the impact of ICTs from the student point of view. It first presents student opinion on the fact that ICTs promote learning and then presents the advantages related to ICTs and student perception of the effects of ICTs on the various aspects of learning in academic life.

Figure 41 shows the degree of agreement with the statement *Generally speaking, using technologies helps me learn*.

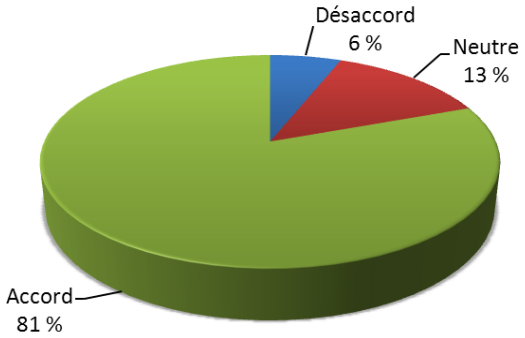

Figure 41. Agreement with the statement that technologies assist learning

A very large majority of students (81%) believe that the use of ICTS promotes their learning. A close look at Figure 42, which shows the main advantages associated with the use of technologies, provides clarification of this positive perception.

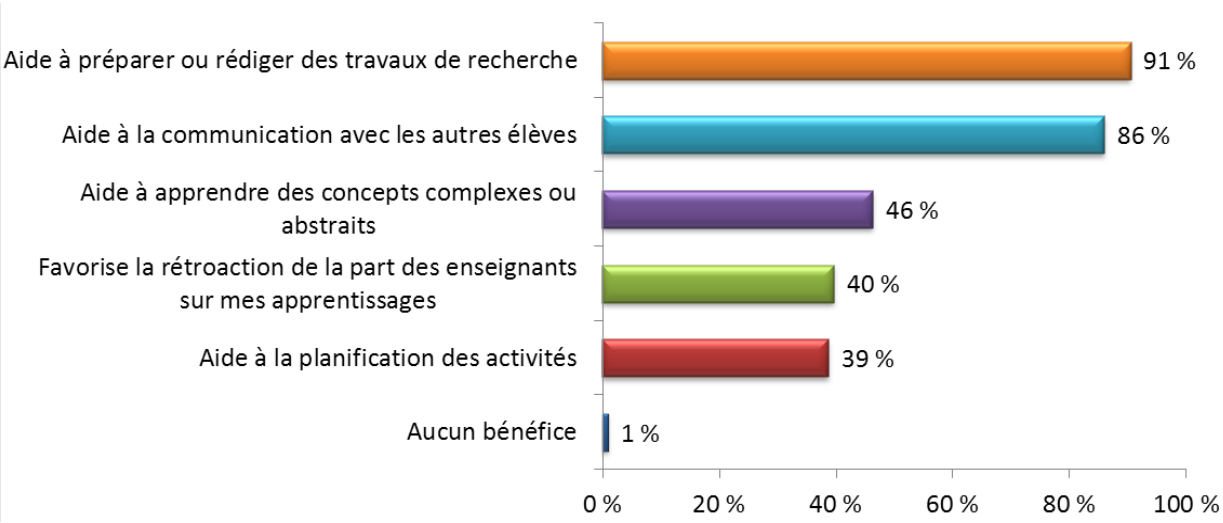

Figure 42. Level of agreement with ICT advantages

In regard to the main advantages related to use of technologies, respondents believe above all that technologies them to prepare or to write research assignments (91%) and to communicate with other students (86%). About half of the students (46%) also consider that technologies help them to learn complex or abstract concepts. It can be imagined that the

use of animation, diagrams, and videos along with the possibility of handling and reviewing technological educational resources explain this result.

Figure 43 presents student opinion in regard to the impact of ICTs on their relationships with other students and with teachers, and in regard to their overall experience as students. Note that the scale used consists of a neutral point of which the percentage can be deduced by examining the two columns Agree and Disagree.

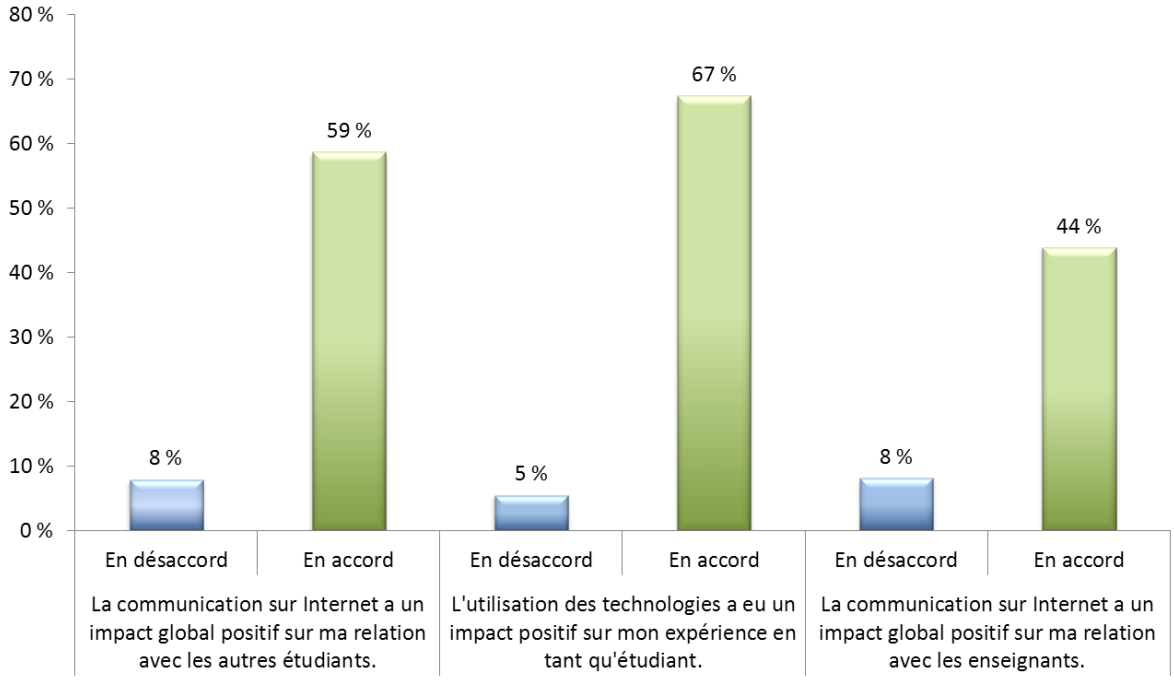

Figure 43. Impact of ICTs on academic life

The number of students who think that ICTs have had a positive impact by far exceeds the number of those in disagreement. Students are most unanimous about their effect on student experience and on peer relationships. While 44% of students are in agreement with the statement that electronic communication has a positive impact on their relationship with teachers, 52% of them remain neutral.

Figure 44 presents student opinion in regard to the effect of ICTs on the academic aspects of their life, effects that one can place in relation to the various dimensions of motivation: commitment, usefulness, significance.

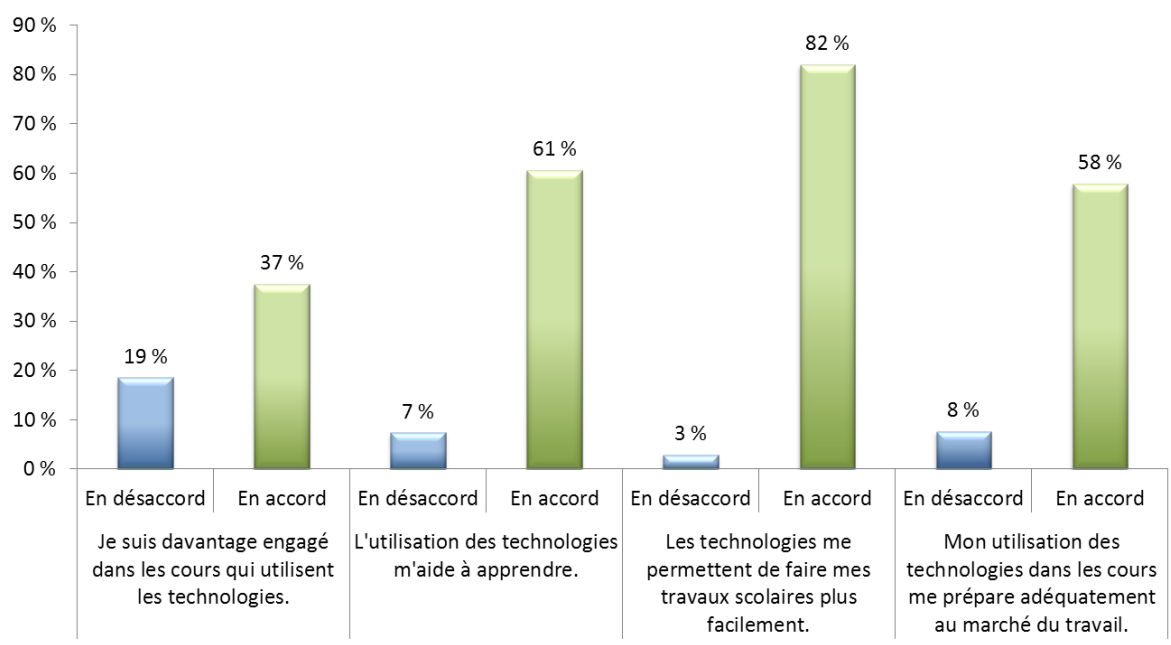

Figure 44. Motivational effect of ICTs

The vast majority of students (82%) believe that ICTs enable them to do their school assignments more easily, and 61% believe that they help them to learn. In other words, ICTs are perceived as being useful in academic life. They are also perceived as important, given that 58% of students believe that the use of ICTs in their courses prepares them adequately for the labour market. Finally, they are less unanimous on the effects of ICTs on their commitment in their courses, but 37% of respondents believe all the same that they are more committed in courses that use ICTs. In regard to this question, it will be interesting to conduct analyses according to sex, given that numerous research findings note a differential effect of ICTs on motivation according to sex.

Poellhuber, B., Karsenti, T., Raynaud, J., Dumouchel, G., Roy, N., Fournier-St-Laurent, S. et Géraudie, N. (2012). Les habitudes *technologiques au cégep : résultats d'une enquête effectuée auprès de 30 724 étudiants.*

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Discussion and conclusions

Development of the informational and technological competencies of postsecondary students has become a necessity, both for university studies and for the labour market. Some 45 years after the creation of the Cegeps, we have the results of an all-Quebec inquiry on student ICT use. It would be interesting to conduct such a survey on a regular basis, as is habitual among our neighbours to the south. This inquiry shows first of all the effectiveness of on-line surveys, notably for a better understanding of the use and effects of technologies among a large number of students attending college network institutions.

While the effectiveness of ICT use has been a topic of debate for several years, from the point of view of students it is clear that ICTs promote their learning by improving their student experience in that they facilitate their research assignments and enable positive experiences in their relationships with other students.

These results are encouraging in that they show student recognition of the pedagogical potential of ICTs and even that a number of teachers use these effectively. Currently, we do not have any point of comparison that would enable us to measure the road travelled, but we nevertheless see that the situation has improved over the past years.

There are a number of challenges posed by the integration of ICTs into teaching, and various actions have already been undertaken: the Centre collégial de développement de matériel didactique (CCDMD) has for years now been producing quality computerized teaching materials designed for students; the Cégep@distance develops distance education courses; Vitrine Technologie-Éducation provides an established technology for the whole of the college network; the Profweb team maintains a Web site that offers various resources for college ICT integration. Yet one of the notable actions is the creation in 2002 of an ICT network of respondents. These exercise a techno-pedagogical consultative function in their colleges for teachers: teacher ICT awareness, techno-pedagogical teacher training, project guidance, etc. These actions appear to be fruitful in terms of student appreciation of teacher ICT use as well as their view of the effects of ICTs on their learning.

However, it must be said that there is still some distance to travel and some challenges to be met, these varying from one institution to the next. Actions undertaken and the importance given to ICT respondents and to ICTs are quite variable as well, some institutions having accomplished a lot in this area and others relatively little. **It is up to each institution to review their own survey results so as to identify the decisions that should be made to enable their students to benefit from the pedagogical potential of ICTs.**[1]

[1]Institution management and ICT respondents can obtain a copy of the report by contacting the head researcher.

Overall, students seem to believe that most of their teachers make effective use of ICTs and that they are well prepared to use them, even though teachers provide very little training to their students for this purpose. Nevertheless, it is to be noted that uses can also involve pedagogical challenges. For example, it is a fact that 74% of students send text messages during their classes and that some 47% of them report going to Facebook.

As for access to ICTs, these survey results seem above all to show that college students are well equipped at the technological level (86% have a cell phone, 76% a laptop); many students do not bring their laptop to school. The degree of penetration of smartphones and tablets remains marginal but calls for follow-up over the next few years. This quite high rate of penetration of mobile equipment leads to the belief that it would be possible to use these devices to facilitate in-class access to ICTs without having to reserve labs, which are often over-used. This might well be the direction that would promote the pedagogical use of ICTs by teachers. **However, to follow this path would require institutional pedagogical planning as well as a process of consultation and training of teachers as for students.** This also raises questions about whether investments will be made in technological infrastructure materials (Wi-Fi, computer labs, electrical outlets). Furthermore, omnipresent technological equipment already gives rise to classroom management challenges, and while prohibition is the easy response, **some planning in regard to conditions that would make it possible to channel the use of such equipment for learning support would be better than policies aimed at their prohibition.**

On the whole, student use of ICTs continues to show little variety: office software (word processing, presentation software, electronic spreadsheets), Internet surfing and searches, social networking (Facebook), and email. These are also the areas in which students believe themselves to be proficient as well as the areas of their preferred activities. Even though almost all students are regular users of Facebook, most of them are not aware of (and thus do not use) other social media such as blogs, wikis, social bookmarking, etc. Students remain mostly unaware of a large number of tools with significant pedagogical potential (such as software for concept mapping, electronic portfolios, or bookmark sharing), perhaps because teachers are also unaware of them. **Some training for students and teachers would probably enable them to take better advantage of the pedagogical potential of ICTs.**

For college students, social networking takes place on Facebook. They are heavy users not only for their social life but also for their academic life, with their peers, and for the conduct of activities and discussions related to their school work. In general, they prefer that this space remains “teacher-free.” The fact that collaboration among students takes place on Facebook is perhaps positive, considering that efforts are often made in their classes to produce such collaboration. **This however causes some concern about plagiarism. In addition, the fact that, in several cases, course Facebook groups are created without inviting the teacher or informing the teacher of their existence also leads to some questions.**

In connection with the motivational power of ICTs claimed by some of the research literature, it is interesting to note that students like to learn by doing Web searches but also by using ICTs for those of their learning tasks that they control. They consider ICTs to be useful in their academic life and report that the use made of them in their courses is important in terms of the labour market. These perceptions show that **some uses of ICTs are motivating for students, and teachers should be encouraged to take advantage of them.**

Students are abandoning traditional means in their information searches and prefer first and above all electronic means (Google and Wikipedia). They believe themselves to be proficient in almost all aspects of the information competencies. This quite likely leads them to believe that they have little need for training (Loiselle et al., 2004). However, **training offered to students in the matter of information competencies could draw on their preferences for electronic means and focus on the indexes, databases, and resources accessible by these means (Google Scholar, library catalogues, ERIC, Biblio Branchée, PubMed, etc.).**

Students frequently turn to electronic communication, especially institutional messaging, in their relationships with their teachers, but they also have regular meetings with them. Many believe that electronic communication has a positive effect on their relationships with teachers. **The use of institutional messaging for communications between students and teachers should be encouraged.**

3.10 Recommendations

Based on the results of the survey conducted, we make the following nine recommendations:

1. That college teachers who have already begun to use ICTs in their teaching continue in their commitment in this direction and that those who have not yet begun to do so should get on with it.
2. That college network institutions find positive ways of encouraging or continuing to encourage teachers to make effective use of ICTs in the various aspects of their teaching, especially by ensuring the requisite technical and techno-pedagogical support.
3. That college network institutions continue to provide or to implement training and continuing professional development for teachers on the use of current technologies as well as on the challenges and real pedagogical advantages inherent to the use of ICTs, while giving special attention to the resources and applications useful for learning and classroom management.
4. That college network institutions implement compulsory training of students focussed on academic uses of ICTs as well as on ethical and respectful use of ICTs and the social media.
5. That students be encouraged to make better use of technologies, in a variety of ways and for academic purposes, especially in connection with their courses.
6. That college network institutions reconsider their investments involving computer rooms and adapting these and their infrastructures to take into account the current

context in which a large number of students own a laptop but do not bring it to school.

7. That college network institutions think about implementing pedagogical guidelines for the use of social networking sites and of laptops and cell phones in class, by associating teachers and students.
8. That library managers continue to adapt their services and training taking into consideration the habits of students at the level of information searches and the changes in their technological competencies.
9. That college network institutions continue to deploy digital learning environments or institutional messaging systems, while linking them to adequate training for teachers.

3.11 Directions for further research

The qualitative aspect of this inquiry (group interviews) enabled enrichment and better understanding of much of the questionnaire data. This qualitative enrichment could eventually be extended by means of one-on-one interviews with students. Furthermore, given that changes in the technologies is rapid, it would be interesting to repeat this survey regularly in order to obtain longitudinal data as do our American neighbours with their ECAR surveys.

As well, a number of measures of skills or competencies are based on the **perception** that students are already proficient in these skills and competencies. It would be interesting to conduct some studies dealing with the actual performance of college students, and more specifically in the area of information competencies.

Given that recent research on ICT use by college students is of little significance, it would be interesting as well to promote research on the effect of ICTs on student motivation and success as well as on the conditions for positive effects.

Finally, it would be useful to conduct a similar survey with college teachers so as to understand the phenomenon from the point of view of teachers. This would enable knowledge of the uses they make of ICTs, especially in regard to teaching and the perception they have of the benefits and challenges of this use, as well as to obtain a portrait of what it is they do that is more accurate than the one achieved from the point of view of the students. In fact, to expand this inquiry to the various levels of education, notably to the universities, would also be interesting by providing some continuity between college and university.

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