# THE NEW ICT PROFILE FOR COLLEGE STUDENTS: DEVELOPING ESSENTIAL SKILLS

Many teachers can doubtless recall events or student assignments characterized by at least one of the following: lack of perseverance and attention in conducting research; shoddy information processing; plagiarism; lack of professionalism in the presentation of results; loss of files occasioned by data handling; failure to obey the rules for technology use; misuse of social media and communication tools; and so on. We have all witnessed students grappling with such problems, and yet carrying out the related tasks has become essential in the pursuit of an education, ongoing professional development, and even daily life.

In order to meet a need expressed by colleges, universities, and the workplace, the Réseau des répondantes et répondants TIC (IT REP Network)¹ has developed an *ICT Profile for College Students*.² This Profile includes a set of skills: several of these relate to the research, processing, and presentation of information; others are aimed at the effective, responsible use of technologies; and still others that are designed to make the most of collaborative efforts.

This article will first set out to what extent the mastery of informational, methodological, and technological skills has become paramount. It will then present the ICT Profile in detail—a profile that aims at ensuring these essential skills are developed.

# **OLLEGE STUDENTS AND ICT USE**

A 2012 survey of some 30,724 Quebec college students (Poellhuber, Karsenti, *et al.* 2012) bears this out: the great majority of respondents considered themselves competent in, and even expert at, various aspects of computer skills. Upon arriving at college, however, many displayed major shortcomings, whether this involved properly defining a research topic, identifying the relevant key words, evaluating the validity and reliability of sources, or analyzing and synthesizing information—not to mention work methods and conduct related to security, ethics, and intellectual property.

Today, in and presenting information in an increasingly mediatized the face of thousands of yottabytes<sup>3</sup> of data, the multitude of means that exist for searching for, analyzing,

world, and the proliferation of tools for communicating and collaborating, the academic community must provide students with more support in coping with a digital society. We must acknowledge that adapting to constant technological developments has become a skill in itself.

It is therefore vital that students be prepared to take up the numerous challenges their academic and working lives will involve, as well as to become citizens of today and tomorrow in an environment in which technologies are omnipresent and more and more varied. This is being accomplished via specific action, not only in Quebec's college network, but also in the United States and France, for example, where the ministry of advanced education and research (2013) has developed a policy for certifying students' digital skills that attests to the fact that they have been acquired and mastered them.

# THE ICT PROFILE FOR COLLEGE STUDENTS: MEETING A NEED

To meet this need, the IT REP Network has developed the *ICT Profile for College Students* (2014), a framework on which teachers and colleges can rely to help their students maintain the informational, methodological, and technological skills required.<sup>4</sup> Rare is the college curriculum that does not involve information searches, processing, and presentation. The ICT Profile sets out a process allowing these skills to be acquired within a single course or an entire program. It should be noted that the ICT Profile is an exit profile, and, as such, focuses on the gradual development of skills and

- IT REPs are college educational advisors in charge of integrating technology into teaching and learning.
- The authors wish to thank the 40-odd college professionals who have contributed, from near and afar, to this major project since the IT REP Network's "ICT Profile" working group was established in 2005. They would also like to mention the commitment and motivation of the dozens of teachers who have never stopped believing in the relevance of this framework and paved the way for ICT integration into their programs, individual colleges, and the college network as a whole. Thanks, too, to all the ICT partners from that network who have supported the ICT Profile by proposing resources and services related to their respective fields of expertise. The authors would also like to acknowledge, in particular, the contribution of Roger de Ladurantaye, an educational advisor at the CÉGEP de Rivière-du-Loup. Mr. de Ladurantaye was a member of the ICT Profile working group for several years, during which time he penned a number of basic texts on the subject; he agreed to allow us to draw freely from that work for this article. Many thanks!
- <sup>3</sup> A yottabyte (YB) is a unit of memory equal to one septillion (1024) bytes.
- The ICT Profile is based on initiatives taken in Quebec and elsewhere. The main sources of inspiration for the team that established the Profile can be consulted at reptic.qc.ca/?p=6073. [TR: in French only.]



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promotes instructional support until students are capable of using those skills on their own. As it is intended for college-level cohorts, the Profile stresses the importance of planning, making choices, and developing independence, as well as the rigour, professionalism, efficiency, quality, complexity, depth, and ethics students will be expected to demonstrate when using technology.

The initial version of the ICT Profile was published in 2009, and used in some 20 Quebec colleges. A census of local practices made it possible to identify shortcomings and make major revisions, which resulted in the 2014 ICT Profile. This new version is the one discussed below.

#### OVERVIEW OF THE ICT PROFILE

The ICT Profile for College Students is composed of five skills (see insert for a complete description<sup>5</sup>). Skills 1, 2, and 3 complement one another in a process that deals with information research, processing, and presentation. Skills 4 and 5 are transversal—in other words, they may be mobilized at any time during the process, a fact that requires students to work in a network (Skill 4) and use ICTs in an efficient and responsible manner (Skill 5).

Each skill is associated with objectives that involve tasks to be performed, resulting in a three-tiered structure that parallels that of government requirements (see Figure 1):

- Because the skills and objectives are consistent with the competencies and competency elements of college curricula, they can be easily integrated into learning activities.
- Similarly, tasks are the equivalent of performance criteria. (While the latter are observable and measurable, the precise degree to which they must be attained and demonstrated is left to the discretion of faculty and programs.)

Like its 2009 precursor, the 2014 ICT Profile focuses on the mastery of technological skills, which is vital. However, the newer version also involves a process associated with the mastery of skills that are not only informational, but also methodological and cognitive (Perreault, 2014). The new ICT Profile has the following characteristics:

- It is universal, and can therefore be adapted to all curricula and colleges.
- It is intended for all students, including those in a handicap situation (a college population that grew 143% between 2009 and 2012): its logic is consistent with that of universal design for instruction, which aims at enabling as many students as possible to develop academic skills (Fichten, Barile, et al. 2013).
- It enables students to acquire the technological skills that promote high-level abilities, whether informational, methodological, or cognitive.
- It gives both teachers and programs flexibility as concerns the software applications and digital environments to be used in mastering a skill.<sup>6</sup>
- It is independent of technological innovations, and therefore more likely to remain valid.



# THE ICT PROFILE: THE SKILLS OUR STUDENTS NEED TO DEVELOP

Let us now examine the five ICT Profile skills, looking first at a general overview, then a more detailed description.

- The insert can be downloaded in English at [bit.ly/ICTs-profilee-insert] and in French at [bit.ly/encart- profile-tic].
- To assist teachers with their technological choices, this year the IT REP Network will be onlining a Website with links to useful resources, in particular software applications associated with Profile skills.







### SKILL 1 — SEARCH FOR INFORMATION

Skill 1 was designed in cooperation with members of the library-instruction committee of the Regroupement des bibliothèques collégiales du Québec (REBICQ)<sup>7</sup> and a member of the Diapason project.<sup>8</sup>

#### OVERVIEW

Searching for information is a frequent and essential activity in all college programs. Whether in art, to critique a certain work; in the humanities, to analyze the impact of a change of government on a given province; or in industrial electronics, to establish a site plan for a factory, the choices of research tools depends on the curriculum in question. In other words, while program as requirements differ, the process remains the same.

Skill 1 involves four objectives, which form part of a typically linear approach. Throughout the entire research process, however, it is often necessary to go back, make different choices, and even perform certain steps again.

# DESCRIPTION

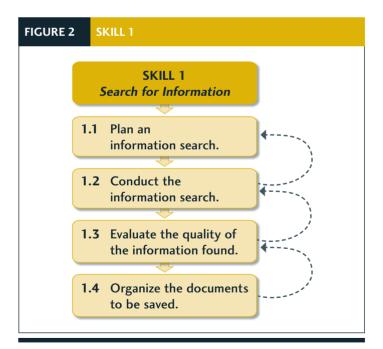
The first step associated with Skill 1 consists in planning the information search (Objective 1.1): students must specify the work that is to be completed in order to better understand and detail, among all its facets, those that will influence their choices and actions. They must be familiar with and use the college's resources, notably those offered by the library, and make the right decisions. They must then properly define their research topic by answering the usual questions (Who? What? When? Where? How? Why?), by exploring the theme and narrowing down the research topic as much as possible. Next, they must select the types of documents (books, newspapers, periodicals, encyclopedias, etc.) and tools (catalogues, search engines, databases, etc.) to be used. To better reflect the realities of academic and working life, this skill also needs to involve an information-watch aspect. The latter is distinguished by its temporal nature: rather than being used on an-ad hoc basis, it is deployed continuously and constantly updated, in a particular field.

Next, students actually conduct their information search (Objective 1.2), applying the appropriate strategies (e.g., the careful choice of keywords or advanced searches, depending on the field of study and tools selected). They continuously adjust their strategies in accordance with the relevance and number of results found. In the "infobulimic" universe that surrounds us, sources of information abound, but are not all

necessarily credible. It is imperative that students be taught to evaluate the quality of the information found (Objective 1.3)—i.e., to recognize, in accordance with specific criteria, what is relevant and valid. The validity criteria selected for the Profile are identical to those found on the Diapason Website, which has been designed for postsecondary students and provides learning resources in the field of information searches.

...the academic community must provide students with more support in coping with a digital society.

While the citation of sources and preparation of mediagraphies is done at the information-presentation stage (Skill 3), in order to prepare for this task, students must keep track of their search results throughout the process, by effectively organizing the documents to be saved (Objective 1.4), i.e., the mediagraphic references and referenced documents, so as to always have them on hand. To that end, they might, for example, give files significant names and classify them logically into folders, or even use a mediagraphic-management tool such as Zotero.<sup>9</sup>



- For more information on this group, go to [rebicq.ca/]. [TR: in French only.]
- For more information on this group, go to [mondiapason.ca/accueil]. [TR: in French only.]
- For more information on Zotero, go to [zotero.org/]







### SKILL 2 — PROCESS INFORMATION

#### **OVERVIEW**

Once the information search has been completed, students must process the data found—i.e., they must identify what is relevant, analyze it in depth, and visually represent the pertinent ideas and concepts. It is extremely important that students know how to compare, characterize, describe, classify, identify, explain, and relate the data elements that allow them to systematically examine a subject, master content, and support an intellectually rigorous process.

At the college level, students need to be introduced to intellectual rigour. Accordingly, we strongly urge teachers to consider information processing as pivotal to the problem-solving process, and to assist their students in this regard.

#### DESCRIPTION

Skill 2 involves three objectives that are actually complementary but distinct means of processing information. Typically, these objectives are reached linearly during a given research activity, but teachers may ask students to attain just one, without the two others necessarily being brought into play.

The first objective consists in identifying the pertinent elements of information (Objective 2.1), and is based on the principles of active reading. At this stage, students note down and annotate the digital documents they have saved, as they did with hard-copy documents, underlining the main ideas, highlighting concepts, circling important portions of the text, and making a few notes in the margins. They may also record different types of information (data, facts, observations, concepts, and reflections). While this objective forms part of information processing, it may also help them take notes during lectures, participate in an observation activity, or listen to recordings, or, in a workplace context, follow up on a patient's file or statistical data.

The next objective (2.2) consists in analyzing information, and is the most open and flexible aspect of all the skills in the ICT Profile. Why? Although the latter is intended to apply to all curricula, it proved difficult, if not impossible, to propose a method of analysis that was suitable to each: every program has its own such methods (literary, quantitative, conceptual, etc.), and it falls to teachers to determine the methods and tools best able to analyze information in their particular field. Objective 2.2 therefore encourages teachers to work together, as it can inform the thinking and decision making of course-team members regarding the choice of specialized

data-processing tools for their area of expertise (for instance, complex calculations with Maple, literary analysis with a word processor, statistical analysis with a spreadsheet program, and so on).

Many teachers deplore the fact that students copy information they have found and paste it into their work in its entirety, as well as the fact that they have difficulty assimilating the subject matter and understanding complex or abstract concepts. Objective 2.3 involves a process that lets students visually represent information and show they understand it, whether such information is that analyzed in the previous step or the concepts currently being studied. Successfully achieving this objective helps break the "copy-and-paste" habit and is an excellent means of avoiding plagiarism (Perreault 2014).

When information is visually represented, the process involved is the same for all fields, from the plastic arts through the natural sciences to social work (Perreault 2014). As the type of information to be depicted often differs from one program to the next, however, it is up to each teacher to choose the kind of vehicle to be used (table, graph, diagram, timeline, etc.), as well as the appropriate software application (word processing, electronic spreadsheet, or concept map (see Figure 3)). Concept maps, for example, constitute relevant, effective ways of processing information where relationships are to be highlighted. Teachers might also want to suggest the use of tables for classifying data and inter-relating data elements. Word-processing and spreadsheet programs can be used to produce complex tables, thereby promoting the management of diverse types of data.

# SKILL 3 — PRESENT INFORMATION

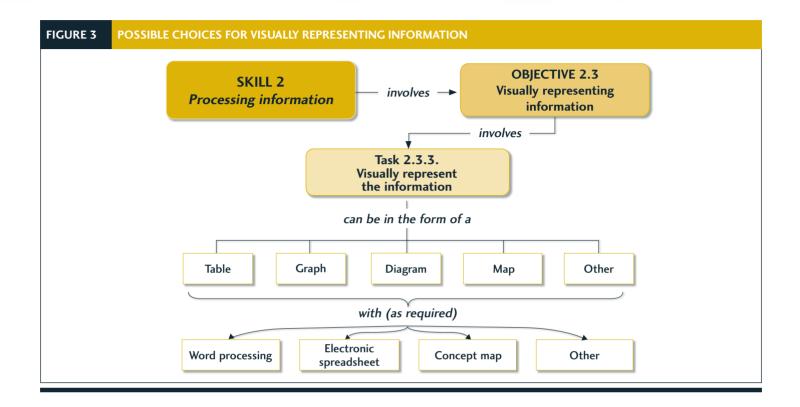
#### OVERWIEW

After searching for and processing information, students complete their assignments, many of which involve an activity requiring them to present information, discuss their research results, detail how their project was conducted, and describe the outcome of their work (using various, pertinent, and stimulating tools). The ICT Profile suggests generic concepts and tasks that can be used with any type of presentation. In other words, the Profile does not prescribe the use of any particular method or tool; rather, it promotes a rigorous process by which information can be presented in the forms deemed essential and suitable for each field of study. Because it also advocates variety, effectiveness, professionalism, and best practices, Skill 3 of the Profile involves four steps.









### DESCRIPTION

The first step consists in planning the information to be presented (Objective 3.1), by selecting the appropriate type of presentation and tool in accordance with specific criteria, then anticipating the logistical and technical aspects involved, so as not to leave anything to chance. We cannot insist too much on the importance of proper planning, as it avoids the need for improvisation and properly structures the final product (not to mention the time saved when transitioning from planning to execution!).

Step two, which lies at the heart of the process, consists in completing the project (Objective 3.2). From the outset, it is vital that students be familiar with and implement the best practices specific to the type of presentation chosen, as everything that follows depends on this. This is when students draft their content, when they produce or adapt the audio and visual components and integrate them into their final product.

There are several methods for presenting information in an increasingly mediatized world; Figure 4 shows just a few (word processors, slide shows (computer-aided publishing), videos, blogs (Web publishing), and so on. It is desirable, for both teachers and learners, to promote diversity by leaving the choice open; this way, students in a handicap situation can select those that suit them best while also following the suggested procedure.

Too often neglected, the topic of intellectual property should be given special attention. Accordingly, Objective 3.2 also requires students to cite their sources correctly and respect the origin of the documentation used, so as to avoid any hint of plagiarism. Mittermeyer *et al.* (2003) say that, although a good number of students plagiarize, it is simply because they are not familiar with the norms governing citation. It is therefore important that they be taught to implement them consistently and rigorously. Objective 3.2 also sets forth a step for improving language by using digital writing tools such as dictionaries, text-correction software, and other specialized programs.

The third step consists in **improving the look of the final product** (Objective 3.3). To do so, students may, *inter alia*, use models and styles, applying and adapting them, or even creating new ones. In so doing, they must make sure to follow the ergonomic rules that improve legibility and identify content (formatting, layout, navigation, and structure) and make their project more dynamic (animation, display settings).







Once the project has been planned, completed, and enhanced, students can **share information** (Objective 3.4). In this step, they must ensure that the final product is accessible and in an appropriate format using the proper methods (print features, file conversion, access rights, onlining, etc.), then save and archive it (back-up copy or, where applicable, in a portfolio).

tools, and social media. As is true for the preceding skills, the choice of these methods is also left to the discretion of each program. Moreover, most Quebec colleges put at the disposal of faculty and students both synchronous and asynchronous means of electronic communication. A number of tools are also available online free of charge.

#### SKILL 4 — WORKING IN A NETWORK

#### OVERVIEW

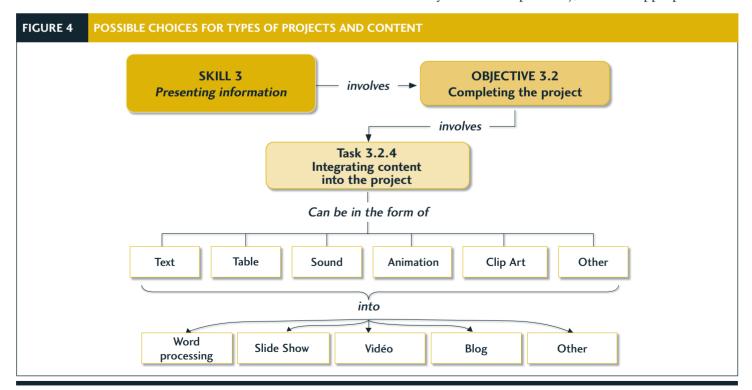
In education, as in the workplace, the use of remote communication and telecollaboration tools is growing exponentially. To be open to the world and fully functional in the digital age, as members of a productive society in which time and place constraints are disappearing, college students should be able to develop effective communication skills and collaboration abilities that enable them to work in teams. This is the goal of Skill 4 (working in a network).

A panoply of traditional and emerging methods currently exists for networking: electronic messaging, Internet forums, chat rooms, video conferencing, online document filing, learning platforms, and Web 2.0 tools such as blogs, content-sharing

#### DESCRIPTION

Working in a network involves three distinct but complementary objectives. The first, remote communications (Objective 4.1), requires students to contact someone to make an announcement, provide information, convey a message, and so on. Students are also asked to share content (Objective 4.2) by pooling information with others. When collaborating (Objective 4.3), they work with classmates on a project involving common objectives or joint efforts.

The three objectives associated with Skill 4 follow a similar trajectory: whether students are communicating, sharing, or collaborating, the objectives and context must first be defined in order to properly understand the task involved (Synchronous or asynchronous communication? With whom and why? Public or private?), and the appropriate tool



<sup>&</sup>quot;Synchronous" means "in real time, at the same time," while "asynchronous" refers to an activity that occurs in delayed time, or at different times.







selected and prepared accordingly. The relevant logistical, technical, and organizational aspects (equipment required, connections, schedule, parameters, and rights) must also be taken into account, in order to ensure success. Furthermore, students must be able to properly use the functionalities of communication, sharing, and collaboration tools to reach their objectives; accordingly, they are expected to implement best practices (netiquette, standards, clarity, and relevance). Certain specific tasks also stem from Skill 4 objectives, such as the monitoring of communications (for Objective 4.1) and saving of collaboration results (for Objective 4.3).

As is true for Skill 2, the three objectives for Skill 4 are distinct but complementary: they may be introduced individually during targeted learning activities or integrated in their entirety within the scope of a given assignment, in support of skills 1, 2, and 3 of the ICT Profile.

Now, more than ever before, it is paramount that our students be aware of their individual and collective digital responsibilities, as well as the risks associated with the use of technology.

# SKILL 5 — USING ICTS IN AN EFFICIENT AND RESPONSIBLE MANNER

#### OVERVIEW

Skill 5 involves four independent objectives with two targets: effectiveness and accountability. They are often closely linked with the other ICT Profile skills, and frequently mobilized in a variety of contexts. Skill 5 offers students a "tool kit" that will help them effectively use ICTs throughout their college experience; it also promotes conduct befitting aware, informed, and responsible citizens.

Some objectives can be easily integrated into courses aimed at "analyzing the workplace", such as those found in technical programs. It should also be noted that, as some aspects are institutional in nature, this skill should ideally be developed in conjunction with various college services.

#### DESCRIPTION

It is important that students master their work environment (Objective 5.1): as soon as they enter college, a minimum level of "expertise" in using technology will be needed if they are to get off to a good start and reach their program goals

(the minimum threshold being determined by the college or curriculum in question). Various measures (e.g., tutorials, technical-assistance offices, and upgrading) can be offered to those students who have not reached that threshold to assist them in their endeavours. Students must also be able to effectively use their college's technological environment as quickly as possible; from the beginning of the first term, they will have to master the information that will make them truly functional (network access, printing, software, disk space, services offered, etc.). Additionally, they will have to develop the ability to properly manage their electronic files (saving and classifying them, understanding their characteristics, etc.). Lastly, they must adopt healthy work habits—for example, with respect to ergonomics (body position in relation to equipment) and the impact of technology on their stress levels.

Objective 5.2 (learning on a self-sustaining basis) may perhaps seem simple and trivial, but it is particularly important at the college level. Independent learning is paramount, and is required by the ICT Profile by the time students graduate: they must be able to organize their time and work, learn new applications, and exploit online resources as part of a process of continuing education and professional development.

More than ever, our students must become aware of their individual and collective digital responsibilities, as well as the risks associated with the use of technology. Objectives 5.3 (ensuring the security of digital information) and 5.4 (acting in an ethical and civil manner) meet this obligation. Is my Facebook properly configured to protect my privacy and professional integrity? Am I responsible when I publish photos online? Do I have a good system for managing my accounts and passwords? Am I aware of the traces I leave on the Web, and of the impact of my actions? Is my attitude in the virtual world appropriate? Do I respect others' work? Do I tend to plagiarize? These are the types of questions that all students should ask themselves. By protecting their identity (personal information, access codes, etc.) and securing their digital content (back-up copies, access rights, and so on), they will become aware of the importance of data security. They must also learn to act in an ethical and civil manner, complying with intellectual-property laws and conditions governing information use (types of licences, broadcasting rights, and a knowledge of the concepts of plagiarism and pirating). It is also up to students to maintain their own reputation, as well as that of others—to be aware of the traces they leave, be respectful with their messages, and obey the rules governing technology use in their environment, whether at college or on an internship.







#### CONCLUSION

The development of informational, methodological, cognitive, and technological skills is essential to the students, employees, and citizens of today and tomorrow. Because we cannot assume that students will acquire these skills themselves, it would seem necessary that they be taught. Accordingly, for the past several years, the college network has mobilized to offer teachers, students, and educational advisors a framework (the ICT Profile), as well as the support, resources, and tools required to assist them in this major endeavour.

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Nicole PERREAULT began her college career as a psychology instructor at the Collège André-Grasset. She then acted as director for the Association pour les applications pédagogiques de l'ordinateur au postsecondaire (APOP) and the Bulletin collégial des technologies de l'information et des communications (CLIC newsletter) before becoming an ICT educational advisor at the Collège Édouard Montpetit. Since 2005, Nicole has headed up the IT REP Network (Fédération des cégeps), an association for all ICT educational advisors from the college community. She has written a number of articles and given several workshops on the educational use of ICTs, and is particularly interested in the effect these technologies have on academic success.

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Another article on the ICT Profile, to be published in the next issue of *Pédagogie collégiale*, will propose a method for integrating ICT skills into courses and curricula, mention various considerations that must be taken into account, and identify a number of related resources.

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