Information Literacy: Study of Incoming First-Year Undergraduates in Quebec

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SUMMARY

THE OBJECTIVE OF THIS STUDY IS TO COMPILE DATA ON THE INFORMATION RESEARCH SKILLS OF UNDERGRADUATE STUDENTS ENTERING QUEBEC UNIVERSITIES TO:

- Determine students' information literacy skills in order to provide more appropriate services;
- Provide university libraries with reliable data to support recommendations for the integration of information literacy into the university curriculum.

The literature review traces the evolution of the concept of information literacy within university education and summarizes several studies similar to this one.

What are the essential skills for successful information searching?

The present study discusses the components of the information research process. The standards published by the Association of College and Research Libraries (ACRL) were used to identify 5 themes on which the 20 questions in the survey are based.

Themes	Multiple-Choice Questionnaire
Concept Identification	3 questions on significant words
Search Strategy	5 questions on the selection of keywords, the Boolean operators "AND" and "OR", search indexes, and controlled vocabulary
Document Types	3 questions on document types
Search Tools	5 questions on library catalogues, databases, search engines and metasearch engines
Use of Results	4 questions on reading a bibliographic reference/citation, bibliographies, evaluating the information found on the Internet and the ethical use of information

A high response rate: 5,281 questionnaires were distributed and 3,003 were returned and analyzed for a response rate of 56.9%. Given the sample size, such a high response rate increases confidence in the representativity of the results. The survey was conducted in collaboration with Dr. Diane Mittermeyer, professor at the McGill University Graduate School of Library and Information Studies (GSLIS).

RESULTS UNDER 36% FOR 11 OF THE 20 QUESTIONS

RESULTS BY THEME

Themes	Results for each question	Problems identified
Concept Identification	Q. 6 **(34.5%)** Q. 10 (64.5%) Q. 15 (63.0%)	Difficulties eliminating non-significant words
Search Strategy	Q. 4 (86.2%) Q. 11 **(27.7%)** Q. 13 **(29.5%)** Q. 14 **(12.7%)** Q. 18 (61.3%)	Incorrect use of the "OR" operator and the search indexes within the catalogue Lack of knowledge of the tool used to identify controlled vocabulary in a database
Documents Types	Q. 5 (50.4%) Q. 17 (74.7%) Q. 22 **(14.9%)**	Inability to define the characteristics of scholarly journals
Search Tools	Q. 3 **(28.5%)** Q. 8 (91.9%) Q. 9 **(19.7%)** Q. 16 (52.7%) Q. 19 **(25.6%)**	Failure to distinguish between library catalogues and bibliographic databases
Use of Results	Q. 7 **(35.8%)** Q. 12 (78.2%) Q. 20 **(23.0%)** Q. 21 **(27.6%)**	Difficulty identifying the citation to a journal article, recognizing when to cite a source and evaluating information found on the Internet

RESULTS BY PERCENTAGE OF CORRECT ANSWERS

Question	Variable	Percentage of Correct Answers
14	Controlled vocabulary	12.7%
22	Scholarly journals	14.9%
9	Library catalogues	19.7%
20	Evaluation of information (Internet)	23.0%
19	Library catalogues	25.6%
21	Ethical use of information	27.6%
11	Boolean operator "OR"	27.7%
3	Databases	28.5%
13	Search indexes	29.5%
6	Significant words	34.5%
7	Reading citations	35.8%
5	Encyclopedias	50.4%
16	Metasearch engines	52.7%
18	Boolean operator "AND"	61.3%
15	Significant words	63.0%
10	Significant words	64.5%
17	Periodicals	74.7%
12	Bibliographies	78.2%
4	Translation into keywords	86.2%
8	Search engines	91.9%

COMMENTS RECEIVED: 25% OF THE RESPONDENTS SUBMITTED COMMENTS

The comments reveal that the Internet is widely used as a source of information. A number of students recognized the difficulties inherent in library research and expressed an interest in attending instruction sessions.

> "*Sorry, but I don't know much about library research. When I begin a search, I type some words in an Internet search engine or at the library and do the best I can with whatever I get. It's a hit-and-miss operation.*"

CONCLUSION

As discussed in the *Literature Review*, it is now widely recognized that information literacy skills play an important role in academic achievement and lifelong learning. Consequently, it is argued that a deficiency in information literacy skills has a negative impact on academic achievement, as well as personal and professional development.
In terms of academic achievement, some of the most important factors influencing the quality of coursework are:

- Difficulty in retrieving relevant information: either few or no documents, or too many documents are retrieved. Students' ability to retrieve information is hampered by their inability to identify concepts and to read citations, a lack of knowledge of the structure and contents of library catalogues and of controlled vocabulary, and deficient search strategies.
- Inefficient use of time: students experiment using different search strategies without success. This "trial and error" approach is time-consuming and leaves the student less time to read, to integrate new information into his or her knowledge base, and to complete assignments.
- Risk of plagiarism due to a lack of knowledge of the principles of the ethical use of information and particularly the use of citations.

Do students entering university have the necessary skills to find, use and evaluate information? Despite the limited number of variables in this study, the results indicate that a significant number of students have limited knowledge, or no knowledge, of basic elements characterizing the information research process.

RECOMMENDATIONS

That the CREPUQ Subcommittee on Libraries submit to the Committee on Academic Affairs the results and recommendations of "Information Literacy: Study of Incoming First-Year Undergraduates in Quebec", so that they might implement the integration of information literacy competencies into the curriculum and affirm the role of university libraries in their development and promotion, as evidenced in the colloquium *La bibliothèque dans l'université: une relation en mutation*, held at the Université de Montréal on October 24-25, 2002.

That the Subcommittee on Libraries encourage the directors of Quebec university libraries to submit the report to the relevant administrators in their respective institutions.

That the Subcommittee on Libraries support the efforts undertaken by the directors of Quebec university libraries to promote close collaboration between the teaching units and information literacy specialists by encouraging them to explore means to implement the following:

- regular evaluation of the information literacy of first-year undergraduate students upon entrance to university;
- participation of a library representative in the various program committees;
- successful completion of a test to measure information literacy competencies during students' first year of studies;
- incorporation of information literacy instruction into academic programs at the undergraduate and graduate levels.

That the Subcommittee on Libraries encourage the directors of Quebec university libraries to promote the adoption of a policy on the integration of information literacy instruction within their institutions.

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INTRODUCTION

University librarians have been involved in library instruction for many years. The creation in January 1991 of the Working Group on Library Instruction by the Subcommittee on Libraries of the Conference of Rectors and Principals of Quebec (CREPUQ) is tangible proof of their interest for the topic. The mandate of the Working Group is to:

- develop common library instruction tools;
- create a forum for sharing information, experiences and expertise;
- collaborate on projects dealing with the use of information technologies;
- reflect on best practices for the development of information literacy competencies in university education.

In 1994, Luc Foucault and Lucie Verreault, in conjunction with the Working Group, compiled the *Guide d'élaboration d'un programme de formation documentaire*. As stated by the authors, the purpose of the guide was to identify the steps required to plan and implement a library instruction program. (Foucault and Verreault, 1994, 3)

The Working Group also surveyed library instruction activities at Quebec universities on a number of occasions. The results show an increase in the number of instruction activities but also indicate that these activities do not reach all students, and instruction on the use of information is generally not included in the curriculum. Librarians have the impression that students do not know or are not very familiar with the information research process, making it difficult for them to complete their assignments.

ORIGIN OF THE PROJECT

This study was inspired by a seminar given by Professor Diane Mittermeyer of the McGill University Graduate School of Library and Information Studies, "The Survey: A Method for Assessing Client Needs". Organized for instruction librarians by the Working Group, the seminar was held in the fall of 2000.

During the seminar, the participants expressed a desire to assess the library skills of undergraduate students entering university. Would it be possible to conduct such a study so that students' library instruction needs could be identified?

In May 2001, Diane Mittermeyer was invited to join the Working Group on Library Instruction to explore the possibility of conducting a province-wide study. A preliminary project was submitted to the Library Directors of the Subcommittee and was well received.

A detailed project plan was then submitted. The Directors supported it and invited all Quebec university library directors to participate.

The objectives of this study are hereby stated:

- Compile data on the information research skills of undergraduate students entering Quebec universities to:
  - determine students' information literacy skills in order to provide more appropriate services;
  - provide university libraries with reliable data to support recommendations for the integration of information literacy into the university curriculum.

A number of meetings were required to discuss the steps necessary for the realization of the project. These included:

- the selection of the methodology: survey, case study, etc.;
- the selection of a tool for data collection: questionnaire to be completed on-site, questionnaire sent by mail or email, interviews, etc.;
- the selection of a sample;
- the development of the questionnaire;
- the administration of a pre-test, application for the necessary certificates of ethics, etc.

The Working Group then proceeded to administer the questionnaire, enter the data, produce and analyse the results for each question.

This study was conducted by a team composed of a researcher, librarians who specialize in instruction, library directors, the registrar's offices of all Quebec universities and CREPUQ staff. It would not have been possible without their collaborative efforts. The study does not claim to evaluate all research skills, nor was it its purpose. It seeks to evaluate whether first-year incoming undergraduates in Quebec have the basic skills necessary to conduct information research and complete their coursework with ease.

The following literature review bears witness to librarians' interest in the topic.

1. LITERATURE REVIEW

This literature review provides an overview of the concept of information literacy in relation to university education and the role of librarians in information literacy instruction.

1.1 LIBRARY INSTRUCTION: CHANGING DEFINITIONS AND TERMINOLOGY

In the North American literature on library instruction, the term "bibliographic instruction" seems to have been replaced by "information literacy". This term, credited in 1974 to Paul Zurkowski, President of the Information Industry Association (Behrens, 1994, 309; Neely, 2002, 1), appears to have entered the vocabulary of library instruction in 1989 with the American Library Association (ALA) publication of the *Final Report* of the Presidential Committee on Information Literacy. The report provides the following definition: "To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information." (ALA, 1989)

According to Paulette Bernhard, "culture de l'information", "culture informationnelle" and "usage de l'information" are the most widespread French synonyms for "information literacy". In an article on the "mastery" of information in a knowledge-based society, Paulette Bernhard defines "information literacy" as the ability to recognize a need for information, find relevant information, evaluate it and use it. (Bernhard, 1998)

The Association of College and Research Libraries (ACRL) adopted the definition of the ALA Presidential Committee on Information Literacy when it published the *Information Literacy Competency Standards for Higher Education: Standards, Performance Indicators, and Outcomes*. (ACRL, 2000)

In a 1998 article, Guy Teasdale and Claude Bonnelly discuss the impact of the Web on information research and its impact on library instruction at Université Laval. The authors posit that, during the course of their studies, university students must become proficient in the skills that will enable them to function effectively in an information society. They note that what Americans refer to as "becoming information literate" has been expressed in French as acquiring an "information culture". (Teasdale and Bonnelly, 1998)

In 1999, two French scholarly journals, *Bulletin des bibliothèques de France* and *Documentation et bibliothèques*, each devoted a special issue to information literacy.

A glance at the special issue entitled "Formation des usagers" ("User Training") of the *Bulletin des bibliothèques de France* shows significant

similarities between the European and American interpretation of the concept of information literacy. The parallel between bibliographic instruction and information literacy, which reflects North American thinking fairly well, is particularly evident in the article by Bernard Pochet and Paul Thirion. The authors maintain that library instruction must not be limited to simply obtaining information but that the subsequent steps must be taught as well: how to understand and critically evaluate the information to ascertain whether it fills the initial need; how to use, manage and integrate information into one's knowledge base; how to reformulate the information need, taking into account the new knowledge. (Pochet and Thirion, 1999, 20)

Certain concerns that we share with Pochet and Thirion form the basis for our study and underlie several questions we asked participants. Pochet and Thirion note that library users have difficulty distinguishing between the online public access catalogue (OPAC) of their own library and the OPACs of other libraries whose documents are not easily accessible. They question whether or not users know the difference between OPACs, bibliographic databases, various types of directories, and search engines. Do they understand that these "systems" use different terminology, commands and approaches to information? In short, are they able to adapt their search strategy to the tool they are using? These are all aspects that information literacy instruction should cover. (Pochet and Thirion, 1999, 20)

The *Documentation et bibliothèques* special issue on information literacy, published in Quebec, contains fewer articles. We focused our attention on two papers, those of Madeleine Proulx and Danielle Tardif. In keeping with the theme, these papers describe information literacy programs at École Polytechnique de Montréal (Proulx, 1999) and the Faculty of Medicine at Université de Montréal (Tardif, 1999).

Although each article describes instructional activities designed for a specific audience, both demonstrate that the success of an institution's information literacy program depends on the cooperation and partnership of decision makers, teaching staff and librarians. Both authors, in their particular way and environment, stressed the importance of such cooperation. The close ties Madeleine Proulx and her team developed with certain professors proved to be most beneficial. Proulx was invited to attend a meeting where she had the opportunity to meet with the instructors to review the course. Participation in this meeting and the support of the teaching consultant lent credence to her approach (Proulx, 1999, 114).

The development of the InfoRepère instruction program by Danielle Tardif and her team at the Université de Montréal Health Sciences Library, in collaboration with the Faculty of Medicine, is another example. The first step was to establish a basic instruction program with the primary objective of ensuring that all undergraduate students received compulsory library instruction. This objective was achieved in 1996. Despite its success, Tardif felt the program had certain shortcomings. Where she felt it had been

beneficial, however, was in fostering contacts between librarians and the office of the vice-dean. Therefore, when an information technology subcommittee within the Faculty of Medicine Undergraduate Program Committee was created, the idea of including a librarian on the subcommittee appeared logical. This provided the opportunity to build on the existing program. (Tardif, 1999, 117-118)

In our opinion, the conclusions of Proulx and Tardif illustrate the current and future impact of introducing an information literacy program targeting a specific clientele. Proulx noted that new opportunities had been created for working with professors and that her involvement in correcting assignments and gathering feedback from students, professors and the teaching consultant gave her a realistic measure of their progress towards achieving their objectives. (Proulx, 1999, 115)

Tardif comments that only the rudiments of library instruction have been added to the medical curriculum. However, the willingness of the Office of the Vice-Dean for Undergraduate Studies to integrate instruction into the curriculum, in addition to the work accomplished by the Information Technology Subcommittee and library staff, bodes well for the future. (Tardif, 1999, 120)

A cooperative or partnership approach between teachers and librarians, in which their respective expertise is complementary, is a winning combination. Paulette Bernhard points out that the literature on information literacy instruction unanimously favours a librarian/professor partnership as opposed to unilateral development by librarians or professors. (Bernhard, 2000, 72)

Furthermore, according to Gilles Caron, the ability to use information efficiently is now considered essential to the survival of individuals and organizations. However, what is commonly referred to as "user training" or "library instruction" is not in step with this reality. To equate information literacy with instruction in the use of specific media or a particular library or search tool is completely outdated. Caron believes that information literacy instruction must be founded in "reasonable" intellectual bases. (Caron, 2000, 81)

Diane Poirier goes further in suggesting the expression "informational intelligence". She argues that the concept of informational intelligence, by analogy with emotional or rational intelligence, is not far-fetched. In fact, a comparison of Poirier and Caron articles shows that both favour a completely redefined approach to information literacy instruction. In Poirier's opinion, informational intelligence involves more than computer literacy and library research methods. It requires a strategic, problem-solving approach to searching for information, adaptation to the specific challenges posed by new information technologies and critical and metacognitive thinking skills. (Poirier, 2000)

1.2 STANDARDS FOR AN EVOLVING PARTNERSHIP

While there have been profound changes in the ways librarians have defined and approached information literacy instruction since the early 1990's, interest in this aspect of university education has significantly increased in recent years.

We believe that the publication of the ACRL standards was a turning point in information literacy and related education, in North America at the very least. Of course, the existence of a set of standards, with a group of performance indicators for evaluating compliance, is a major asset for educators. The development and publication of these standards highlighted the importance and role of education in the use of information, not only in academic pursuits but also in the broader context of lifelong learning. The ACRL explicitly acknowledges the university's role in such learning.

> "Developing lifelong learners is central to the mission of higher education institutions. By ensuring that individuals have the intellectual abilities of reasoning and critical thinking, and by helping them construct a framework for learning how to learn, colleges and universities provide the foundation for continued growth throughout their careers, as well as in their roles as informed citizens and members of communities. Information literacy is a key component of, and contributor to, lifelong learning. Information literacy competency extends learning beyond formal classroom settings and provides practice with self-directed investigations as individuals move into internships, first professional positions, and increasing responsibilities in all areas of life." (ACRL, 2000, 4)

Moreover, a year earlier, the French Ministère de l'Éducation Nationale, de la Recherche et de la Technologie published a document on information literacy instruction entitled *Former les étudiants à la maîtrise de l'information: repères pour l'élaboration d'un programme*. This document, which includes benchmarks for program development, reveals a certain consensus among Europeans and North Americans, as noted earlier.

The document points out that students entering university are no longer a homogeneous group, having on the contrary different social, cultural and academic backgrounds, that information explosion requires an increasingly critical approach to searching for information and that information-related instruction is one responsibility that universities can no longer ignore. Today's students must be given the tools for tomorrow's information survival. Library instruction should enable them to acquire new work methods and become more autonomous and "connected" with the university. The work environment will undoubtedly change very quickly and students will need to continue learning after they finish university. Knowing how to find, evaluate and use information will be a major asset in their careers. (France, Ministère de l'Éducation Nationale, de la Recherche et de la Technologie, 1999)

In Quebec, Université de Montréal adopted a policy on information literacy instruction in 2002. This policy states that Université de Montréal recognizes that proficiency in the appropriate use of information and information technologies is essential to the success of university learning. These skills constitute a lifelong learning objective, and as such, the University acknowledges them to be a core competency required of all its students at the undergraduate and graduate levels. (Université de Montréal, 2002, 1)

The Preamble states that the policy is based on the work of a committee that put forth seven principles and five skills. These principles cover all the various elements acknowledged to date as being essential to the success of information literacy instruction. For example, one such element is that it targets all levels of university education and that responsibility for teaching these skills is to be shared between the teaching staff and library personnel. Furthermore, such instruction should be part of the academic program in which the student is registered (Université de Montréal, 2002, 2). The five skills outlined in the Preamble are accompanied by performance indicators, and are based on a translation and adaptation of the ACRL *Information Literacy Competency Standards for Higher Education*.

At Université Laval, a document dated November 2002 on library instruction for the 2001-2002 academic year indicates that library instruction at the University is offered through two types of credit courses. One type deals solely with library instruction while the other offers library instruction as one component. Many of the courses in both categories are linked to the teaching of research methods. (Université Laval, 2002, 1)

Five courses were identified as focusing solely on library instruction. A professor or lecturer is appointed by the department to teach the course, generally in collaboration with a librarian. (Université Laval, 2002, 2). Fifty-eight courses partially devoted to library instruction were also identified. These incorporate library instruction that may vary in scope depending on the program. Professors always call upon library staff to teach this component. (Université Laval, 2002, 2)

1.3 Assessing Information Literacy – Some Examples

While there is a body of literature that promotes library instruction or discusses topics to be covered in such programs, few studies examine students' needs and information competencies in depth. Indeed, the number of studies which sought to measure students' information literacy is limited: "…there is a paucity of actual assessment tools that measure student competencies rather than evaluate library instruction" (Caravello et al., 2001), and more recently: "There are some exceptions, but in general there is little information about the skill levels of incoming students…" (Whitehead and Quinlan, 2003, 22).

The article by O'Connor, Radcliff, and Gedeon (2001) mentions eight studies involving tests that assess students' knowledge and skills. These tests cover the following elements: Library of Congress Subject Headings, understanding classification systems, locating information sources and library services, using the library catalogue, Boolean operators, developing research strategies and interpreting bibliographic references.

University of California at Los Angeles (UCLA)

Of the various studies, the study by the UCLA Library was selected because its goals, similar to our own, were to verify in a more objective manner impressions gained through day-to-day observations and to obtain data on which to base discussions with academic partners.

> "Librarians have long had anecdotal evidence that undergraduates do not possess adequate information skills for some of the coursework they are required to complete. To obtain an objective measure of their information competence, the UCLA Library's Instructional Services Advisory Committee (ISAC) conducted an assessment project.
>
> […]
>
> The main goal of the project was to identify ways to make library instruction more effective at UCLA. A practical objective was to obtain data to use in discussions with faculty about students' information and research skills, the impact of those abilities on students' coursework, and the potential of library instruction to improve them." (Caravello et al., 2001)

Although the two studies are similar in conceptual approach and evaluate similar information skills, their contexts and populations differ. While the UCLA study deals with students who had already received more or less elaborate library instruction, our own approach targets incoming first-year students who have not yet received library instruction at the university.

California State University

The campus-wide project at California State University (CSU) is also worthy of mention. This complex project is a longitudinal study of information literacy instruction. It is the outcome of a strategic plan to boost information skills among students at all twenty-three CSU campuses. The project, conducted in conjunction with the Social and Behavioral Research Institute, California State University at San Marcos, includes the following three phases:

> "Phase I: A questionnaire-based quantitative study to establish a baseline of student information competence.

Phase II: A multi-method qualitative study to capture what students do when they search for information.

Phase III: A multi-pronged study to include some or all of the following:

- longitudinal study of a sample of students using control groups and specific instructional models or activities;
- development and testing of questions for an entrance/exit assessment; and
- system-wide survey of faculty attitudes, expectations and awareness of student information competence skills." (Dunn, 2002, p. 27)

The twenty questions used to assess the information literacy competencies of students entering freshman year at CSU provided a basis for this study. The CSU questionnaire, *Information Competency Assessment,* is available on the Web at:

http://www.csupomona.edu/~library/InfoComp/instrument.htm

And in 2003?

In our literature review, we have attempted to illustrate the changes in collective thinking about library instruction for the benefit of university students.

Are students lacking in "information literacy" when they start university? This was our concern when we began our research. This brief literature review demonstrates the necessity, even urgency, of verifying the observations of information professionals who work with university students. Librarians are responsible for instructing students in the information research process. Are they mistaken in thinking that students' information skills are sorely lacking? Could their day-to-day observations be so wrong?

If these observations were confirmed in some manner, they could be used to establish institutional procedures. Among these is the need to persuade the university community as a whole of the value of specific information literacy instruction and, more particularly, professors must be convinced that their collaboration is necessary.

The next section describes the library research process on which our study is based.

2. STATEMENT OF THE PROBLEM

Information specialists, librarians and library technicians have long observed that there are major gaps in students' information skills. They have the impression that some students know very little, or nothing at all, about basic library research. With no tangible proof, however, the observations of these specialists remain hypothetical.

The goal of this study is to verify whether these impressions have validity and to determine whether students entering first-year university have the ability to retrieve, process and evaluate information.

In order to situate our study within a conceptual framework and make readers aware of the complex process involved in information research, we will first describe the research process on which our study is based and then focus on the conceptual approach used.

2.1 INFORMATION RESEARCH PROCESS

A. Defining the information need

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B. Formulating the research topic and identifying the concepts

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C. Developing a search strategy

- C.1 "Mapping" the concepts and formulating the search statement
- C.2 Selecting document types
- C.3 Selecting search tools
- C.4 Refining the search statement

↓

D. Executing the search

↓

E. Using the results

- E.1 Locating and retrieving documents
- E.2 Evaluating information
- E.3 Citing sources

A. Defining the Information Need

In this first step, the student must determine what information is needed based on the professor's assignment.

- Does he or she need to write a research project, a report, a book review, a bibliography, etc.?
- Did the professor ask for a particular type of document, such as peer-reviewed articles?
- Did the professor establish a required number of references?
- Does the paper have to be a specific length?
- Is the problem to be covered in general or exhaustively?
- Is recent information required?
- Should language and points of view specific to the discipline or field of study be included (social, scientific, historical, etc.)?
- How much time has been allotted to complete the work?

These points will influence selection of the sources to consult and the steps in the research process. Regardless of the level of exhaustivity required, the student will have to go through most of the steps in this process.

To make this process easier to understand, the following example will be used: in an education class, the professor asks the students to write a paper on **the factors that influence educational achievement**.

B. Formulating the Research Topic and Identifying the Concepts

Formulating the Research Topic

In this step, the student must outline and circumscribe the research topic by asking a certain number of questions, such as:

- **Who?** Who does this topic concern?
- **What?** What are the components of this topic?
- **When?** What are the chronological limitations of this topic?
- **Where?** Does the topic relate to a particular geographic location?
- **How?** What aspects of the topic are to be considered: sociological, historical, technological, legal, economical, etc.?
- **Why?** Why is this topic important? Why should we think about it?

To learn about the topic and guide his or her work, the student may consult general or specialized reference sources such as dictionaries or encyclopedias.

The student expresses the topic as a search statement. This query often is a relatively succinct question that covers all of the main ideas of the topic, for example:

What is the impact of family relationships on the educational achievement of elementary school students?

Identifying the Concepts

Once the topic has been expressed as a statement, the student must identify the main concepts.

In the example above, the concepts are:

Concept No. 1	Concept No. 2	Concept No. 3
family relationship	**educational achievement**	**elementary school**

The words used to express these concepts may eventually be used as search terms to retrieve information from various tools: library catalogues, databases, search engines, etc.

The student must avoid using words that are not significant such as impact, cause, consequences, situation, occurrence, etc., because these words describe the relationships between ideas and do not identify the subject itself.

C. Developing a Search Strategy

C.1 "Mapping" the Concepts and Formulating the Search Statement

Once the concepts have been identified, the student makes a list, as exhaustive as possible, of all synonyms and related terms for each of the concepts. The more terms there are, the greater the chances of finding relevant documents. The student's list could be enriched as follows:

Concept No. 1	Concept No. 2	Concept No. 3
family relationship	**educational achievement**	**elementary school**
family life	**educational performance**	**primary school**
family environment	**academic achievement**	**elementary education**

If the student queries a search tool in a language other than English – in French, for example – he or she needs to translate the concepts and significant terms.

Concept No. 1	Concept No. 2	Concept No. 3
relations familiales	**résultats scolaires**	**école primaire**
famille	**performance scolaire**	**enseignement primaire**
environnement familial	**succès scolaire**	**études primaires**

To represent the relationships between concepts and their synonyms, the student should use Boolean operators and parentheses in a subsequent step.

The usual Boolean operators are "OR" and "AND". Parentheses are used to indicate the order in which the search sequence is to be conducted. Appendix III explains the functions of the Boolean operators "OR" "AND", and "NOT".

Group No. 1 (Concept No. 1)		Group No. 2 (Concept No. 2)		Group No. 3 (Concept No. 3)
family relationship **OR** **family life** **OR** **family environment**	**AND**	**educational achievement** **OR** **educational performance** **OR** **academic success**	**AND**	**elementary school** **OR** **primary school** **OR** **elementary education**

Our example will result in the following search statement:

(family relationship OR family life OR family environment)
AND
(educational achievement OR educational performance OR academic achievement)
AND
(elementary school OR primary school OR elementary education)

Search tools differ in structure, in the way they function and in the vocabulary they use. The student may need to adjust his or her search statement in order to account for these differences.

C.2 Selecting Document Types

Once the concepts have been mapped, the student chooses the document types likely to provide the required information.

Document types include encyclopedias, dictionaries, directories, monographs, magazine or newspaper articles, government publications, statistical data, theses, conference proceedings, statutes, standards, and patents. In this example, we will assume the information has to be retrieved in articles and books.

C.3 Selecting Search Tools

In this step, the student needs to identify, from the tools available at the library, those that will enable him or her to retrieve the desired document types.

There are various search tools; the three main ones are the library catalogue, databases and the Internet.

LIBRARY CATALOGUE

For many years, the catalogue was a tool providing access only to those documents physically located within the library: books, magazines, theses, videocassettes, statutes, government publications, maps and charts, etc. Today, it also provides access to selected electronic resources.

Author, title, subject, keywords, etc., can be used to find documents. However, the catalogue does not index journal or newspaper articles by title or author. In order to find these, the student must consult another tool, such as a bibliographic database.

DATABASES

There are various types of databases: bibliographic, numerical, image banks, etc. Bibliographic databases list mainly journal and newspaper articles. In some cases, the full text of the article is also available.

Databases may also list other references that cannot be found using the library catalogue. As a result, databases complete the catalogue search.

INTERNET

The Internet is a vast computer network that provides access to all sorts of information. On the Web, searches are conducted with search engines, directories, metasearch utilities, etc. To search the Internet efficiently, the student must understand the differences between these tools and how to use them.

To find articles on our topic, we will use the *Biblio Branchée* database for Quebec newspaper articles, the *ERIC* database for articles in the field of education, and the *Atrium* catalogue of the Université de Montréal libraries for books.

C.4 REFINING THE SEARCH STATEMENT

The student must now ensure that the words in his or her initial query appear in the indexes of the selected search tools. For this step, a basic understanding of how to search by subject is needed.

Most databases, including the catalogue, have author, title and subject indexes. Some also have abstract indexes, keyword indexes, etc. Searching by author and title is relatively simple. However, searching by subject may be more complex, because the vocabulary used by library catalogues and databases varies. The subject index of a database or catalogue may use controlled vocabulary or natural language.

A tool that uses controlled vocabulary always employs the same word or expression to describe a given concept. The list of terms may be called thesaurus, descriptors, subject-heading directory, subject list, or may have yet another name. To search by subject successfully within a controlled-vocabulary tool, the words used in the search statement must be present in the list of subjects indexed by the tool.

The student must first verify that the terms in his or her initial search statement match those in the controlled vocabulary list; if they do not, he or she must adapt the statement to use the terms in the list.

Inversely, a natural-language tool generates its list of words and expressions from the author's textwords without consideration for redundancies that occur in natural language. With this type of tool, the student must think of the various words or expressions that the author might have used to describe the subject.

To summarize, the success of the search depends on the concordance between the terms used by the student in his or her query and those found in either the natural-language or controlled-vocabulary subject index of a particular search tool.

In our example, the following search statements and tools would be used to find information on the topic:

Atrium Initial query adapted for a controlled vocabulary	*(famille OU "parents et enfants")* *ET* *("classement et notation" OU performance OU succès scolaire)* *ET* *(écoles primaires OU enseignement primaire)*
ERIC Initial query adapted for a controlled vocabulary	(family relationship OR family environment) AND academic performance AND (elementary schools OR primary education)
Biblio Branchée Initial query kept in natural language	*(relations familiales OU famille OU environnement familial)* *ET* *(résultats scolaires OU performance scolaire OU succès scolaire)* *ET* *(école primaire OU enseignement primaire OU études primaires)*

D. Executing the Search

In this step, the student executes the search by entering the search statement in the tool selected. Acconding to the results obtained, the student may need to refine the search strategy.

E. USING THE RESULTS

E.1 LOCATING AND RETRIEVING DOCUMENTS

In this step, the student must locate and retrieve the documents found using the catalogue or database.

The student must be able to identify a document type from a citation in order to be able to locate the document itself. Is it a journal article, conference proceeding, book chapter, book, etc.?

E.2 EVALUATING INFORMATION

The student must first ensure that the documents obtained meet his or her needs and then assess the quality of the information according to certain criteria such as:

- reputation, credibility of the author;
- reliability of the sources;
- publication date;
- accuracy of the information, etc.

E.3 CITING SOURCES

In preparing his or her paper, the student must include a list of the works consulted and cited. Not only is this an ethical requirement, but it also enables the reader to identify and locate these works.

2.2 CONCEPTUAL APPROACH SELECTED

Once the research process had been defined and described, the members of the Working Group reviewed the ACRL standards. As previously mentioned, the *Information Literacy Competency Standards for Higher Education* lists the information literacy competencies that university students should develop during their education. (See the ACRL standards in Appendix IV.)

On the basis of these standards, a number of research skills essential to the success of a search were identified. These skills were linked to variables grouped under five themes. The themes and variables studied are provided in the following table.

Themes	Variables	Questions
Theme 1. Concept Identification	Significant words	6
	Significant words	10
	Significant words	15
Theme 2. Search Strategy	Translation into keywords	4
	Boolean operator "OR"	11
	Search indexes	13
	Controlled vocabulary	14
	Boolean operator "AND"	18
Theme 3. Document Types	Encyclopedias	5
	Periodicals	17
	Scholarly journals	22
Theme 4. Search Tools	Databases	3
	Search engines	8
	Library catalogues	9
	Metasearch engines	16
	Library catalogues	19
Theme 5. Use of Results	Reading citations	7
	Bibliographies	12
	Evaluation of information (Internet)	20
	Ethical use of information	21

Part 3 of the report discusses the methodology used to measure students' knowledge of these variables when entering first-year university.

3. RESEARCH METHODOLOGY

3.1 SURVEY

The Working Group decided to use the survey as a means to collect data on the information literacy of students entering their first-year undergraduate program in Quebec universities.

A. QUESTIONNAIRE

Various data-collection scenarios were considered:

- a questionnaire distributed and completed during class;
- a questionnaire sent by electronic mail;
- an interview;
- a questionnaire sent by regular mail.

The last option was selected. A questionnaire sent by regular mail presented several advantages over an email questionnaire: mailing addresses could be supplied by the registrar's office, participants could remain anonymous and could be contacted before they arrived at the university.

In addition, this method usually generates an acceptable response rate (50%). However, the possibility of sending a reminder to encourage students to return the questionnaire was precluded by the date chosen for the mailing —the week of July 19, 2002— as many students could be in the process of moving and would not receive it.

To encourage students to complete the questionnaire, a personal approach was favoured: the letter accompanying the questionnaire was signed by the library director or another university director; the names of the library and the university were clearly identified on the shipping and return envelopes; and postage stamps were used in place of a postage meter.

The names of participants who returned the completed questionnaire were also entered in a draw for two prizes. The first prize was a desktop computer and the second, a Palm Personal Digital Assistant.

In order to respect their anonymity, participants were instructed to fill out the entry form for the draw, put it in a sealed envelope and include it with the questionnaire in the return envelope addressed to the library director.

B. SAMPLE

The number of first-year students registered at the fifteen Quebec universities was estimated to be about 40,000. A sample of 10% was considered adequate to provide satisfactory results; a response rate of 50%

was assumed. The registrar's office provided the library director with a random sample of students residing in Canada and admitted as full-time, first-year undergraduates. Four library directors requested an increase in the size of their institution's sample: Université de Montréal (30%), Université du Québec à Trois-Rivières (20%), École de technologie supérieure (15%) and École Polytechnique (20%).

Samples by Library

Library	Sample
Bishop's University	60
Concordia University	300
École de technologie supérieure	148
École Polytechnique	199
HEC Montréal	80
McGill University	498
Université de Montréal	2200
Université de Sherbrooke	300
Université du Québec à Chicoutimi	100
Université du Québec à Montréal	400
Université du Québec à Rimouski	50
Université du Québec à Trois-Rivières	300
Université du Québec en Abitibi-Témiscamingue	85
Université du Québec en Outaouais	35
Université Laval	625
Total	**5380**

C. Procedure Prior to Distribution of the Questionnaire

- **Document Preparation: Questionnaire, Letters and Entry Form for the Draw**

Based on the themes and variables listed in the table on page 28, a questionnaire consisting of 20 questions was developed. The development of the questionnaire took place over two months. The members of the Working Group were asked to suggest questions and these were reviewed and revised during meetings.

Once the French versions of the documents (questionnaire, cover letter and entry form for the draw) were completed, the members of the Working Group representing the three English-language universities — Bishop's, Concordia and McGill — prepared the English translation.

- **Certification of Ethical Acceptability of the Study**

Diane Mittermeyer submitted two applications for certification of the ethical acceptability of the study to the Faculty of Education Ethics Review Committee at McGill University. The first *Certificate of Ethical Acceptability for Funded and Non Funded Research Involving Humans* was granted for the pre-test, the second for the survey itself.

- **Pre-Test and Modification of the Questionnaire**

The questionnaire was tested at two CEGEPs (the equivalent of grades twelve and thirteen): one English, John Abbott College, and one French, Cégep du Vieux-Montréal. Participation in the pre-test was voluntary. Students who participated were eligible to enter the draw for the second-prize, the Palm Personal Digital Assistant. The results were analyzed and the members of the Working Group then reviewed each question once again, making necessary changes and finalizing both versions of the questionnaire.

- **Preparation of Mailing, Mailing and Receipt of the Completed Questionnaires**

The mailing was prepared by CREPUQ staff. Each student received the following documents:

- a cover letter signed by the library director or another university administrator;
- a questionnaire;
- an envelope containing the entry form for the draw;
- a return envelope bearing the name and address of the library director.

These documents were forwarded to the offices of the library directors where the mailing labels provided by the registrar's office were affixed. All participating libraries were responsible for mailing the questionnaires during the week of July 19, 2002.

Five thousand three hundred and eighty envelopes were prepared and mailed. As the questionnaires were returned, the library directors sent them to the offices of CREPUQ. They were then forwarded to Professor Mittermeyer's office for data entry and analysis using the Statistical Package for Social Sciences (SPSS). As each envelope was opened, the questionnaire was numbered and the envelope containing the entry form for the draw was inserted into the draw box.

At this stage, an error in the preparation of the mailing was discovered: the questionnaires returned from Bishop's University were in French. Among the questionnaires returned for McGill University, 26 were also in French. This was not the case for Concordia University. As a result, the French questionnaires were withdrawn in order to preserve the validity of the study results but the coupons for the draw were kept and entered in the draw. In addition, 39 envelopes sent to wrong addresses were returned to the libraries.

QUESTIONNAIRES RETURNED LABELLED "ADDRESS UNKNOWN"

Library	Number of Questionnaires Returned
McGill University	2
Université de Montréal	26
Université de Sherbrooke	2
Université du Québec à Chicoutimi	1
Université du Québec à Trois-Rivières	7
Université du Québec en Abitibi-Témiscamingue	1

3.2 RESPONSE RATE

For the majority of the libraries, 11 out of 14, the desired response rate of 50% was achieved. The Université de Sherbrooke and the Université du Québec à Trois-Rivières exceeded 70%. The overall response rate of 56.9% was quite high given the target population, the timeframe, and the object of the study.

RESPONSE RATE

Library	Sample	Question-naires Received and Analyzed	Response Rate
Concordia University	300	147	49.0%
École de technologie supérieure	148	93	62.8%
École Polytechnique	199	108	54.3%
HEC Montréal	80	46	57.5%
McGill University	496	222	44.6%
Université de Montréal	2174	1210	55.7%
Université de Sherbrooke	298	215	72.1%
Université du Québec à Chicoutimi	99	48	48.5%
Université du Québec à Montréal	400	226	56.5%
Université du Québec à Rimouski	50	29	58.0%
Université du Québec à Trois-Rivières	293	212	72.4%
Université du Québec en Abitibi-Témiscamingue	84	43	51.2%
Université du Québec en Outaouais	35	23	65.7%
Université Laval	625	381	61.0%
Total	**5281**	**3003**	**56.9%**

It appears that the draw was an excellent incentive. However, the number of comments received confirms the students' real interest in the subject and their desire to answer the questionnaire in earnest: 767 respondents out of a total of 3003, or 25%, wrote comments after the statement "Your comments are welcome". Some of these were expressions of thanks[1]:

- "Thank you for taking an interest in our academic success."
- "It's a great idea! I find fantastic your real interest in our success. Thank you!"

[1] Comments submitted in French have been translated into English in this report.

- "This is an excellent initiative by the University to care about students' research skills. Thank you!"
- "I couldn't answer half of the questions asked. Good idea to do a survey to be able to help us!"
- "Good to see that you are interested in young people's difficulties with research and that you try to help. Thanks very much."
- "Excellent idea to do this survey because it isn't easy to find things in a library."
- "This is a great idea. It made me realize how little I know about research! Thank you."
- "It's encouraging to see that some people have the students' interest at heart for research and learning."

4. RESULTS

4.1 SUMMARY AND ANALYSIS

The questions have been grouped by theme. The purpose, the results and their interpretation, as well as the corresponding step in the research process, are given for each. The correct answer or best practice, in the opinion of the members of the Working Group, is indicated in bold typeface.

THEME 1: CONCEPT IDENTIFICATION

VARIABLE: SIGNIFICANT WORDS

Question 6 You must use a psychology database to find information on "The effect of family relations on the academic results of primary school students". Which combination of words will you use?

	Response Distribution	Percentage
a) Family relations, academic results, primary school	**1035**	**34.5**
b) Family relations, academic results	705	23.5
c) Effect, family relations, academic results	296	9.9
d) Effect, family relations, academic results, primary school	871	29.0
e) Other (please specify)	38	1.3
f) Don't know	55	1.8
Total	3000	100

PURPOSE OF THE QUESTION

The purpose of the question was to examine how respondents select concepts in their search strategy. Do they hold to the wording of the statement of the problem? Are they able to distinguish between significant terms and non-significant or meaningless words? Do they include all the appropriate terms?

RESULTS AND INTERPRETATION

Just over one-third of the respondents (34.5%) chose the best answer (a). This option includes the three concepts in the original question. Nearly one-quarter of the students (23.5%) chose (b) which does not include the "primary school" concept. This search strategy will find more documents, but some will not be relevant because they will deal with academic results obtained in high school and CEGEP. In addition, 38.9% of the students do not appear to be able to distinguish between significant and non-significant terms when formulating a search statement as they selected options which include the non-significant term "effect".

Question 10 Using a search engine such as Yahoo to search for documents on "The depletion of the ozone layer and the impact on health", I use the words:

	Response Distribution	Percentage
a) Impact, depletion, ozone layer, health	570	19.0
b) Ozone layer, health	**1931**	**64.5**
c) Ozone layer	359	12.0
d) Skin cancer, ozone layer	59	2.0
e) Other (please, specify)	51	1.7
f) Don't know	24	0.8
Total	2994	100

PURPOSE OF THE QUESTION

As was the case for Question 6, the purpose of this question was to examine how students select concepts in their search strategy. The inclusion of non-significant words reduces the number of results obtained, while the omission of significant words renders the strategy too broad and will retrieve irrelevant results.

RESULTS AND INTERPRETATION

In this case, the results show that the majority (64.5%) of the participants were able to recognize significant words in selecting answer (b). However, 35.5% did not choose the most efficient strategy or admitted they did not know the answer. Among these, those who opted for (c), "ozone layer", selected a strategy that is too broad. Those who retained all the words in the statement and chose (a), "impact, depletion, ozone layer, health", which includes the non-significant term "impact", selected an overly restrictive search strategy. The same can be said for those who selected (d), "skin cancer, ozone layer", since cancer is only one of the many effects of ozone layer depletion.

Question 15 You must make an oral presentation on the topic "Measures currently used across the country to decrease the damage to the natural environment". Among the following choices, which one describes best the ideas contained in your subject?

	Response Distribution	Percentage
a) Damage to the natural environment, Canada	330	11.0
b) Measures currently used, country	120	4.0
c) Damage, environment, measures currently used	552	18.4
d) Protective measures, environment, Canada	**1885**	**63.0**
e) Other (please, specify)	53	1.8
f) Don't know	54	1.8
Total	2994	100

Purpose of the Question

For this question, as was the case for Questions 6 and 10, our goal was to examine how students select the concepts to use in their search strategy. Another aim was to determine if they are able to distance themselves from the formulation used in the statement of the problem when selecting search terms.

Results and Interpretation

The results show that 63% of the respondents did not hold to the wording of question and selected (d), retaining all the important concepts. Nevertheless, nearly 3 out of 10 (29.4%) chose an answer in which one of the important concepts was missing, selecting either (a) or (c). Few (4%) students retained the wording of the question and did not realize that although "country" was an important concept, it needed to be translated into a more significant word for the search strategy.

To sum up, in the answers to the three questions (6, 10 and 15) on concept identification, we observed that students have difficulty identifying significant words, even when their task is facilitated by being presented with a choice of possible answers. Identifying significant words corresponds to Step B in our *Information Research Process*, *"Formulating the Research Topic and Identifying Concepts".*

THEME 2: SEARCH STRATEGY

VARIABLE: TRANSLATION INTO KEYWORDS

Question 4 You have used the words "*business letters*" in a library catalogue search. No document is found by the computer. What do you conclude?

	Response Distribution	Percentage
a) The library does not have any documents on this topic	270	9.0
b) I have not used the right words	**2576**	**86.2**
c) All documents on this topic are already on loan	20	0.7
d) The system is down	5	0.2
e) Other (please, specify)	71	2.4
f) Don't know	45	1.5
Total	2987	100

PURPOSE OF THE QUESTION

The purpose of this question was to determine if students are able to identify a common problem researchers face, namely, that the words they use to describe their topic do not correspond to those employed by the search tool. The identification of synonyms, related terms or descriptors used to represent a subject is an important component of the search strategy and improves retrieval of relevant documents.

RESULTS AND INTERPRETATION

A vast majority (86.2%) chose the right answer, (b). This result does not support library staff's general impression of students' abilities in this regard. They have often observed that students have difficulty identifying the cause of the problem when they obtain few or no results, and that they are unable to identify preferred search terms in a particular context. Translation into keywords is a component of Step C.4 of the *Information Research Process*, "*Refining the Search Statement".*

It may be that the increased use of the Internet in recent years has increased students' awareness of the importance of using a variety of keywords in their searches. It should be noted however that since the other three answers to the question do not represent likely possibilities [(a) "The library does not have any documents on this topic"; (c) "All documents on this topic are already on loan"; (d) "The system is down"], the correct answer might be easily deduced.

VARIABLE: BOOLEAN OPERATOR "OR"

Question 11 In order to find more documents on my topic I can include synonyms in my search statement. To connect those synonyms in my statement, I use:

	Response Distribution	Percentage
a) AND	438	14.7
b) +	1136	38.1
c) NOT	4	0.1
d) OR	**826**	**27.7**
e) Other (please, specify)	78	2.6
f) Don't know	498	16.7
Total	2980	100

PURPOSE OF THE QUESTION

The purpose of Question 11 was to assess if students are familiar with Boolean operators, specifically the "OR" operator. An understanding of Boolean logic, used by most search tools, is essential for developing a sound search strategy: it can be used to formulate a query that reflects the logic of the original question and clearly indicates to the system the relationship between the keywords.

RESULTS AND INTERPRETATION

Only 27.7% of the respondents chose the right answer (d). With synonyms or related terms, the search operator to use is "OR". This operator tells the system to include in the search results all the documents that contain one or more of the query terms. This basic concept escapes the majority of students. Some opted for the "AND" operator (14.7%) which has the opposite effect to "OR" in limiting the search to documents containing all the terms. An even larger percentage (38.1%) chose the "+" symbol, often employed by search engines to represent the Boolean operator "AND" or to indicate that a term must figure in the search results, as is the case with Google. Finally, 16.7% of the respondents didn't know. These results show that the Boolean operator "OR" is not properly understood.

In the "Other" category, 2.6% said they would use a comma, probably referring to the symbol used to represent the operator "OR" in the *Repère* database, demonstrating familiarity with the operator in a very specific context.

This basic element is part of Step C.1 of the *Information Research Process,* "*Mapping the Concepts and Formulating the Search Statement".* To combine various concepts, the student must use Boolean operators.

VARIABLE: SEARCH INDEXES

Question 13 To find all the documents about *Margaret Atwood* in the library catalogue, I would do a search:

	Response Distribution	Percentage
a) By title	43	1.4
b) By publisher	10	0.3
c) By subject	**884**	**29.5**
d) By author	2031	67.9
e) Other (please, specify)	6	0.2
f) Don't know	18	0.6
Total	2992	100

PURPOSE OF THE QUESTION

Question 13 assesses the student's understanding of the search indexes in a library catalogue. As previously mentioned, the development of a search strategy requires several elements: concept identification, translation of these concepts into keywords, and the use of Boolean operators. A good search strategy also requires an understanding of the structure and content of the fields in a library catalogue or database in order to select the appropriate search indexes when executing the strategy.

RESULTS AND INTERPRETATION

Less than one-third (29.5%) of the respondents chose the right answer (c), that is they would search the subject field to look for documents about an author. The answer (d), search by author, selected by 67.9% of the students, will find texts written by Margaret Atwood but not documents about her. This question was not particularly difficult, but did not have a high success rate. Students must know how information is structured and indexed in a search tool, be it a catalogue, database or search engine.

As mentioned in Step C.3 of the *Information Research Process, "Selecting Search Tools"*, the catalogue is one of the three main search tools; students must understand how it works in order to find the information they seek.

VARIABLE: CONTROLLED VOCABULARY

Question 14 When searching a specialized database for documents on my subject, it is recommended to use the terminology specific to the database. To identify these terms I would consult:

	Response Distribution	Percentage
a) An ideogram	140	4.7
b) A dictionary	496	16.6
c) A thesaurus	**379**	**12.7**
d) An Internet search engine	204	6.8
e) Other (please, specify)	30	1.0
f) Don't know	1738	58.2
Total	2987	100

PURPOSE OF THE QUESTION

The aim of Question 14 was to determine if students are familiar with the concept of a controlled vocabulary tool, such as a thesaurus. Since a given concept may be represented by different terms, according to the search tool used, it is a good idea to consult the database thesaurus, when one is available. The thesaurus facilitates document retrieval by providing a list of preferred terms used to describe a subject in the database.

RESULTS AND INTERPRETATION

Only 12.7% of the respondents had the right answer (c). A large percentage (58.2%) said they did not know. Option (b), a dictionary, selected by 16.6% of the students, is not completely incorrect; however, as dictionaries are not associated with any specific search tools, they cannot indicate which terms to use in a given tool. Furthermore, dictionaries do not situate terms in their linguistic environment by providing generic, specific and related terms for each descriptor. Many catalogues and databases use controlled vocabulary to describe the documents they identify. Students may be less familiar with this concept since they often use Internet search engines that do not have thesauri.

As stated in Step C.4 of the *Information Research Process, "Refining the Search Statement"*, the concept of controlled vocabulary must be mastered in order to develop a sound search strategy.

VARIABLE: BOOLEAN OPERATOR "AND"

Question 18 You have to write a paper on the "Treatment of depression". Which search strategy will find the least number of documents?

	Response Distribution	Percentage
a) Depression and psychotherapy	207	6.9
b) Depression or psychotherapy or antidepressants	324	10.8
c) Depression and psychotherapy and antidepressants	**1834**	**61.3**
d) Depression	501	16.7
e) Other (please, specify)	27	0.9
f) Don't know	101	3.4
Total	2994	100

PURPOSE OF THE QUESTION

The purpose of this question was to verify if students understand Boolean logic. The aim of Question 11 was to determine if students were familiar with the "OR" operator. In this case, our intention was to verify if they were familiar with the "AND" operator which has the effect of limiting the search to documents containing all the specified search terms.

RESULTS AND INTERPRETATION

A large proportion of the students (61.3%) chose the correct answer, "depression and psychotherapy and antidepressants": this search strategy will retrieve the smallest number of documents. If we compare the results with those obtained for Question 11, the "AND" operator appears to be better understood than the "OR" operator, although Question 11 was formulated differently. Of the 38.7% who did not choose the correct answer, 16.7% chose (d), which contains only one term, probably making the mistake of thinking that the fewer words there are in a search statement, the fewer results there will be. This strategy, however, will produce many more results than (c). Option (b), chosen by 10.8% of the students, would retrieve the most documents, the opposite of what was asked. Many students need to develop an understanding of Boolean logic and its use in a search strategy.

As was the case for Question 11, this question relates to Step C.1 of the *Information Research Process, "Mapping the Concepts and Formulating the Search Statement"*.

THEME 3: DOCUMENT TYPES

VARIABLE: ENCYCLOPEDIAS

Question 5 In order to become familiar with a subject about which I know very little, first I consult:

	Response Distribution	Percentage
a) A journal	190	6.4
b) An encyclopedia	**1501**	**50.4**
c) A database	473	15.9
d) A book	404	13.6
e) Other (please, specify)	365	12.3
f) Don't know	46	1.5
Total	2979	100

PURPOSE OF THE QUESTION

The purpose of the question was to see if students know that an encyclopedia can be used to familiarize oneself with a subject. Whether print or electronic, an encyclopedia is a basic reference tool that makes it easier to learn about a new field by giving an overview of the topic. Encyclopedias can be general or specialized.

RESULTS AND INTERPRETATION

The percentage of respondents who chose option (b), 50.4%, indicates that only half of the students seem to recognize the usefulness of encyclopedias. Is the other half unaware of their value? Options (a) and (c), chosen by 22.3% of the students, while not incorrect, do not represent the "best" answer: a journal article, (a), generally deals with a specific aspect of a topic and does not provide an overview; a database, (c), is used to retrieve references to various types of documents, but does not include summaries. A book, (d), selected by 13.6% of the respondents, may provide an introduction to a subject, but often contains much more detailed information than an encyclopedia and cannot be used as a quick reference. Note that among the 12.3% who chose (e), "Other", 280 of 365 (76.7%), said "Internet" without giving any further explanation. Given the multitude of document types found on the Internet, this approach lacks precision and may not be very efficient.

Knowledge of reference works relates to Step B of the *Information Research Process, "Formulating the Research Topic and Identifying the Concepts*".

VARIABLE: PERIODICALS

Question 17 To find the most recent information about drug abuse, I consult:

	Response Distribution	Percentage
a) A book	88	3.0
b) A journal	**2213**	**74.7**
c) An encyclopedia	69	2.3
d) A dictionary	15	0.5
e) Other (please, specify)	529	17.9
f) Don't know	47	1.6
Total	2961	100

PURPOSE OF THE QUESTION

The purpose of the question was to find out if students understand the characteristics of various documents types and, more specifically, if they know that periodicals contain more recent information than other document types. In order to be able to choose the appropriate document type for their needs, students need to be familiar with the information cycle.

RESULTS AND INTERPRETATION

A large majority of participants, 74.7%, selected the right answer (b). The second most popular answer was "Other", given by 17.9% of students. Among them, 89.2%, or 472 out of 529, wrote "Internet". This general reference to the Internet by a sizeable number of students indicates that they make little distinction between the different types of documents available on the Web (books, encyclopedias, reports, press releases, dictionaries, articles, etc.). It appears that many people consider the Internet to be a document type although, in fact, it is a means of disseminating information much the same as print. This "all-purpose" approach is hazardous, because the quality, reliability and currency of information on the Internet varies greatly.

Knowledge of the characteristics of the various document types relates to Step C.2 of the *Information Research Process, "Selecting Document Types".*

VARIABLE: SCHOLARLY JOURNALS

Question 22 Which of the following best describe(s) articles published in a scholarly journal?

a) The information is written for the layperson
b) It includes a list of references
c) The research method used is described
d) It has been evaluated by an editorial board before publication
e) None of the above
f) Don't know

						Response Distribution	Percentage
					f	603	20.2
	b	**c**	**d**			**444**	**14.9**
	b	c				303	10.2
a						183	6.1
	b		d			172	5.8
		c				168	5.6
a	b	c	d			140	4.7
	b					137	4.6
a	b					130	4.4
			d			123	4.1
a	b	c				122	4.1
		c	d			111	3.7
a		c				104	3.5
a			d			85	2.9
				e		62	2.1
a	b		d			58	1.9
a		c	d			33	1.1
					Total	2978	100

Answers Including Option	Percentage
a	28.7
b	50.6
c	47.8
d	39.1
e	2.1
f	20.2

Purpose of the Question

The purpose of the question was to see if students' knowledge of various document types enables them to distinguish between scholarly journals and popular magazines. It is important to be able to distinguish between these types of publications when conducting research as they do not have the same objectives nor are they written for the same audience. A scholarly journal contains theoretical discussions or research results for a specialized public whereas a popular magazine provides information in layman's language for the general public.

Results and Interpretation

Only 14.9% of the respondents selected the three answers that characterize the scholarly journal: (b), (c) and (d). In selecting only one or two of the three valid criteria (b, c, d), alone or with an invalid answer, (a) or (e), most of the students demonstrated a partial understanding of the characteristics of the scholarly journal. More than one person in five (20.2%) chose (f), "don't know". The second table shows that peer review of articles appears to be the least well-known characteristic; only 39.1% of the students selected it. In a context where the importance of critically assessing information is emphasized, it is important that students be familiar with this characteristic of the scholarly journal and that they be made aware that most other types of documents do not share it.

As in the case of Question 17, knowledge of the characteristics of the scholarly journal pertains to Step C.2 of the *Information Research Process, "Selecting Document Types".*

THEME 4: SEARCH TOOLS

VARIABLE: DATABASES

Question 3 If I want to find journal articles about "*The popularity of video games"*, I will search in:

	Response Distribution	Percentage
a) The library catalogue	544	18.4
b) A database	**841**	**28.5**
c) Yahoo	702	23.7
d) The journals in the library	447	15.1
e) Other (please, specify)	281	9.5
f) Don't know	141	4.8
Total	2956	100

PURPOSE OF THE QUESTION

Question 3 aimed to discover what strategy students adopt when they have to find journal articles. The choice of a search strategy is related to knowledge of the search tools at one's disposal for finding various types of documents.

RESULTS AND INTERPRETATION

The best answer is (b) because the search tool that enables one to search for journal articles is the database. Only 28.5% of the respondents chose this option.

It is possible to browse the journals in the library (d) in the hope of finding one or more relevant articles, but this does not represent a particularly efficient search strategy. The answer "Yahoo" (c), is also a poor choice: while Yahoo does provide links to certain electronic journals and magazines, one would still have to browse the Web site to find articles on one's topic. These two strategies, which leave much to be desired, were selected by 38.8% of the participants. The library catalogue, (a), does not index journal articles; this answer is incorrect but was selected by 18.4% of the students.

The "Other" category was selected by 9.5% of the respondents. Of these, 35.2% mentioned search engines or metasearch engines such as Google, AltaVista and Copernic. However, search engines only provide access to free journal articles on the Internet. Moreover, they do not allow one to limit a search by document type (books, articles, advertising, personal sites, etc.).

Also in the "Other" category, 29.9% gave *Repère* as their answer; *Repère* is one of the databases most widely used by CEGEP students in Quebec. Although these students were able to name an example of a database, they did not recognize the category of search tool to which *Repère* belongs.

These results show that very few students entering university are familiar with databases despite the fact that they will likely have to use them to find periodical articles to complete their assignments. To be successful in their research, students need not only to be familiar with databases, but also to understand the real limitations of Internet search engines for finding journal articles.

"Selecting Search Tools" is Step C.3 of the *Information Research Process.*

VARIABLE: SEARCH ENGINES

Question 8 Using a search engine such as Google or Yahoo, I would not find:

	Response Distribution	Percentage
a) **The books available in the library**	**2746**	**91.9**
b) Biographical information about famous people	12	0.4
c) Merchandise catalogues	20	0.7
d) Information about companies	14	0.5
e) Other (please, specify)	18	0.6
f) Don't know	177	5.9
Total	2987	100

PURPOSE OF THE QUESTION

This question was developed to verify if students understand that search engines are not appropriate tools for finding documents held by the library.

RESULTS AND INTERPRETATION

91.9% of the respondents recognized that "library books" (a) cannot be found using search engines. Although it is possible to find the library catalogue using a search engine such as Google, search engines do not enable one to directly access titles within the catalogue.

Although search engines represent many students' first recourse to find information, the response rate for Question 8 shows that they are aware that search engines have certain limitations. However, this question does not enable us to conclude that the students would have been able to identify the catalogue as the appropriate tool to use to find library books.

As was the case for Questions 3 and 13 above, the use of Internet search engines corresponds to Step C.3 of the *Information Research Process, "Selecting Search Tools"*.

VARIABLE: LIBRARY CATALOGUES

Question 9 A friend told me that I should read an article published in the November 2001 issue of Internet Guide, "The Microsoft Xbox Console", by Mark Kenney. To check the availability of this article at the library, I search in the catalogue under:

	Response Distribution	Percentage
a) Internet Guide	**589**	**19.7**
b) Martin Kenney	157	5.2
c) The Microsoft Xbox Console	166	5.5
d) Answers (a), (b) and (c) are correct	1878	62.7
e) Other (please, specify)	32	1.1
f) Don't know	171	5.7
Total	2993	100

PURPOSE OF THE QUESTION

This question sought to evaluate students' knowledge of the library catalogue, specifically what kind of documents can be found using the catalogue and how to use the different search indexes within it. When writing a paper, it is often advisable to follow up on the citations provided by the professor or found in the bibliography of a book or article. In order to locate these documents, the student must check whether his or her library or another university library has a copy of the document for consultation. Also, he or she must understand what information can be found using the catalogue.

RESULTS AND INTERPRETATION

Only 19.7% of the respondents gave the right answer, (a). The catalogue does not index individual journal articles, and as a result, one cannot search by author or by article title. The only access point is the journal title. A large percentage of the respondents (62.7%) believe that they can search indiscriminately by journal title, article title, or author (d).

Among the themes of this study, *Theme 4 – Search Tools* has the greatest number of variables relating to one single step, Step C.3 of the *Information Research Process, "Selecting Search Tools"*. As noted below in section 5.2 *Consequences of Poor Information Research Skills*, a better understanding of the structure and content of search tools would enable students to avoid wasting time and to be more efficient when searching. These results, like those obtained in Question 3, indicate that many students fail to distinguish between the library catalogue and databases.

VARIABLE: METASEARCH ENGINES

Question 16 Using a metasearch engine such as Copernic or MetaCrawler, it is possible to:

	Response Distribution	Percentage
a) Launch a search in many search engines simultaneously	**1573**	**52.7**
b) Execute a search in all the existing Web sites	338	11.3
c) Extend the search into foreign language Web sites	23	0.8
d) Execute the search in all the databases available in the library	75	2.5
e) Other (please, specify)	7	0.2
f) Don't know	969	32.5
Total	2985	100

PURPOSE OF THE QUESTION

The purpose of this question was to assess students' understanding of one type of Internet search tool, metasearch engines. Since the use of the Internet as a source of information is on the rise, it is becoming increasingly important for students to distinguish between the various categories of Web search tools and to understand the particularities and limitations of each.

RESULTS AND INTERPRETATION

Among the possible answers for this question, just over half of the students (52.7%) chose the statement (a) that best characterizes metasearch engines, "Launch a search in many search engines simultaneously". Nearly one-third (32.3%) chose (f), "Don't know". Finally, 11.3% think that metasearch engines search all existing Web sites (b), something no Internet search tool can do. This question demonstrates that students do not necessarily have a good understanding of this type of tool and may believe that Google and Copernic do more or less the same thing. These differences, like those between conventional bibliographic tools such as the catalogue and databases, have an impact on the choice and efficiency of a search strategy.

As mentioned in Step C.3 of the *Information Research Process, "Selecting Search Tools",* "to search the Internet efficiently, the student must understand the differences between these [search] tools and how to use them."

VARIABLE: CATALOGUE

Question 19 Some of the items that can be found in the library catalogue include:

a) All the titles of the books available in the library

b) All the titles of the books available on the market
c) All the titles of articles found in the journals available in the library
d) All the titles of journals available in the library
e) None of the above
f) Don't know

						Response Distribution	Percentage
a		c	d			1355	45.4
a			**d**			**764**	**25.6**
					f	261	8.7
a		c				246	8.2
a						174	5.8
a	b	c	d			35	1.2
		c				34	1.1
			d			32	1.1
		c	d			31	1.0
				e		22	0.7
	b	c				9	0.3
	b					8	0.3
a	b					7	0.2
a	b		d			4	0.1
a	b	c				3	0.1
	b		d			1	0.0
					Total	2986	100

Answers Including Options	Percentage
a	86.6
b	2.2
c	57.3
d	74.4

PURPOSE OF THE QUESTION

The purpose of this question was to determine, using an approach different from that used in Question 9, whether students know how to query the library catalogue and for what types of searches it can be used.

RESULTS AND INTERPRETATION

The respondents could circle more than one answer for this question. The only valid choices were (a) and (d), as the books and journals available in the library are indeed indexed in the catalogue. Just 25.6% of the respondents selected only these two options.

Among the other respondents, some demonstrated a partial knowledge of what a catalogue contains: 45.5% selected (a) and (d) but also added (c), "All the titles of articles found in the journals available in the library". The fact that 8.7% circled (f), "Don't know", is also noteworthy.

The second table above shows that the most frequent error is the belief that periodical articles are indexed in the catalogue: this answer (c), was selected by 57.3% of the respondents. Of course, this is not the case.

The catalogue is the search tool that enables library users to find documents available at their university, whether in print, audiovisual or electronic format. It is therefore essential that students have a good understanding of the content and use of this tool. As was the case for Question 9, the results indicate that there is room for improvement in this area.

As previously mentioned, the group of questions for Theme 4 — Search Tools — questions 3, 8, 9, 16 and 19 — deal with Step C.3 of the *Information Research Process, "Selecting Search Tools"*.

THEME 5: USE OF RESULTS

VARIABLE: READING CITATIONS

Question 7 Which one of the following citations refers to a journal article?

a) Miller, A.W. (1997). *Clinical disorders and stressful life events*. Madison, CT, International University Press.

Response distribution: 316 Percentage: 10.6%

b) Anderson, K.H. (1999). "Ethical dilemmas and radioactive waste: A survey of the issues." *Environmental Ethics*, 2(3):37-42.

Response distribution: 1067 Percentage: 35.8%

c) Hartley, J.T. & D.A. Walsh. (2000). "Contemporary issues and new directions in adult development of learning and memory", in L.W. Poon (ed.), *Aging in the 1980s: Psychological issues*, Washington, D.C., American Psychological Association, pp. 239-252.

Response distribution: 352 Percentage: 11.8%

d) Maccoby, E.E. & J. Martin. (1983). "Socialization in the context of the family: Parent-child interaction", in P.H. Mussen (ed.), *Child psychology: Socialization, personality, and social development*. New York, Wiley, vol. 4, pp. 1-101.

Response distribution: 717 Percentage: 24.0%

e) Don't know

Response distribution: 532 Percentage: 17.8%

Total: 2984 100%

PURPOSE OF THE QUESTION

The purpose of the question was to determine if students are able to interpret a bibliographic reference and recognize the document type to which it corresponds. This knowledge is important for the following reasons: first, the way to query the catalogue to locate a particular document varies according to document type; second, the nature, specificity and currency of information varies according to publication type. As a result, the ability to identify a document type from a given citation is useful in assessing the relevance of a source for one's information needs. It is therefore important to be able to identify the document type corresponding to a citation.

Results and Interpretation

While 35.8% of the respondents selected the correct answer, (b), a large percentage (64.2%) were unable to identify the citation associated with a journal article. We can deduce that if a professor were to ask students to locate documents using a bibliography, almost two-thirds would have serious difficulties.

The "reading citations" variable in Question 7 relates to Step E.1 of the *Information Research Process, "Locating and Retrieving Documents"*.

VARIABLE: BIBLIOGRAPHIES

Question 12 You have found a book that is right on your topic. Which section of the book will you consult to find other documents on the topic?

	Response Distribution	Percentage
a) The glossary	121	4.1
b) The index	204	6.8
c) The bibliography	**2333**	**78.2**
d) The table of contents	252	8.4
e) Other (please, specify)	10	0.3
f) Don't know	63	2.2
Total	2983	100

PURPOSE OF THE QUESTION

The purpose of the question was to determine if students know what a bibliography is. It is important for them to understand the added value of the bibliographic references selected by the author. Such references enable them to find other documents on their topic, thus enhancing their awareness of existing knowledge.

RESULTS AND INTERPRETATION

The results show that 78.2% of the respondents are familiar with the bibliography as a tool for finding other documents. However, one student in five (21.7%) does not know what a bibliography is. It should be noted however, that while this question rates students' understanding of the bibliography as a tool, it does not show to what extent they use it. The small percentage (35.8%) of correct responses to the previous question regarding the bibliographic reference to a journal article leads us to believe that those who understand the usefulness of a bibliography would nevertheless have difficulty understanding the references it contains and, as a result, locating the documents cited.

As for the "reading citations" variable in Question 7, the "bibliographies" variable in this question relates to Step E.1 of the *Information Research Process, "Locating and Retrieving Documents"*.

VARIABLE: EVALUATING INFORMATION (INTERNET)

Question 20 Among the characteristics that are used to evaluate the quality of an Internet site one finds:

a) The date of publication is provided
b) The author is known in the field
c) Responsibility for the site is clearly indicated
d) The site is rapidly accessible
e) None of the above
f) Don't know

						Response Distribution	Percentage
a	**b**	**c**				**687**	**23.0**
a	b					468	15.7
					f	321	10.8
	b	c				231	7.7
a		c				188	6.3
	b					187	6.3
				e		175	5.9
		c				135	4.5
a						110	3.7
a	b	c	d			106	3.5
a			d			91	3.0
			d			79	2.6
a		c	d			68	2.3
a	b		d			62	2.1
		c	d			39	1.3
	b		d			26	0.9
	b	c	d			13	0.4
					Total	2986	100

Answers Including Option	Percentage
a	59.6
b	59.6
c	49.1
d	16.2
e	1.6
f	10.8

PURPOSE OF THE QUESTION

The purpose of the question was to see if students know what criteria are used to evaluate the quality of a Web site. Today's students often look to the Internet to meet their information needs. Since the information on a Web site is not always evaluated or checked before it is posted, it is imperative that students be made aware of the need to critically evaluate it.

RESULTS AND INTERPRETATION

Among all the possible options and combinations, 23% of the respondents selected what is considered to be the best answer, (a), (b) and (c). The fact that 57.7% demonstrated partial knowledge in selecting one or two of the relevant criteria, with or without including the irrelevant criterion (d), or in selecting all four options, is of note.

Rapid access to a site, (d), although desirable, is contingent on several factors that are often external to the site and does not constitute a measure of quality. Furthermore, 16.7% of the respondents circled either (e), "None of the above", or (f), "Don't know". Knowledge of how to evaluate a Web site is essential for any user. The results obtained for this question indicate that the concept of evaluation does not appear to be well understood.

This aspect relates to Step E.2 of the *Information Research Process, "Evaluating Information"*.

Variable: Ethical Use of Information

Question 21 You found magazine articles and Web pages presenting different views on a current issue. You want to use this information to write your paper. In which case(s) do you need to include a reference to the source of information?

a) When I copy word for word a paragraph from the magazine article
b) When I copy word for word a paragraph from a Web page
c) When I write in my own words what is being said in a magazine article
d) When I write in my own words what is being said in a Web page
e) In none of the above cases
f) Don't know

						Response Distribution	Percentage
a	b					1705	57.1
a	**b**	**c**	**d**			**824**	**27.6**
a						132	4.4
					f	93	3.1
		c	d			80	2.7
				e		47	1.6
	b					28	0.9
a	b	c				23	0.8
		c				22	0.7
	b	c				14	0.5
			d			9	0.3
a			d			3	0.1
	b		d			2	0.1
a		c				4	0.1
Total						2986	100

Answers Including Option	Percentage
a	90
b	87
c	32.3
d	30.8
e	1.6
f	3.1

Purpose of the Question

The purpose of the question was to see if students know when to include a reference to the source of the information used. When repeating someone's words or opinions, it is important to mention the author of the original text so the reader may refer to the text. Repeating the text word for word or paraphrasing it without documenting the source constitutes plagiarism. It is

important for students to be familiar with the principles of the ethical use of information.

RESULTS AND INTERPRETATION

Some 27.6% of respondents circled all the correct answers, (a), (b), (c) and (d). The other 72.4% demonstrated a partial knowledge of when to include bibliographic references or have no idea at all when to quote a source. Students appear to be aware of the need to quote the source when they reproduce a text word for word, regardless of whether or not it is a magazine article or a Web page. As shown in the second table above, 90% of the respondents circled statement (a), "When I copy word for word a paragraph from a magazine article", and 87% circled statement (b), "When I copy word for word a paragraph from a Web page".

However, students are far less aware of the need to quote sources when paraphrasing: only 32.3% of the respondents circled statement (c), "When I write in my own words what is being said in a magazine article", and 30.8% chose (d), "When I write in my own words what is being said in a Web page".

Citing Sources is Step E.3 in the *Information Research Process*. In preparing his or her paper, the student must include a list of the works consulted and cited. Not only is this an ethical requirement, but it also enables the reader to identify and locate these works.

4.2 ANALYSIS OF COMMENTS RECEIVED

At the end of the questionnaire was the statement, "Your comments are welcome". Generally, few participants write comments, but this study produced an impressive number: 25% of the participants accepted the invitation (767 out of 3003).

Many of the comments consisted of *expressions of thanks* and *observations about a lack of knowledge of the information research process*. Among those who admitted they did not know how to do library research, several said since they were unfamiliar with the university library, they could not answer the questionnaire properly. This indicates that they do not understand how documentation is organized, that search tools are similar from one library to another, and that previously acquired research skills are transferable. The comments below[2] illustrate this situation.

- "Some answers are "Don't know" mainly because I've never been to the university library yet."
- "I've never used the university library, so I don't know much about the search methods it uses like the catalogue."

[2] Comments submitted in French have been translated into English in this report.

- "It is rather difficult for me to answer questions about the library catalogue. I'll be starting university in the fall and my CEGEP library didn't have a catalogue, or at least it wasn't called that."
- "Since I've never been to the university, I don't know what the library catalogue is or what it contains."
- "Sometimes I hesitated over answers about the library catalogue, because I wondered if all library catalogues function the same way. Ex.: Should "CD Actualité" be included in the library catalogue query? Thank you!"

The comments also reveal that *students make extensive use of the Internet to find the information they need*. It appears that Internet research is more popular than library research: rapidity and ease of use are the reasons given.

- "In high school and at college, I did all my research for papers and exams on the Internet and not in books because I find it a lot less complicated and I can access the information much faster."
- "I use the Internet 99% of the time because I find library research long and complicated."
- "I think it will be more convenient if everybody had good search skills. Some people have difficulties doing a search in the library, and that could be why people prefer using Internet as a search guide (easier and faster)."
- "I rarely use the libraries that are available to me, I use the Internet instead."
- "I mostly use the Internet for research, so I'm sorry if some of my answers appear mixed up or are wrong."
- "Some library catalogues are hard to use and using a search engine (Yahoo) on the Internet is a lot easier and less time consuming."

These comments complement the answers given for two of the three questions (5 and 17) in *Theme 3*, *Document Types*: Question 5 deals with using an encyclopedia to become familiar with a topic and Question 17 is about finding recent information on drug abuse. In the first case (Question 5), 365 respondents selected (e), "Other" and among them, 280 wrote "Internet". In the second case (Question 17), the answer (e), "Other", was the second most popular answer: 529 respondents (17.9%) selected it and of that number, 472 specified "Internet".

Since only 23% of the participants were able to identify the criteria for evaluating an Internet site in Question 20, their use of the Internet to learn or find information about a topic raises questions. Will this research practice have an impact on the quality of students' academic work and on their success at university and in their careers? As previously mentioned, the *Ministère de l'Éducation Nationale, de la Recherche et de la Technologie* in France has already published an opinion on the subject, stating that, in light of the information explosion, students need to learn early how to think critically about information, and that knowing how to find, evaluate and use

information is a major career asset. (France, Ministère de l'Éducation Nationale, de la Recherche et de la Technologie, 1999)

The comments also reveal *confusion between computer literacy and information literacy*. Students seem to believe that computer literacy and information literacy involve the same skills.

- "Not having a computer at home and not using the Internet, I don't know much about it. I hope I've helped you a bit anyway."
- "I'm not very good with computers! There are a number of things I don't know!"
- "I am sorry. I do not know much about computers, therefore, a lot of questions I was unable to answer."
- "I admit I don't know much about computers. I find them very complicated. I don't know anything about them at all!"
- "Please note that I have no computer science education."

Confusion also reigns regarding the various search tools. Students have difficulty *distinguishing between a library catalogue and a database* or are unacquainted with these tools. They also *confuse search engines and databases.*

- "What is the difference between the catalogue and the database?"
- "Having never used the library I am not familiar with the functioning of the catalogue. However, I figured that my answers are reasonable. Well constructed survey."
- "Need to explain certain terms (i.e., database)."
- "I've never worked with a database, so I had more difficulty answering questions on that topic."
- "Good to know about specialized databases. No idea if Google or Yahoo is considered a specialized database. If they are not, then which one would be considered one."
- "Some terms, like "catalogue" and "metasearch engine", are unfamiliar to me. I realize now that some instruction would be necessary."
- "What is a catalogue? A binder or a computer list of information?"

This confusion is not limited to Quebec students. Pochet and Thirion, as noted earlier, mentioned that users have difficulty distinguishing between the OPAC in their own university library and that of other libraries. They wondered if users could distinguish between bibliographic databases, various directories and search engines. (Pochet and Thirion, 1999, 20)

Students generally pointed out the *problems they encounter when they search for information*:

- "I rarely find what I am looking for in a library and I have difficulty knowing whether Internet articles are reliable."
- "After answering the questionnaire I realized I have a lot to learn about how to search for an article, book, etc."

- "As a first year student coming from an Ontario high school, I know very little about journals. I am fairly certain few of my peers know much at all. Will need to research this to discover how to use new system."
- "Sorry, but I don't know much about library research. When I begin a search, I type some words in an Internet search engine or at the library and do the best I can with whatever I get. It's a hit-and-miss operation."
- "Although I consult the Internet, I often have a lot of trouble finding information on specific topics."
- "This short questionnaire made me realize to what extent my research methods are inefficient. I end up finding what I want, but not by any direct route."
- "I find library a difficult and confusing place due to so many options of research. I appreciate when people are helpful. Thanks for trying to improve the system."
- "I feel a bit lost in all this. I hope I will have the help I need when I do research at the library. Thank you."

How can we help them develop research skills? How can we help fulfill the library's mission so that the search for information and the use of library resources (print, electronic, locally or remotely accessible) are not considered elements of a second order but rather, as elements essential to the student's education?

Finally, a number of students hope to attend *instruction sessions* to improve their information research skills. It should be noted that libraries already offer bibliographic instruction; this practice must be continued but there is room for improvement. Information specialists generally find that the time allotted during courses for information literacy instruction is insufficient and that the instruction provided is fragmented and partial. Students do not obtain a complete picture of the research process.

- "I think it essential that instruction be offered to undergraduate students because research methods vary tremendously from one place to another."
- "I find it necessary to offer library research support to students. This is an area where it is easy to get lost and miss relevant documentation."
- "It would be very interesting to have access to workshops on this topic! I would definitely participate!"
- "I personally have a lot of trouble with search methods. If there could be a course or something that would explain everything in detail, it would surely give me a hand. Thank you!"
- "Whew! And I thought I was pretty good at research! This survey brought me back to reality – a few introductory sessions on research would save me a lot of time!"
- "I think that workshops on the various search methods available would be very appropriate for students entering university."

- "Responding to this survey made me realize that a workshop would be very useful for me in order to make a better use of the library's resources, and learn how to make good bibliographies."
- "As a result of this questionnaire, I realize I don't know much about library research. Developing workshops would be a very good idea."

While the questionnaire dealt with a limited number of bibliographic research skills, it is clear that information literacy competencies go beyond this. It may be necessary to follow Diane Poirier's lead (2000) and not limit instruction to computer skills and library research methods. Also, as discussed in the literature review, we support the approach of Gilles Caron (2000) who points out that the survival of individuals and organizations now depends on their ability to use information effectively. We hope that the recommendations in the next section will serve as guidelines for achieving these objectives.

5. CONCLUSION AND RECOMMENDATIONS

5.1 ORIGINAL OBJECTIVES

As stated in the Introduction, the objective of this study was to compile data on the information research skills of undergraduate students entering Quebec universities to:

- determine students' information literacy skills in order to provide more appropriate services;
- provide university libraries with reliable data to support recommendations for the integration of information literacy into the university curriculum.

This project was also intended to verify librarians' impressions of gaps in students' knowledge about the information research process. Many students appear to misunderstand or be totally unaware of the basic elements of library research. Our objective was therefore to see whether undergraduate students entering university have the abilities to retrieve, process and evaluate information.

WERE THESE OBJECTIVES ACHIEVED?

Given the nature of this study, a survey administered by means of a questionnaire sent by mail, the results quite clearly show certain shortcomings in the information literacy skills of the students who began their first year at Quebec universities in the fall of 2002.

The following elements enable us to conclude that the objectives established at the outcome of the project have been achieved: the high response rate (3003 participants of a possible 5281, or 56.9%), the quantitative results obtained for the 20 variables in the study, and the qualitative results gleaned from the many comments received.

With regard to the information literacy indicators (variables) evaluated in this study, we see that for more than half of the variables (11 of 20 or 55%), the success rate is less than 36%, as shown in the following table. Although the number of variables in the study was limited, the results provide tangible proof of librarians' impressions and indicate that the need for library instruction is very real. A number of the comments, noted in the "Analysis of Comments Received" section, confirm this.

RESULTS BY PERCENTAGE OF CORRECT ANSWERS

Question	Variable	Percentage of Correct Answers
14	Controlled vocabulary	12.7%
22	Scholarly journals	14.9%
9	Library catalogues	19.7%
20	Evaluation of information (Internet)	23.0%
19	Library catalogues	25.6%
21	Ethical use of information	27.6%
11	Boolean operator "OR"	27.7%
3	Databases	28.5%
13	Search indexes	29.5%
6	Significant words	34.5%
7	Reading citations	35.8%
5	Encyclopedias	50.4%
16	Metasearch engines	52.7%
18	Boolean operator "AND"	61.3%
15	Significant words	63.0%
10	Significant words	64.5%
17	Periodicals	74.7%
12	Bibliographies	78.2%
4	Translation into keywords	86.2%
8	Search engines	91.9%

5.2 CONSEQUENCES OF POOR INFORMATION RESEARCH SKILLS

Although the *Information Research Process*, briefly discussed in Section 2 of this report, may appear complex in both its conceptualization and its application, a lack of awareness of this process often has a negative impact on students' abilities to search and retrieve the information needed to complete their coursework.

Among the most important factors impacting the quality of students' work are the following:

- few or no relevant documents are found;
- time is wasted due to inefficient search strategies;
- too many documents are found;
- too few documents are found.

NO DOCUMENTS FOUND

Since many search tools, catalogues and databases must be queried using a controlled vocabulary (i.e., a list of accepted terms for describing the documents indexed), students who are unaware of this and always use the same term or expression for a given concept will experience difficulties. Question 14, pertaining to the thesaurus (list of accepted terms), had a success rate of only 12.7%.

A lack of knowledge about the structure and content of the library catalogue (Questions 9 and 19, 19.7% and 25.6% respectively) may also prevent students from finding documents. For example, information specialists frequently observe students searching for magazine or newspaper articles in the catalogue. As this tool does not allow one to search by the author or the title of an article, students may be led to believe that the library does not have the document they want.

Question 7 (with a success rate of 35.8%) concerning the citation corresponding to a periodical article was formulated to verify students' ability to understand and interpret bibliographic references. Failure to understand this variable may result in the inability to retrieve relevant information. A student who is unable to interpret bibliographic references may have difficulties retrieving documents. For example, if one searches the catalogue using the title of a book chapter instead of the title of the book itself, the lack of results may lead one to think that the library does not have the item in question.

Time Wasted Due to Inefficient Search Strategies

Students often abandon their search when they do not find any relevant information, or they waste time by consulting the wrong type of document (Question 22) or by using search tools ineffectively (Question 3); this leaves less time for reading books and articles and for writing papers.

For example, the student who does not understand the utility of the various types of documents and the different search tools will spend a significant amount of time searching by trial and error. A basic understanding of the research process would enable them to use a more direct, efficient approach. Searches in different tools (catalogues, databases and the Internet) are not conducted in the same way. These tools do not provide access to the same types of documents, just as different types of documents do not provide access to the same type of information. The information contained in a scientific or scholarly journal article is not the same as the information presented in a popular magazine article. A bibliographic database can be used to identify articles in periodicals but a catalogue cannot. Failure to understand the characteristics of search tools and the different types of documents wastes time and produces disappointing results.

The first two consequences of poor information research skills —few or no relevant documents being found and time wasted due to inefficient search strategies— can be attributed to a lack of knowledge about search tools and document types, and the inability to read a citation. The latter two consequences —too many or too few documents being found— result from difficulties in identifying appropriate concepts and in developing a search strategy. Students may be frustrated if few or no documents are found or feel overwhelmed if they find too many documents, some of which are irrelevant.

TOO MANY OR TOO FEW DOCUMENTS

These two consequences often result from inappropriate concept identification and a deficient search strategy. Questions 6 (significant words) and 11 (Boolean operator "OR") touched upon these skills.

Once the need for information has been recognized, the next step is to state the problem and identify the concepts. If the concept identification step is not mastered, the result may be (a), a reduced number of hits because of the inclusion of non-significant terms, such as the word "effect", or (b), a large number of irrelevant hits because significant words were omitted, such as the concept of "primary school".

But just as it is essential to use significant words to obtain satisfactory search results, a thorough understanding of how to use Boolean operators within specific search tools is also important. In Question 11, where students were asked to select the Boolean operator that would retrieve the most documents, only 27.7% gave the right answer; the use of another Boolean operator could only result in fewer documents being retrieved.

RESULTS BY THEME

To "determine students' information literacy skills in order to provide more appropriate services" (Objective 1), the Working Group considered it important to assess students' knowledge of the information research process.

The various steps in the *Information Research Process* provide the conceptual framework for this study. The Working Group also considered the Association of College and Research Libraries *Information Literacy Competency Standards for Higher Education*, published in 2000. (The standards are reproduced in Appendix IV.)

In order to better understand the strengths and weaknesses of the 3000-plus students who participated in this survey, the results for each variable and theme are presented in the following table.

The range of results for each theme suggests that the indicators (variables) are discriminant. In at least one instance (Question 4) however, the choice of answers may have influenced the results. In spite of this, the table of results by theme signals that students entering Quebec universities in the fall of 2002 had only a partial understanding of the various steps in the research process.

Weaknesses were noted in students' knowledge of each of the steps in the *Information Research Process*, from *Identifying the Concepts* to *Using the Results*. These weaknesses varied according to the variable examined and in proportion to the number of questions included for each step. Some of the consequences of poor research skills have already been discussed. Although we may be surprised that students have difficulty identifying

concepts and understanding the role of Boolean operators and natural language, it is even more startling that they do not know what a catalogue is and are unable to recognize the characteristics of a scholarly journal. The fact that only a very small percentage of students were able to correctly answer the two questions that focused on these variables, 19.7% and 25.6% respectively, is indicative of a serious problem that requires attention.

Results by Theme

Theme	Variable	Question	Result
Theme 1. Concept Identification	**Significant words**	**6**	**34.5%**
	Significant words	10	64.5%
	Significant words	15	63.0%
Theme 2. Search Strategy	Translation into keywords	4	86.2%
	Boolean operator "OR"	**11**	**27.7%**
	Search indexes	**13**	**29.5%**
	Controlled vocabulary	**14**	**12.7%**
	Boolean operator "AND"	18	61.3%
Theme 3. Document Types	Encyclopedias	5	50.4%
	Periodicals	17	74.7%
	Scholarly journals	**22**	**14.9%**
Theme 4. Search Tools	**Databases**	**3**	**28.5%**
	Search engines	8	91.9%
	Library catalogues	**9**	**19.7%**
	Metasearch engines	16	52.7%
	Library catalogues	**19**	**25.6%**
Theme 5. Use of Results	**Reading citations**	**7**	**35.8%**
	Bibliographies	12	78.2%
	Evaluation of information (Internet)	**20**	**23.0%**
	Ethical use of information	**21**	**27.6%**

This phenomenon is not exclusive to Quebec. The essence of our concerns can be expressed in the following questions:

Since first-year Quebec university undergraduates do not appear to understand or have not mastered the steps in the *Information Research Process*, does the university, as an institution of higher learning in what is now called the "information society", have a duty to educate students in the use of information? In a knowledge-based economy, can it take the risk of training professionals who are incapable of locating, evaluating and using information effectively?

At the moment, numerous observations lead us to believe that such is the case for many of our university graduates: this could be the subject of another study. We would like to draw the reader's attention to the recommendations that follow. Their primary aim is to promote awareness at the institutional level, or better yet, at the level of Quebec universities as a whole, that students should "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information". (ALA, 1989)

To achieve this "informational intelligence", as Diane Poirier calls it, students must learn a strategic problem-solving approach to searching for information. This approach involves adapting to the cognitive challenges of new information technologies and requires critical and metacognitive thinking. (Poirier, 2000)

Such education is not possible without a partnership between librarians and educators.

5.3 RECOMMENDATIONS

That the CREPUQ Subcommittee on Libraries submit to the Committee on Academic Affairs the results and recommendations of *Information Literacy: Study of Incoming First-Year Undergraduates in Quebec*, that they might implement the integration of information literacy competencies into the curriculum and affirm the role of university libraries in their development and promotion, as evidenced in the colloquium *La bibliothèque dans l'université: une relation en mutation*, held at Université de Montréal on October 24-25, 2002.

That the Subcommittee on Libraries encourage the directors of Quebec university libraries to submit the report to the relevant administrators in their respective institutions.

That the Subcommittee on Libraries support the efforts undertaken by the directors of Quebec university libraries to promote close collaboration between the teaching units and information literacy specialists by encouraging them to explore means to implement the following:

- regular evaluation of the information literacy of first-year undergraduate students upon entrance to university;
- participation of a library representative in the various program committees;

- successful completion of a test to measure information literacy competencies during the student's first year of studies;
- incorporation of information literacy instruction into academic programs at the undergraduate and graduate levels.

That the Subcommittee on Libraries encourage the directors of Quebec university libraries to promote the adoption of a policy on the integration of information literacy instruction within their institutions.

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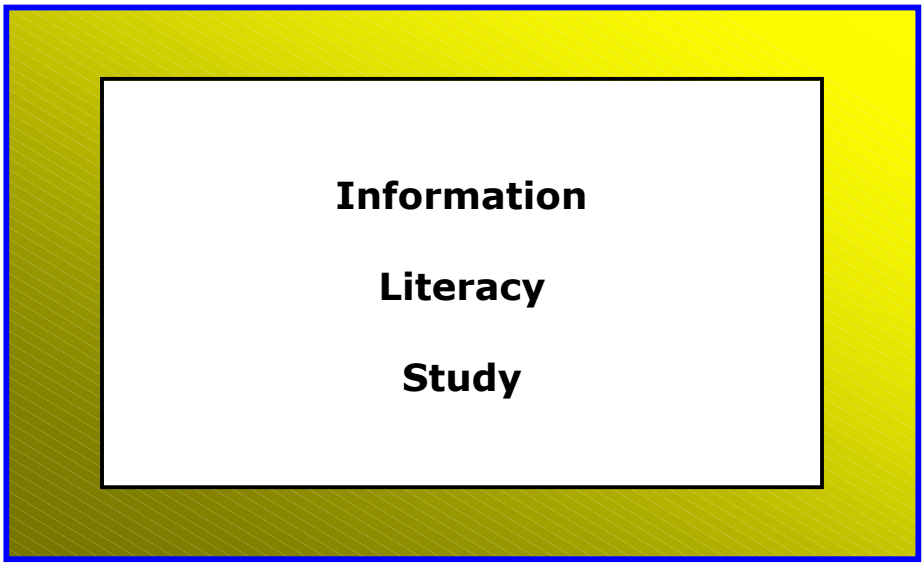
Appendix

APPENDIX I ENGLISH QUESTIONNAIRE



This questionnaire covers a variety of topics pertaining to information seeking when you work on an assignment for a course. The goal of this questionnaire is to help us assess your information literacy skills in order to develop library instruction workshops which will respond better to your needs.

1) Last degree completed:

High School ☐

Cegep/College ☐ Program: _____

University Undergraduate ☐ Program : _____

Other (please, specify): _____

2) In which program will you study in Fall 2002?

_____

As indicated in the covering letter, your responses are anonymous and it is important to answer all questions without consulting anyone else. If you don't know the answer, circle "Don't know".

For questions 3 to 18, circle only one

3) If I want to find journal articles about "*The popularity of video games*", I will search in:

a) The library catalogue

b) A database

c) Yahoo

d) The journals in the library

e) Other (please, specify): _____

f) Don't know

4) You have used the words "*business letters*" in a library catalogue search. No document is found by the computer. What do you conclude?

   a) The library does not have any documents on this topic
   b) I have not used the right words
   c) All documents on this topic are already on loan
   d) The system is down
   e) Other (please, specify): _____
   f) Don't know

5) In order to become familiar with a subject about which I know very little, first I consult:

   a) A journal
   b) An encyclopedia
   c) A database
   d) A book
   e) Other (please, specify): _____
   f) Don't know

6) You must use a psychology database to find information on "*The effect of family relations on the academic results of primary school students*". Which combination of words will you use?

   a) family relations, academic results, primary school
   b) family relations, academic results
   c) effect, family relations, academic results
   d) effect, family relations, academic results, primary school
   e) Other (please, specify): _____
   f) Don't know

7) Which one of the following citations refers to a journal article?

   a) Miller, A.W. (1997). *Clinical disorders and stressful life events*. Madison, CT, International University Press.

   b) Anderson, K.H. (1999). "Ethical dilemmas and radioactive waste: A survey of the issues." *Environmental Ethics*, 2(3):37-42.

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   e) Don't know

8) Using a search engine such as Google or Yahoo, I would not find:

   a) The books available in the library

   b) Biographical information about famous people

   c) Merchandise catalogues

   d) Information about companies

   e) Other (please, specify): _____

   f) Don't know

9) A friend told me that I should read an article published in the November 2001 issue of Internet Guide, "The Microsoft Xbox Console", by Mark Kenney. To check the availability of this article at the library, I search in the catalogue under:

   a) Internet Guide

   b) Mark Kenney

   c) The Microsoft Xbox Console

   d) Answers (a), (b), and (c) are correct

   e) Other (please, specify): _____

   f) Don't know

10) Using a search engine such as Yahoo to search for documents on "*The depletion of the ozone layer and the impact on health*", I use the words:

a) impact, depletion, ozone layer, health

b) ozone layer, health

c) ozone layer

d) skin cancer, ozone layer

e) Other (please, specify):_____

f) Don't know

11) In order to find more documents on my topic I can include synonyms in my search statement. To connect those synonyms in my statement, I use:

a) AND

b) +

c) NOT

d) OR

e) Other (please, specify): _____

f) Don't know

12) You have found a book that is right on your topic. Which section of the book will you consult to find other documents on the topic?

a) The glossary

b) The index

c) The bibliography

d) The table of contents

e) Other (please, specify): _____

f) Don't know

13) To find all the documents about *Margaret Atwood* in the library catalogue, I would do a search:

a) By title

b) By publisher

c) By subject

d) By author

e) Other (please, specify): _____

f) Don't know

14) When searching a specialized database for documents on my subject, it is recommended to use the terminology specific to the database. To identify these terms I would consult:

a) An ideogram

b) A dictionary

c) A thesaurus

d) An Internet search engine

e) Other (please, specify): _____

f) Don't know

15) You must make an oral presentation on the topic "*Measures currently used across the country to decrease the damage to the natural environment*". Among the following choices, which one describes best the ideas contained in your subject?

a) damage to the natural environment, Canada

b) measures currently used, environment, country

c) damage, environment, measures currently used

d) protective measures, environment, Canada

e) Other (please, specify): _____

f) Don't know

16) Using a metasearch engine such as Copernic and MetaCrawler, it is possible to:

a) Launch a search in many search engines simultaneously

b) Execute a search in all the existing Web sites

c) Extend the search into foreign language Web sites

d) Execute the search in all the databases available in the library

e) Other (please, specify): _____

f) Don't know

17) To find the most recent information about drug abuse, I consult:

a) A book

b) A journal

c) An encyclopedia

d) A dictionary

e) Other (please, specify): _____

f) Don't know

18) You have to write a paper on the "*Treatment of depression*". Which search strategy will find the least number of documents?

a) depression and psychotherapy

b) depression or psychotherapy or antidepressants

c) depression and psychotherapy and antidepressants

d) depression

e) Other (please, specify): _____

f) Don't know

For questions 19 to 22, you may circle more than one answer.

19) Some of the items that can be found in the library catalogue include:

a) All the titles of the books available in the library

b) All the titles of the books available on the market

c) All the titles of articles found in the journals available in the library

d) All the titles of journals available in the library

e) None of the above

f) Don't know

20) Among the characteristics that are used to evaluate the quality of an Internet site one finds:

a) The date of publication is provided

b) The author is known in the field

c) Responsibility for the site is clearly indicated

d) The site is rapidly accessible

e) None of the above

f) Don't know

21) You found magazine articles and Web pages presenting different views on a current issue. You want to use this information to write your paper. In which case(s) do you need to include a reference to the source of information?

a) When I copy word for word a paragraph from a magazine article

b) When I copy word for word a paragraph from a Web page

c) When I write in my own words what is being said in a magazine article

d) When I write in my own words what is being said in a Web page

e) In none of the above cases

f) Don't know

22) Which of the following best describe(s) articles published in a scholarly journal?

a) The information is written for the layperson
b) It includes a list of references
c) The research method used is described
d) It has been evaluated by an editorial board before publication
e) None of the above
f) Don't know

Your comments are welcome: _____

_____

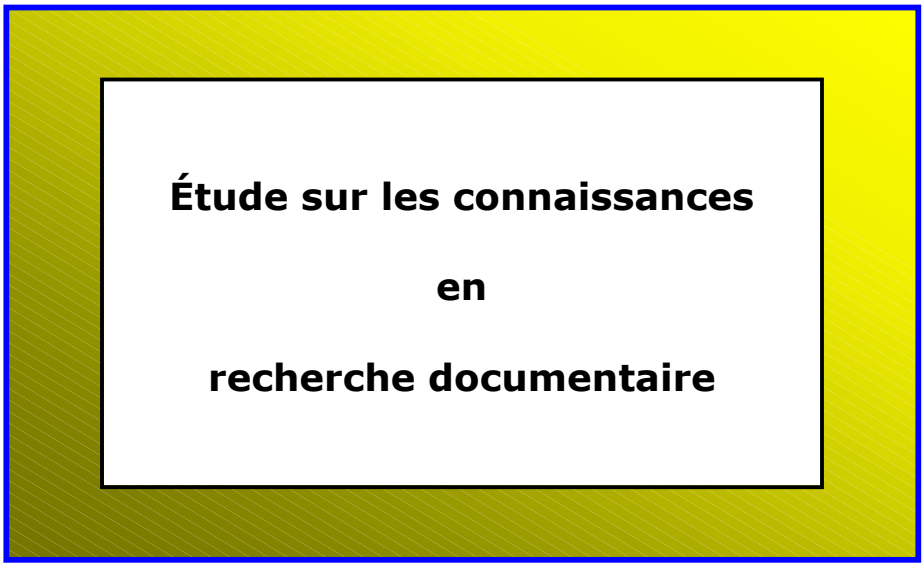
_____

_____

_____

We thank you very much for your participation.

ANNEXE II FRENCH QUESTIONNAIRE



Le présent questionnaire couvre les divers aspects de la recherche documentaire lorsque vous préparez un travail pour un cours. Il a pour but de nous aider à mieux cerner vos connaissances afin de développer des ateliers de formation de recherche en bibliothèque qui répondent à vos besoins.

1. Veuillez indiquer le dernier diplôme complété :

   Secondaire ☐

   Diplôme d'études collégiales (D.E.C.) ☐

   Programme : _____

   Baccalauréat ☐

   Programme : _____

   Autre (s.v.p., préciser) : _____

2. Dans quel programme étudierez-vous à l'automne 2002?

   _____

Comme mentionné dans la lettre ci-jointe, vos réponses sont anonymes et il est important de répondre à toutes les questions sans consulter d'autres personnes. Si vous ne connaissez pas la réponse, encerclez « Ne sais pas ».

Pour les questions 3 à 18, encerclez une seule réponse.

3. Si je veux trouver des articles de revues sur « La popularité des jeux vidéos », je cherche dans :

   a) Le catalogue de la bibliothèque
   b) Une base de données
   c) Yahoo
   d) Les revues de la bibliothèque
   e) Autre (s.v.p., préciser) : _____
   f) Ne sais pas

4. Vous faites une recherche dans le catalogue de la bibliothèque en utilisant les mots « art oratoire ». Aucun document n'est retrouvé par l'ordinateur. Qu'en déduisez-vous?

   a) La bibliothèque n'a pas de document sur le sujet
   b) Je n'ai pas utilisé les bons mots
   c) Tous les documents sur ce sujet sont prêtés
   d) Le système est en panne
   e) Autre (s.v.p., préciser) : _____
   f) Ne sais pas

5. Pour aborder un sujet avec lequel je ne suis pas familier, je consulte d'abord :

   a) Une revue
   b) Une encyclopédie
   c) Une base de données
   d) Un livre
   e) Autre (s.v.p., préciser) : _____
   f) Ne sais pas

6. Vous devez effectuer une recherche dans une base de données en psychologie portant sur « L'effet des relations familiales sur les résultats scolaires des élèves à l'école primaire ». Lequel des ensembles de mots utiliserez-vous?

   a) relations familiales, résultats scolaires, école primaire
   b) relations familiales, résultats scolaires
   c) effet, relations familiales, résultats scolaires
   d) effet, relations familiales, résultats scolaires, école primaire
   e) Autre (s.v.p., préciser) : _____
   f) Ne sais pas

7. Laquelle des références bibliographiques suivantes décrit un article de revue?

   a) Tarrab, Gilbert et Robert Pelsser. (1992). *Le Rorschach en clinique et en sélection*. Marseille, Hommes et perspectives.

   b) Peaucelle, Jean-Louis. (2001). « La recherche française en systèmes d'information : comparaison avec les États-Unis. » *Systèmes d'information et management*, 6(3) :5-30.

   c) Boudon, Pierre. (1991). « L'architecture des années 30, ou l'inversion des signes », in *Masses et culture de masses dans les années 30*, sous la direction de Régine Robin. Paris, Éditions ouvrières, pp. 137-162.

   d) Tellier, Yvan et Roger Tessier (dir.). (1990). « Priorités actuelles et futures », in *Changement planifié et développement des organisations*. Ste-Foy, (Qué.), Presses de l'Université du Québec, T. 2, pp. 132-189.

   e) Ne sais pas

8. Un moteur de recherche tel Google ou Yahoo, ne permet pas de trouver :

   a) Les livres disponibles à la bibliothèque

   b) Des renseignements biographiques sur des personnalités connues

   c) Des catalogues de produits

   d) De l'information sur les entreprises

   e) Autre (s.v.p., préciser) : _____

   f) Ne sais pas

9. Mon amie m'a suggéré de lire un article publié dans Guide Internet du mois de novembre 2001 : « La console Xbox de Microsoft », par Martin Pelletier. Pour vérifier la disponibilité de cet article à la bibliothèque, je cherche dans le catalogue sous :

   a) Guide Internet

   b) Martin Pelletier

   c) La console Xbox de Microsoft

   d) Les réponses (a), (b), et (c) sont bonnes

   e) Autre (s.v.p., préciser) : _____

   f) Ne sais pas

10. Pour trouver à l'aide d'un moteur de recherche comme Yahoo des documents sur « *L'impact de l'amincissement de la couche d'ozone sur la santé* », j'utilise les mots :

    a) impact, amincissement, couche d'ozone, santé

    b) couche d'ozone, santé

    c) couche d'ozone

    d) cancer de la peau, couche d'ozone

    e) Autre (s.v.p., préciser) : _____

    f) Ne sais pas

11. Pour repérer un grand nombre de documents sur mon sujet, je peux inclure des synonymes dans mon expression de recherche. Pour réunir ces synonymes, j'utilise :

    a) ET

    b) +

    c) SAUF

    d) OU

    e) Autre (s.v.p., préciser) : _____

    f) Ne sais pas

12. Vous avez trouvé un livre portant exactement sur le sujet qui vous intéresse. Quelle section du livre allez-vous consulter pour trouver d'autres documents sur le sujet?

    a) Le glossaire

    b) L'index

    c) La bibliographie

    d) La table des matières

    e) Autre (s.v.p., préciser) : _____

    f) Ne sais pas

13. Pour trouver tous les documents sur *Michel Tremblay* dans le catalogue de la bibliothèque, je fais une recherche :

    a) Par titre

    b) Par éditeur

    c) Par sujet

    d) Par auteur

    e) Autre (s.v.p., préciser) : _____

    f) Ne sais pas

14. Lorsque j'interroge une base de données spécialisée pour repérer des documents sur un sujet, il est conseillé d'utiliser la terminologie spécifique à cette base.

    À cette fin, je consulte

    a) Un idéogramme

    b) Un dictionnaire

    c) Un thésaurus

    d) Un moteur de recherche Internet

    e) Autre (s.v.p., préciser) : _____

    f) Ne sais pas

15. Vous devez faire une présentation orale portant sur « *Les mesures actuellement utilisées au pays pour pallier à la dégradation du milieu nature* ». Parmi les choix suivants, lequel décrit le mieux les idées contenues dans votre sujet?

    a) dégradation du milieu naturel, Canada

    b) mesures utilisées, environnement, pays

    c) dégradation, environnement, mesures utilisées

    d) mesures de protection, environnement, Canada

    e) Autre (s.v.p., préciser) : _____

    f) Ne sais pas

16. J'utilise un métamoteur de recherche tel Copernic ou MetaCrawler pour :

    a) Lancer une requête dans plusieurs moteurs de recherche simultanément
    b) Exécuter la recherche dans tous les sites Web existants
    c) Étendre la recherche à des sites Web de langues étrangères
    d) Exécuter la recherche dans toutes les bases de données disponibles à la bibliothèque
    e) Autre (s.v.p., préciser) : _____
    f) Ne sais pas

17. Pour trouver l'information la plus récente sur la toxicomanie, je consulte :

    a) Un livre
    b) Une revue
    c) Une encyclopédie
    d) Un dictionnaire
    e) Autre (s.v.p., préciser) : _____
    f) Ne sais pas

18. Vous devez faire un travail portant sur « *Le traitement de la dépression* », quelle stratégie de recherche trouvera le plus petit nombre de documents?

    a) dépression et psychothérapie
    b) dépression ou psychothérapie ou antidépresseurs
    c) dépression et psychothérapie et antidépresseurs
    d) dépression
    e) Autre (s.v.p., préciser) : _____
    f) Ne sais pas

Pour les questions 19 à 22, vous pouvez encercler plus d'un choix de réponse.

19. Le catalogue de la bibliothèque permet de trouver, entre autre(s) :
    a) Tous les titres des livres disponibles à la bibliothèque
    b) Tous les titres des livres disponibles sur le marché
    c) Tous les titres des articles de revues disponibles à la bibliothèque
    d) Tous les titres des revues disponibles à la bibliothèque
    e) Aucun de ces énoncés
    f) Ne sais pas

20. Parmi les caractéristiques qui permettent d'évaluer la qualité d'un site Internet on retrouve :
    a) La date de publication est mentionnée
    b) L'auteur est connu dans le domaine
    c) La responsabilité du site est clairement indiquée
    d) Il est accessible rapidement
    e) Aucun de ces énoncés
    f) Ne sais pas

21. Vous trouvez des articles de revues et des pages Web qui présentent des opinions sur un sujet d'actualité. Vous désirez utiliser cette information pour rédiger votre travail. Dans quel(s) cas devez-vous inclure une référence à la source d'où vient l'information?
    a) Quand je reproduis mot à mot un paragraphe d'un article de revue
    b) Quand je reproduis mot à mot un paragraphe d'une page Web
    c) Quand j'écris dans mes propres mots ce qui est dit dans un article de revue
    d) Quand j'écris dans mes propres mots ce qui est dit dans une page Web
    e) Aucun de ces énoncés
    f) Ne sais pas

22. Parmi les énoncés suivants, identifiez celui ou ceux décrivant bien les articles publiés dans les revues savantes?

    a) Ils présentent de l'information scientifique vulgarisée

    b) Ils fournissent une liste de références

    c) Ils décrivent la méthodologie de recherche utilisée

    d) Ils ont été évalués par un comité de lecture avant publication

    e) Aucun de ces énoncés

    f) Ne sais pas

Vos commentaires sont les bienvenus :_____

Nous vous remercions beaucoup de votre participation.

APPENDIX III BOOLEAN OPERATORS

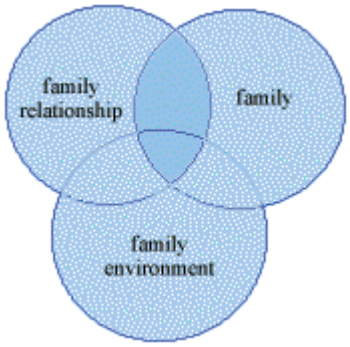
OR

(OU)

"OR" is used to retrieve documents that include **one or several** of the search terms **or all** of the terms. Documents retrieved can contain one term only, two out of three, or all terms.

"OR" can be used to connect synonyms or related terms describing a concept.

"OR" broadens the search and **increases** the number of documents that can be retrieved. A greater number of terms connected with "OR" will generate a greater number of results.



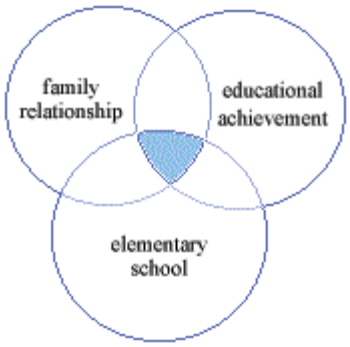
family relationship OR family OR family environment

AND

(ET)

"AND" is used to retrieve documents that include **all** of the search terms. Documents retrieved **must have** all terms.

"AND" narrows the search and as a result, it **limits** the number of documents that can be retrieved. A greater number of terms connected with "AND" will result in a more precise search and will generate fewer results.



family relationship AND educational achievement AND elementary school

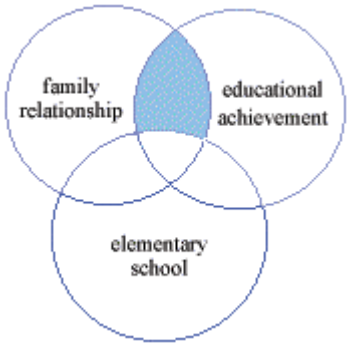
NOT

(SAUF)

"NOT" is used to retrieve documents that include one or more search terms while excluding from the search results documents that include a specific search term.

For example, NOT is used here to exclude all documents that include the term "elementary school".

"NOT" enables one to **exclude** one or more search terms.



(family relationship AND educational achievement) NOT elementary school

Parentheses are used to prioritize operations in a search, i.e. the system will connect terms included within the parentheses first before dealing with other operations in the search query.

APPENDIX IV INFORMATION LITERACY COMPETENCY STANDARDS FOR HIGHER EDUCATION

Association of College and Research Libraries
Information Literacy Competency Standards for Higher Education
Standards, Performance Indicators, and Outcomes

Approved by: ACRL Board, January 18, 2000.

Standard One

The information literate student determines the nature and extent of the information needed.

Performance Indicators:

1. The information literate student defines and articulates the need for information.

   Outcomes Include:

   1. Confers with instructors and participates in class discussions, peer workgroups, and electronic discussions to identify a research topic, or other information need
   2. Develops a thesis statement and formulates questions based on the information need
   3. Explores general information sources to increase familiarity with the topic
   4. Defines or modifies the information need to achieve a manageable focus
   5. Identifies key concepts and terms that describe the information need
   6. Recognizes that existing information can be combined with original thought, experimentation, and/or analysis to produce new information

2. The information literate student identifies a variety of types and formats of potential sources for information.

   Outcomes Include:

   1. Knows how information is formally and informally produced, organized, and disseminated
   2. Recognizes that knowledge can be organized into disciplines that influence the way information is accessed

3. Identifies the value and differences of potential resources in a variety of formats (e.g., multimedia, database, website, data set, audio/visual, book)
4. Identifies the purpose and audience of potential resources (e.g., popular vs. scholarly, current vs. historical)
5. Differentiates between primary and secondary sources, recognizing how their use and importance vary with each discipline
6. Realizes that information may need to be constructed with raw data from primary sources.

3. The information literate student considers the costs and benefits of acquiring the needed information.

Outcomes Include:

1. Determines the availability of needed information and makes decisions on broadening the information seeking process beyond local resources (e.g., interlibrary loan; using resources at other locations; obtaining images, videos, text, or sound)
2. Considers the feasibility of acquiring a new language or skill (e.g., foreign or discipline-based) in order to gather needed information and to understand its context
3. Defines a realistic overall plan and timeline to acquire the needed information

4. The information literate student reevaluates the nature and extent of the information need.

Outcomes Include:

1. Reviews the initial information need to clarify, revise, or refine the question
2. Describes criteria used to make information decisions and choices

Standard Two

The information literate student accesses needed information effectively and efficiently.

Performance Indicators:

1. The information literate student selects the most appropriate investigative methods or information retrieval systems for accessing the needed information.

Outcomes Include:

1. Identifies appropriate investigative methods (e.g., laboratory experiment, simulation, fieldwork)

2. Investigates benefits and applicability of various investigative methods
3. Investigates the scope, content, and organization of information retrieval systems
4. Selects efficient and effective approaches for accessing the information needed from the investigative method or information retrieval system

2. The information literate student constructs and implements effectively-designed search strategies.

Outcomes Include:

1. Develops a research plan appropriate to the investigative method
2. Identifies keywords, synonyms and related terms for the information needed
3. Selects controlled vocabulary specific to the discipline or information retrieval source
4. Constructs a search strategy using appropriate commands for the information retrieval system selected (e.g., Boolean operators, truncation, and proximity for search engines; internal organizers such as indexes for books)
5. Implements the search strategy in various information retrieval systems using different user interfaces and search engines, with different command languages, protocols, and search parameters
6. Implements the search using investigative protocols appropriate to the discipline

3. The information literate student retrieves information online or in person using a variety of methods.

Outcomes Include:

1. Uses various search systems to retrieve information in a variety of formats
2. Uses various classification schemes and other systems (e.g., call number systems or indexes) to locate information resources within the library or to identify specific sites for physical exploration
3. Uses specialized online or in person services available at the institution to retrieve information needed (e.g., interlibrary loan/document delivery, professional associations, institutional research offices, community resources, experts and practitioners)
4. Uses surveys, letters, interviews, and other forms of inquiry to retrieve primary information

4. The information literate student refines the search strategy if necessary.

   Outcomes Include:

   1. Assesses the quantity, quality, and relevance of the search results to determine whether alternative information retrieval systems or investigative methods should be utilized

   2. Identifies gaps in the information retrieved and determines if the search strategy should be revised

   3. Repeats the search using the revised strategy as necessary

5. The information literate student extracts, records, and manages the information and its sources.

   Outcomes Include:

   1. Selects among various technologies the most appropriate one for the task of extracting the needed information (e.g., copy/paste software functions, photocopier, scanner, audio/visual equipment, or exploratory instruments)

   2. Creates a system for organizing the information

   3. Differentiates between the types of sources cited and understands the elements and correct syntax of a citation for a wide range of resources

   4. Records all pertinent citation information for future reference

   5. Uses various technologies to manage the information selected and organized

Standard Three

The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.

Performance Indicators:

1. The information literate student summarizes the main ideas to be extracted from the information gathered.

   Outcomes Include:

   1. Reads the text and selects main ideas

   2. Restates textual concepts in his/her own words and selects data accurately

   3. Identifies verbatim material that can be then appropriately quoted

2. The information literate student articulates and applies initial criteria for evaluating both the information and its sources.

   Outcomes Include:

   1. Examines and compares information from various sources in order to evaluate reliability, validity, accuracy, authority, timeliness, and point of view or bias
   2. Analyzes the structure and logic of supporting arguments or methods
   3. Recognizes prejudice, deception, or manipulation
   4. Recognizes the cultural, physical, or other context within which the information was created and understands the impact of context on interpreting the information

3. The information literate student synthesizes main ideas to construct new concepts.

   Outcomes Include:

   1. Recognizes interrelationships among concepts and combines them into potentially useful primary statements with supporting evidence
   2. Extends initial synthesis, when possible, at a higher level of abstraction to construct new hypotheses that may require additional information
   3. Utilizes computer and other technologies (e.g. spreadsheets, databases, multimedia, and audio or visual equipment) for studying the interaction of ideas and other phenomena

4. The information literate student compares new knowledge with prior knowledge to determine the value added, contradictions, or other unique characteristics of the information.

   Outcomes Include:

   1. Determines whether information satisfies the research or other information need
   2. Uses consciously selected criteria to determine whether the information contradicts or verifies information used from other sources
   3. Draws conclusions based upon information gathered
   4. Tests theories with discipline-appropriate techniques (e.g., simulators, experiments)
   5. Determines probable accuracy by questioning the source of the data,

the limitations of the information gathering tools or strategies, and the reasonableness of the conclusions

6. Integrates new information with previous information or knowledge
7. Selects information that provides evidence for the topic

5. The information literate student determines whether the new knowledge has an impact on the individual's value system and takes steps to reconcile differences.

Outcomes Include:

1. Investigates differing viewpoints encountered in the literature
2. Determines whether to incorporate or reject viewpoints encountered

6. The information literate student validates understanding and interpretation of the information through discourse with other individuals, subject-area experts, and/or practitioners.

Outcomes Include:

1. Participates in classroom and other discussions
2. Participates in class-sponsored electronic communication forums designed to encourage discourse on the topic (e.g., email, bulletin boards, chat rooms)
3. Seeks expert opinion through a variety of mechanisms (e.g., interviews, email, listservs)

7. The information literate student determines whether the initial query should be revised.

Outcomes Include:

1. Determines if original information need has been satisfied or if additional information is needed
2. Reviews search strategy and incorporates additional concepts as necessary
3. Reviews information retrieval sources used and expands to include others as needed

Standard Four

The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.

Performance Indicators:

1. The information literate student applies new and prior information to the planning and creation of a particular product or performance.

   Outcomes Include:

   1. Organizes the content in a manner that supports the purposes and format of the product or performance (e.g. outlines, drafts, storyboards)
   2. Articulates knowledge and skills transferred from prior experiences to planning and creating the product or performance
   3. Integrates the new and prior information, including quotations and paraphrasings, in a manner that supports the purposes of the product or performance
   4. Manipulates digital text, images, and data, as needed, transferring them from their original locations and formats to a new context

2. The information literate student revises the development process for the product or performance.

   Outcomes Include:

   1. Maintains a journal or log of activities related to the information seeking, evaluating, and communicating process
   2. Reflects on past successes, failures, and alternative strategies

3. The information literate student communicates the product or performance effectively to others.

   Outcomes Include:

   1. Chooses a communication medium and format that best supports the purposes of the product or performance and the intended audience
   2. Uses a range of information technology applications in creating the product or performance
   3. Incorporates principles of design and communication
   4. Communicates clearly and with a style that supports the purposes of the intended audience

Standard Five

The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.

Performance Indicators:

1. The information literate student understands many of the ethical, legal and socio-economic issues surrounding information and information technology.

   Outcomes Include:

   1. Identifies and discusses issues related to privacy and security in both the print and electronic environments
   2. Identifies and discusses issues related to free vs. fee-based access to information
   3. Identifies and discusses issues related to censorship and freedom of speech
   4. Demonstrates an understanding of intellectual property, copyright, and fair use of copyrighted material

2. The information literate student follows laws, regulations, institutional policies, and etiquette related to the access and use of information resources.

   Outcomes Include:

   1. Participates in electronic discussions following accepted practices (e.g. "Netiquette")
   2. Uses approved passwords and other forms of ID for access to information resources
   3. Complies with institutional policies on access to information resources
   4. Preserves the integrity of information resources, equipment, systems and facilities
   5. Legally obtains, stores, and disseminates text, data, images, or sounds
   6. Demonstrates an understanding of what constitutes plagiarism and does not represent work attributable to others as his/her own
   7. Demonstrates an understanding of institutional policies related to human subjects research

3. The information literate student acknowledges the use of information sources in communicating the product or performance.

Outcomes Include:

1. Selects an appropriate documentation style and uses it consistently to cite sources

2. Posts permission granted notices, as needed, for copyrighted material