Higher Education
Quality Council
of Ontario

Information Literacy Competency Standards for Students:
A Measure of the Effectiveness of Information Literacy Initiatives in Higher Education

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Cite this publication in the following format:

Duncan, A., Varcoe, J. (2012). *Information Literacy Competency Standards for Students: A Measure of the Effectiveness of Information Literacy Initiatives in Higher Education.* Toronto: Higher Education Quality Council of Ontario.

Higher Education Quality Council of Ontario
An agency of the Government of Ontario

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Executive Summary

This research project was a two-year study that measured the effectiveness of information literacy models delivered to a sample of convenience, yielding 503 students in college diploma, college applied degree, collaborative degree, and university undergraduate programs at Georgian College, located in Barrie, Ontario. The project differentiates between four information literacy delivery models (Course-based, Embedded, Common Hour, and Online Tutorial) in order to identify best practices to organizations of different nature, size, and scope. Students' information literacy skills and the benefits and challenges of the information literacy model are examined. This study also explored faculty knowledge and their perception of the importance of information literacy skill development and application.

Students had the opportunity to complete four online skill and self-assessment surveys during the two-year term of the research study, which collected both quantitative and qualitative data. Using a semi-structured format, faculty members were interviewed at three points during the same two-year term of study to assess their perceptions of student progress in achieving the American College and Research Libraries' *Information Literacy Competency Standards for Higher Education* (2000). Student surveys and faculty interviews were analyzed separately and then were compared to each other.

Student survey results revealed a reliance on web-based tools to collect information. Student accuracy, comfort, and engagement scores of information literacy skills increased somewhat across the four surveys. One significant main effect was observed in Survey Four, where the Embedded model had a significantly higher accuracy in citation identification than the Course-based model. Faculty interviews suggested the need to improve their own information literacy awareness and development. Faculty members also commented on the student experience of information literacy skill development and evaluation.

By comparing student survey and faculty interview results with the literature, the research suggested the value of introducing an Information Literacy Curriculum. The curriculum would address the following components in a program: pedagogy; skills/knowledge levels; delivery models; human resources; underlying characteristics of information literacy programs; and the benefits/outcomes for the student and institution. Student survey and faculty interview findings suggested the value of a blended delivery model (e.g., offer various delivery models) that should be embedded in an academic program's curriculum throughout the entire program duration. It is further recommended that an information literacy strategic plan be implemented, which would include utilizing the Information Literacy Curriculum to promote student success, engagement, and life-long learning.

1. Introduction

This research measured the effectiveness of students' information literacy skills and comfort levels in four different delivery models, delivered to college and university students at Georgian College in Barrie, Ontario. The enhancement of information literacy skills and gaps in student learning were explored and identified within these delivery models. Findings from this two-year study addressed the benefits and challenges of each of these models.

Qualitative and quantitative information was collected from four online student surveys which measured both skills and comfort level. Interviews with faculty, undertaken at three points of time in the research study, captured faculty's perceptions of students' information literacy skills and comfort levels. Survey and interview data were also evaluated for comparison and contrast to inform a best practice.

1.1 Importance of Information Literacy

Several student learning outcomes, such as student success, engagement, and graduate employability are linked to library and information literacy activities (Gardner & Koch, 2007; Ministry of Training, Colleges and Universities [MTCU], 2009; Rockman, 2004). For the purposes of this research study, engagement is defined as active participation and quality of effort in academic and other activities (Beaudoin, Sheridan & Matthews, 2012) as they relate to information literacy. The importance of acquiring skills in information literacy "multiplies the opportunities for students' self-directed learning, as they become engaged in using a wide variety of information sources to expand their knowledge, ask informed questions, and sharpen their critical thinking skills for further self-directed learning" (Association of Colleges & Research Libraries [ACRL], 2000, p. 3).

Academic performance is directly linked to core skills, such as reading, writing, and thinking critically. As Rockman (2004) argues, "Just as writing shapes and enhances thought, clarifies thinking, and facilitates learning, so does information literacy. Both are interdisciplinary, employ technology, and contribute to lifelong learning" (p. 57). The ability to think critically is similarly directly linked with information literacy: "Information literacy supports critical thinking since it emphasizes assessing search results for quality and relevance, and evaluating information choices for reliability, validity, authority, and timeliness before making judgments based upon them" (Curzon, 2004, p. 33). Furthermore, Wiggers and Arnold (2011) recognized that "[s]tudent associations, postsecondary institutions and governments are now making increasing efforts to ensure that a quality learning experience is being offered to students throughout their PSE experience, one that includes solid and effective teaching, strong levels of student engagement, deep learning, and value-added skills development" (p. 2).

Employability is similarly dependent on graduates who can demonstrate these skills. "Information fluency is the set of requisite 21st century skills needed to succeed in the information economy" (Gardner & Koch, 2007, p. xv). The Conference Board of Canada (2000) further identifies an individual's need to be able to manage information as a skill needed for employment. Furthermore, Ontario colleges are required to meet objectives called *Employability Skills Standards* that include skills related to information literacy, such as communication (reading, writing, presenting), critical thinking and problem solving, and information management (MTCU, 2009).

Several prominent employers have recognized the value of information literacy (Rockman, 2004). Anthony Comper, the president of the Bank of Montreal, told the 1999 commerce graduating class at the University of Toronto that information literacy is essential to future success:

> Whatever else you bring to the 21st century workplace, however great your technical skills and however attractive your attitude and however deep your commitment to excellence, the bottom line is that to be successful, you need to acquire a high level of information literacy. What we need in the knowledge industries are people who know how to absorb and analyze and integrate

and create and effectively convey information – and who know how to use information to bring real value to everything they undertake. (as cited in Rockman, 2004, p. 8)

To this end, information literacy skills development is not only beneficial to students while in school, but also as they enter the workforce.

Several academic and professional institutions have recognized the importance of information literacy skills acquisition and have strategized how to make this opportunity for skills development available to both faculty and student user groups. ACRL (2003) presents characteristics "intended to help those who are interested in developing, assessing, and improving information literacy programs." These best practice characteristics for information literacy programs include the following: mission, goals and objectives, planning, administrative and institutional support, articulation of the curriculum, collaboration, pedagogy, staffing, outreach, and assessment/evaluation (ACRL, 2003). ACRL has developed a hands-on workbook that allows institutions to evaluate their current information literacy strategies so it can help them plan for further information literacy initiatives and programming (ACRL, 2010).

1.2   Literature Review

Information literacy (IL) initiatives are delivered in colleges and universities across Ontario, Canada, and around the world. These initiatives are mostly designed and delivered by librarians – sometimes in the classroom, sometimes outside – but usually in collaboration with teaching faculty. While the delivery methods may vary, what is constant is the definition and intended learning outcomes. Information literacy is the ability to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (ACRL, 2000). ACRL contends that information literacy "forms the basis of lifelong learning… is common to all disciplines, to all learning environments, and to all levels of education. It enables learners to master content and extend their investigations, become more self-directed, and assume greater control over their own learning" (ACRL, 2000). In essence, formal and deliberate information literacy instruction offers students, regardless of their entry skill level, knowledge or ability, an equal opportunity to succeed as informed students and informed life-long learners, if that instruction is based on core concepts such as those set out by ACRL (ACRL, 2000).

Information literacy has a long history, with references dating back to the late 1800s describing some academic librarians teaching bibliographic sessions and providing library tours. Information literacy instruction has changed and evolved to incorporate technology and become more student focused, targeting students in various stages of their academic careers: elementary school, secondary school, and higher education (Guskin, 2007).

Specifically, information literacy instruction in higher education is guided by ACRL's *Information Literacy Standards for Higher Education* (2000). There are five standards which are broken down to performance indicators and then broken down further into performance outcomes. These standards will be discussed in a subsequent section of this document.

Information literacy instruction in higher education takes place in both the classroom and library, depending on the program or faculty (Julien, 2000). As a highly used and highly important student service (MTCU, 2011), libraries deliver a myriad of direct-to-student services that support student learning (Julien, 2000). Library services offered at Canadian colleges and universities usually include the following components: group instruction for specific courses, individualized instruction, library tours, classroom lectures, library guides, and computer assisted and hands-on instruction (Julien, 2000). These library services can be offered under different models of delivery: course-based (ACRL, n.d.), online tutorials (Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K., 2009; Orme, 2004), lecture tutorials (Gandhi, 2004), and embedded (ACRL, n.d.; Bent & Stockdale, 2009; Hsieh, C. & Knight, L., 2008).

Postsecondary students acquire library and information related skills for use in their coursework, presentations, assignments, or other written work (McGuiness, 2006). However, McGuiness cautions about the use of assignments solely for information literacy skill acquisition, as assignments may not

specifically evaluate components of information literacy, such as critical evaluation and effective search strategies. Furthermore, faculty members use "overly generalized terminology such as 'research skills' and 'information gathering' in assignments [which] fails to provide sufficient clear guidelines for students, in terms of mastery they are expected to reach" (McGuiness, 2006, p. 580). McGuiness' (2006) study recommends opportunities for faculty to develop information literacy skills and strategies for discipline-specific information literacy development.

Several studies have discussed the joint role of faculty and library staff in the development and progression of information skills in higher education. Bury (2010) found that many faculty members recognize the value of information literacy instruction for students. Over three-quarters of the faculty surveyed suggested that information literacy instruction should consist of collaboration between librarians and faculty. However, this does not always happen. Just over half of the survey sample reported teaching information literacy competencies in their course. Furthermore, of those faculty members incorporating information literacy instruction into their course, most were doing it themselves.

Other studies found that faculty members believe that students develop information literacy skills on their own and through shared experiences with their peers (Bury, 2010; McGuiness, 2006), while others expect that their students have already gained these competencies in previous education (Bury, 2010). Therefore, faculty members rely on the student to have or acquire these skills outside of the classroom. Researchers have identified a number of other barriers to information literacy instruction in the classroom: curriculum too full (Bury, 2010), faculty's lack of awareness of information literacy concepts and instruction opportunities (Bury, 2010), scarce resources (time, human resources, equipment) (Julien, 2005), and negative student attitudes toward instruction in this area (Julien, 2005).

To encourage engagement in information literacy activities and instruction, the literature explores numerous factors (Bury, 2010; Head & Eisenberg, 2009, 2010; Neely, Ferguson, Romary, Simmons, & Sullivan, 2003; Rockman, 2007). Student skills assessments, engagement, and perceptions are common topics discussed by postsecondary students, faculty, and library staff, and the findings are often utilized to improve the delivery methods of information literacy skills.

Students' research behaviours in higher education have been discussed in several articles. Studies have shown that postsecondary students rely on the web to collect information for assignments before using any other resources (Bury, 2010; Head & Eisenberg, 2010; Neely, Ferguson, Romary, Simmons, & Sullivan, 2003). Research suggests that students are not motivated to go beyond this approach and are hesitant to use print sources (Bury, 2010).

Information literacy skills are not used solely for academic research but are also utilized in the students' inquiries related to their day to day activities (Head & Eisenberg, 2009). Participants from the Project Information Literacy (PIL) study, a national study of U.S. college and university students and their information seeking behaviours, reported a difference in course-based research and everyday life research (Head & Eisenberg, 2009). Students described everyday research as broad, and the topic was generally of personal interest or curiosity and had no deadlines (Head & Eisenberg, 2009). Students commented that they have less difficulty finding information for personal use, while course-based research required a narrower scope and sometimes yielded few results, leading to student frustration (Head & Eisenberg, 2009). Students revealed that getting started on a project was one of their greatest challenges when conducting research (Head & Eisenberg, 2009). They also reported procrastinating, only starting to work on a course-based assignment two or three days before the submission date (Head & Eisenberg, 2009).

Students reported being challenged with "defining a topic, narrowing it down, and filtering irrelevant results" (Head & Eisenberg, 2010, p. 3). "Students in both large universities and small colleges use a risk averse strategy based on efficiency and predictability in order to manage and control information available to them" (Head & Eisenberg, 2010, p. 3). In other words, Head and Eisenberg (2010) contended that students are predictable and cautious when it comes to accessing and obtaining information.

Students have identified context as an important characteristic needed to complete the research process (Head & Eisenberg, 2009). Context or keywords can be obtained by finding background research on the topic and through "traditional methods, such as libraries and self-taught, creative workarounds, such as 'presearch' and Wikipedia" (Head & Eisenberg, 2009, p. 1). These methods help the student locate information with greater ease and confidence.

Postsecondary students often self-report higher confidence levels for their information literacy abilities than is really the case for their actual abilities (Bury, 2010; Neely et al., 2003). For example, students reported a high level of confidence for evaluating sources for currency, accuracy, and authority, but actually had difficulties selecting and evaluating articles (Neely et al., 2003). In the same study, Neely et al. (2003) identified that students understood the concepts of plagiarism and copyright, but some experienced challenges with paraphrasing and with determining which documents from websites could be used without asking for permission (Neely et al., 2003).

Faculty members reported having high expectations of entering students' information literacy skills (Bury, 2010; Rockman, 2007). Some faculty members expect that their students should be entering postsecondary education with adequate information literacy skills (Bury, 2010). Rockman (2007) reflects that "most classroom faculty expected students to come to classes already acclimated to university life, mature and academically ready to complete assignments, study effectively, write well, take tests, select a major, use the library and pursue a career" (p. 87). Faculty members expressed concerns about the students' ability to meet ACRL's *Information Literacy Competency Standards for Higher Education*, identifying student challenges in each standard (Bury, 2010).

The sections that follow include the examination of an information literacy framework, a description of the information literacy models used in this study, followed by the methodology, findings, discussion of best practices, and recommendations.

1.3   Information Literacy Framework

In 2000, Georgian College adopted the *Information Literacy Competency Standards for Higher Education* (ACRL, 2000), which were approved in January 2000 by the Board of Directors of the Association of College and Research Libraries (ACRL), a division of the American Library Association. These delivery standards have been adopted by most colleges and universities in Ontario, as well as other jurisdictions. Information literacy is defined as the ability to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (ACRL, 2000).

The ACRL (2000) lists five standards which are broken down into performance indicators, which are then divided further into a total of 87 performance outcomes:

- Standard One: The information literate student determines the nature and extent of the information needed;

- Standard Two: The information literate student accesses needed information effectively and efficiently;

- 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;

- Standard Four: The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose;

- 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 (ACRL, 2000).

The researchers created three levels of information literacy, and each level builds on the skills and knowledge of the previous:

- The *literate level* is a basic ability to determine that information is needed, to access information, to evaluate and incorporate information into knowledge base and value system, to use information effectively to accomplish a specific purpose, and to understand the economic, legal, and social issues surrounding the use of information.

- The *fluent level* involves a sophisticated comprehension and synthesis of the information literacy standards with an ability to transfer the skills.

- The *master level* is a progression from the fluent level that includes a specialized ability in a particular discipline or narrowly defined subject area and the ability to actualize the skills in an interdisciplinary environment.

Other examples of information literacy frameworks exist. A framework was developed through the Welsh Information Literacy Project to create a "common understanding and to provide a reference point from which information literacy can be integrated into other strategies as appropriate" (Welsh Information Literacy Project, 2011, p. 5). The framework was developed to be used in curricula, beginning at the elementary educational level through to higher education and industry. Another framework was developed in Scotland called the *National Information Literacy Framework Scotland* (2009). "The framework is seen as a key tool for the embedding of information literacy in schools, F[urther] E[ducation], H[igher] E[ducation], and lifelong learning and for life" (Glasgow Caledonia University, 2011). The common element between the framework in this research report and the other two frameworks is a description of skills and knowledge progression that can be incorporated into a curriculum.

In the present study, each performance outcome was identified in one or more of the levels and can be found in a framework in Appendix A where examples of the expected skills and/or knowledge are described for each outcome. If an outcome was present in more than one level, the examples progress in difficulty. The framework examples were developed using ACRL's *Objectives for information literacy instruction: A model statement for academic librarians* (n.d.). For example, performance outcome 2.2b states: "identifies keywords, synonyms and related terms for the information needed" (ACRL, 2000). A student who is literate will be able to identify and record the keywords and phrases and related terms (e.g., synonyms, alternate spellings) to be used in a search. However, a student who is fluent will identify keywords or subject terms found in results that may specify, broaden, or narrow the results.

Another example is 3.2a: "examines and compares information from various sources in order to evaluate reliability, validity, accuracy, authority, timeliness, and point of view or bias" (ACRL, 2000). This performance outcome is reflected in both the literate and fluent levels. Performance outcome 4.2b states: "reflects on past successes, failures, and alternative strategies" (ACRL, 2000) and is only listed in the fluent level.

Performance outcome 2.2d is represented in all three skill levels and states that the student "constructs a search strategy using appropriate command for the information retrieval system selected" (ACRL, 2000). A student who is literate can understand that a search strategy is required and is able to identify the keywords and subject terms and how they are combined. A basic search strategy is developed. A student who is fluent recognizes that more relevant results may be obtained using field searching, more complex Boolean logic that uses "and," "or," or "not" connectors. They may also use truncation techniques, keywords, and controlled vocabulary. A student who is at the master level incorporates search methodologies unique to a discipline, choosing specialized bibliographies, indexes, etc., and can search specialized data like statistical data sets.

The Discussion section of this report will examine how the survey results and faculty interviews demonstrated the different levels of information literacy skills.

1.4 Information Literacy Delivery Models

Four delivery models were examined in this study to measure the effectiveness of information literacy delivery. These models are associated with three different credentials: college diploma, college degree, and university degree. Two models – Course-based and Embedded – were delivered in two courses or programs. Figure 1 illustrates the four models and their corresponding course(s) or program(s). The following sections describe the content in each of the delivery models, content which varied based on the needs of the particular course or program.

For a description of costs associated with each delivery model, see Appendix B for a general cost analysis framework. The framework describes generic components in the delivery of any information literacy model. The Appendix highlights the differing costs related to this study's specific information literacy delivery models.

Figure 1: Information literacy models by delivery method and program
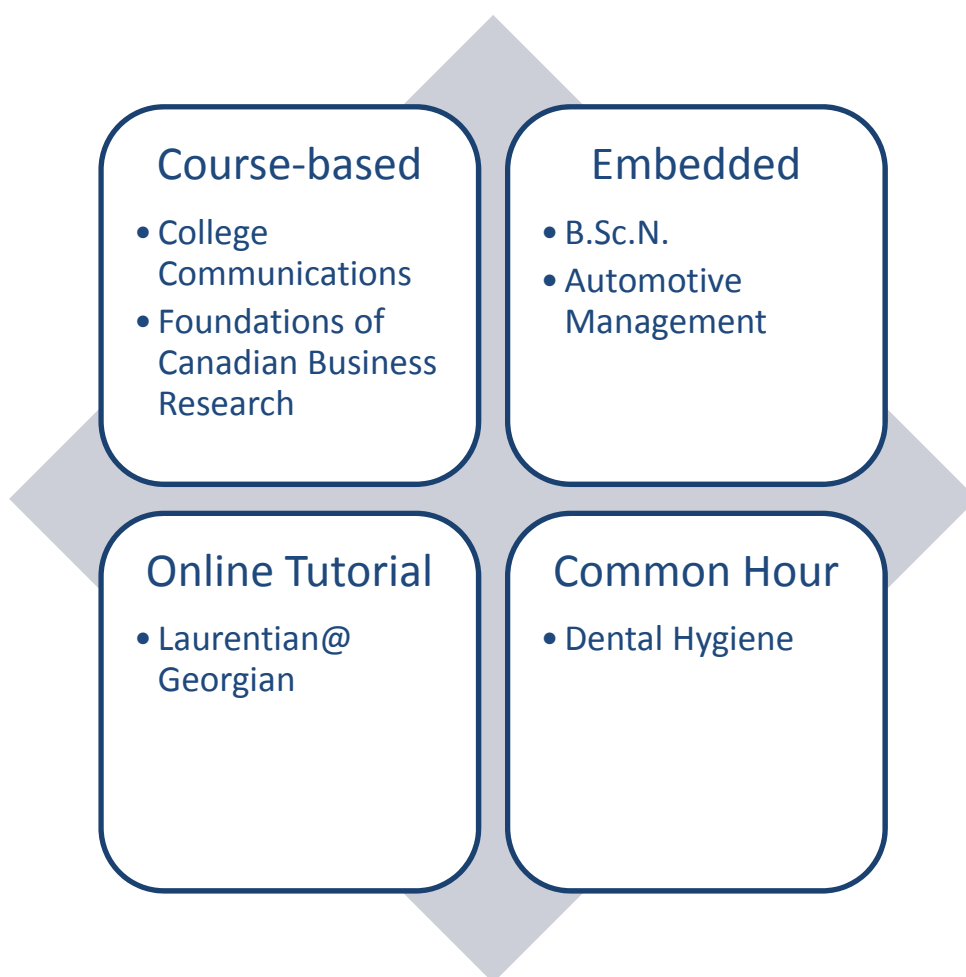
Course-based Model

College Communications

In this model, information literacy skills are taught in a portion of the course College Communications (COMM1000). This particular model began at Georgian College in the 1980s as a video that introduced students to the catalogue and to a print-based index. It included a paper-based assignment that was marked by library staff. In the 1990s, the video was replaced with a staff-led tour of resources and facilities and continued to include a paper-based assignment that was marked by library staff. At that time, approximately 60 per cent of College Communications students completed the assignment. In 2002, the assignment became a quiz in Blackboard™, and by 2008, every College Communications section attended a library instruction class.

The library instruction session and information literacy quiz are part of the College Communications curriculum. Every section participates in this model. A one-hour slide presentation with scripted notes is delivered by library technicians and librarians at all campuses. A quiz is available in each section's Blackboard™ course shell that students are required to complete. The quiz is worth 5 per cent of their total mark. At present, there are over 120 sections of College Communications reaching more than 3000 students. The content covered in College Communications includes: database definition, catalogue searching, general article database searching, keyword development, search strategy and Boolean connectors, and citation review.

Foundations of Canadian Business Research

Foundations of Canadian Business Research (REAS2002) is a business course elective developed by the Business Librarian. It was first delivered in the winter of 2009 to upper semester Business students. Typically, one course section is offered to students in the fall and winter semesters. This three hour per week, semester-long course explores many information literacy concepts within the context of the business discipline. Course content includes: business information structure, business information sources, industry and company research, business-focused databases, keywords, Boolean connectors, controlled vocabulary and other search strategy items, effective web searching, and value of information in the business community.

There is a combination of in-class assignments and other assignments that require students to demonstrate their research capabilities and to document their research. In the Fall 2010 semester, this became a required course for first-semester students in the Law Clerk program. In order to ensure continuity of study participants, a second recruitment of students from this course in this particular academic program (Law Clerk) occurred at this time.

Embedded Model

Bachelor of Science in Nursing

In this model, information literacy is integrated into the course objectives and outcomes. Additionally, information literacy is reflected in the program outcomes. The study looked at the use of this model in the Bachelor of Science in Nursing (B.Sc.N.) program, a college-university collaborative degree where students complete their first two years of study at Georgian and their last two years at York University, the degree partner. This particular model has been in use since the fall of 2002, with some changes over time in areas such as assignment value and the number of librarian visits.

In the first semester, students take a course called Development of Self as Nurse: Professionhood and Knowledge of Nursing 1 (NURS1511). In this course, the Health Sciences Librarian is involved in the class approximately three times over the semester. A physical tour of the library takes place early in the semester, followed by another session where information literacy, its relevancy to the field, the importance of critical thinking, and the library catalogue are reviewed. Approximately one week later, the

librarian visits the class again to cover search strategies and how to search the Nursing and Allied Health Source database. The next class visit demonstrates and discusses searching in the Cumulative Index to Nursing and Allied Health Literature (CINAHL) database, and reviewing the requirements for the information literacy assignment, which is worth 10 per cent of the course mark. The assignment is co-marked by the Health Sciences Librarian and the course faculty member.

The Health Sciences Librarian is closely involved with students and faculty throughout the program duration and is available for additional information literacy sessions as required. Many assignments in the remainder of the nursing courses have a requirement for the nursing literature to be referenced. This model includes a member of the nursing faculty who spends time (approximately three hours a week) in the health sciences knowledge hub in the library assisting students with assignment interpretation, research, and citation style. The faculty member assigned to the knowledge hub is provided with a course download in order to assist students.

Bachelor of Business Automotive Management

Georgian has developed a *Degree-level Learning Objectives and Outcomes* document that is based on the Postsecondary Education Quality Assessment Board (PEQAB) and Ontario Council of Academic Vice-Presidents (OCAV, 2007) *Guidelines for University Undergraduate Degree Level Expectations*. Courses in Georgian's Bachelor of Business Automotive Management were identified that incorporated the objectives and outcomes. It was dependent upon the course professor to incorporate information literacy content in the course and to involve the associated librarian. One course, Concepts of the Automotive Industry (AUTM1002), was chosen in semester one and the Business Librarian conducted a one-hour presentation that was supported by a class assignment. While the Business Librarian had been involved in this course in previous years, the fall 2009 student intake was the first time that the objectives and outcomes were integrated into the program's courses.

Online Tutorial Model

Laurentian@Georgian students

In this model, information literacy concepts and skills are explained in a library research course that is available on Blackboard™. The module objectives are to introduce students to fundamental concepts and techniques of library research and to help students become information literate as they develop research skills. The content was originally developed and written by Ashley Thomson and Robert Wilson, librarians at Laurentian University in Sudbury. In 2003, Laurentian's Senate decided that the library research online workshop should be integrated as a required component into each undergraduate program in the earliest-level course (or courses) that expect(s) the use of the library. Prior to the fall of 2009, students were asked to complete the modules via Laurentian's course management system.

This content was adapted and expanded to reflect the research tools and services available to Laurentian students at Georgian College and to provide a greater explanation of particular concepts. The content covers known item searching, beginning library research, searching for books, searching for articles, and using the web as an academic research tool. Each module is broken down into specific objectives that incorporate text, images, and exercises. There is a quiz at the end of each module which students must complete. In order to access the next quiz, the student must obtain a score of 80 per cent or better. These library research modules are incorporated into the course Academic Reading and Writing in English 1 (ENGL1541) and contribute to 10 per cent of the course final grade.

Common Hour Model

Dental Hygiene

In this model, instruction is provided in information literacy theory, concepts, and principles as well as specific tools. However, the content is covered during a common hour, that is, a common time when the students have no other classes scheduled and students are strongly encouraged but not required to

attend. This information literacy model began in the fall of 2008. Development of information literacy was considered part of the assignment process, but a separate information literacy assignment was not developed.

The common hour was scheduled weekly and covered many different topics (e.g., WHMIS, presentations, etc.) based on student needs, not just information literacy. There was a consistent level of faculty involvement in the common hour. The Health Sciences Librarian attended the common hour three times over the first semester for each section of students and continued to provide instruction in subsequent semesters as needed. The content of those sessions was a combination of lecture and hands-on lab work. Dental Hygiene students have multiple assignments throughout the five academic semesters that involve research.

2.   Research Questions

This research will measure the effectiveness of students' information literacy skills and comfort levels in four different delivery models, delivered to college and university students at Georgian College. The following research questions will be explored:

1. Do the information literacy delivery models enhance the information literacy skills of postsecondary students?

2. What gaps in student knowledge of information literacy can be identified?

3. Do students' comfort and confidence enable their development and acquisition of information literacy skills and knowledge?

4. How do faculty members understand information literacy in relation to curriculum development and delivery?

5. How do faculty members perceive information literacy skill readiness and development in postsecondary students?

6. How do faculty members incorporate information literacy skills and knowledge into their curriculum?

7. What are the best practices in information literacy delivery that contribute to skill development and student engagement?

The study's methodology will demonstrate what data were collected to answer these research questions.

3. Methodology

This research project was a two-year study that measured the effectiveness of information literacy delivery models provided to students in college diploma, college degree, collaborative degree, and university bachelor degree programs. Definitions for information literacy competency skills were drawn from the Association of College and Research Library (ACRL) Information Literacy Standards. The project differentiated between four different models of delivery in order to recommend best practices to organizations of different nature, size, and scope.

Two types of research informed this study: a self-assessment tool to determine student skills and perception of research skills, and a faculty interview to determine faculty members' perception of student skill development. The faculty interviews collected qualitative data, while the student survey permitted the collection of both qualitative and quantitative data for analysis. The study was divided into four "study terms," which parallel the academic progression of a program. A skill and self-assessment survey was administered at four points during the two-year duration of the study: early in study term one, late in study term one, late in study term two, and late in study term four. Faculty interviews were conducted at three points (end of study terms one, two, and four) during the same two-year duration of the study to assess perceptions of student progress in achieving the competency standards.

Research ethics approval was obtained in June 2009 from the Georgian College Research Ethics Board for a one-year period. The approval was extended in June 2010 and June 2011. Approval expired on June 23, 2012.

3.1   Student Survey

The survey was adapted for the purposes of this study from an information literacy survey (based on ACRL IL Standards) developed at The Albin O. Kuhn Library and Gallery (AOK), University of Maryland Baltimore Campus (UMBC), in 2002 and 2003. The researchers in this study adapted the survey to reflect the Canadian community college setting and the performance outcomes delivered in the information literacy models as identified through a curriculum mapping process. Each of the librarians involved in the development of the delivery methods was asked to map the content of the delivery against the ACRL Information Literacy Standards using a mapping document. In essence, the mapping document (see Appendix C) became a curriculum mapping tool that can be used in the future.

Survey questions were then compared to the mappings to ensure that performance outcomes covered in multiple models were captured in the survey questions. Performance outcomes that were present in only some models were represented in fewer survey questions. Interview questions also reflected the performance outcomes of ACRL Information Literacy Standards associated with each model.

A master survey was created from which the four individual surveys were generated. Questions were chosen for each of the four surveys that would allow comparability over time. Each of the survey questions was mapped to an ACRL Information Literacy performance outcome and identified as either a skill or perception question. Skill and perception questions were matched within the survey for further analysis at the completion of the study. The master survey questions can be found in Appendix D.

Specific courses and sections were identified for each of the information literacy models. In total, 16 sections with a total of 503 students enrolled were identified at the start of the two-year period from which students would be recruited to participate in the surveys. Recruitment occurred in two phases, the Fall 2009 and Fall 2010 semesters. The course, Foundations of Canadian Business Research, was a mandatory first semester course for the Law Clerk program, which was launched in the Fall 2010 semester. In order to ensure continuity of study participants, a recruitment of students from this course only occurred in the fall of 2010. These students answered the same four online surveys, and the database contains the merged results from the two recruitments.

The two principal researchers obtained permission from the faculty member responsible for each section to speak with the students. A prepared script was delivered and any questions were answered. Students were informed of the incentives that would be offered at the end of each survey timeframe. Incentives for

the first three surveys were print credits (electronic credits to use college printers), escalating in value from Survey One to Survey Three. The incentive for Survey Four was a $20 Chapters gift card. Students were given two copies of the consent form. Those who chose to volunteer were asked to return a signed copy to the researcher and to keep a copy for themselves. A total of 341 students were recruited out of a possible 503, representing the study's convenience sample. Recruitment occurred after Georgian's add/drop timeframe was complete. The college's Blackboard™ administration was notified of the course sections that would be used to populate the course, and the survey was available on Blackboard™ only to those students who agreed to participate. Only 134 students participated in at least two surveys and hence longitudinal data analysis was not conducted. Table 1 details the actual survey periods, the incentives offered, and whether the surveys were administered before (pre) or after (post) the information literacy delivery model.

Table 1: Timeline for student surveys

Survey	When	Pre / Post Delivery Model	Incentive
One	Early Study Term One	Pre	500 print credits
Two	Late Study Term One	Post	1000 print credits
Three	Late Study Term Two	Post	1500 print credits
Four	Late Study Term Four	Post	$20 Chapters gift card

The student survey was delivered via a course shell in Georgian's course management system Blackboard Learn™ (version 9.0.440.7). In addition to tests, Blackboard Learn™ supports surveys using the same question types as tests. Survey responses are kept anonymous. While Blackboard™ has the ability to show if a student has completed the survey, his or her individual answers are not visible. This meant that a question was added to obtain the student identification number in order to distribute incentives. Once a survey period was completed, survey results were downloaded from Blackboard™ in Excel format and the field containing the student identification numbers was removed from the downloaded Excel file to maintain student anonymity. Data was then manipulated and analyzed using SPSS 18/PASW. The number of students enrolled in the identified Blackboard™ course fluctuated with the students' enrolment status due to graduation, attrition, or semester registration, so the number of available participants decreased over the two-year period.

Sample for Analysis

In total, 503 Georgian College and UPC students were approached to participate in the online student surveys. Over two-thirds of the students approached consented to participate. Figure 2 displays the distribution of consented students by delivery model. The Embedded model, comprised mainly of B.Sc.N. students, had the highest number of students participating of any of the models being studied.

Figure 2: Consented participants by delivery model
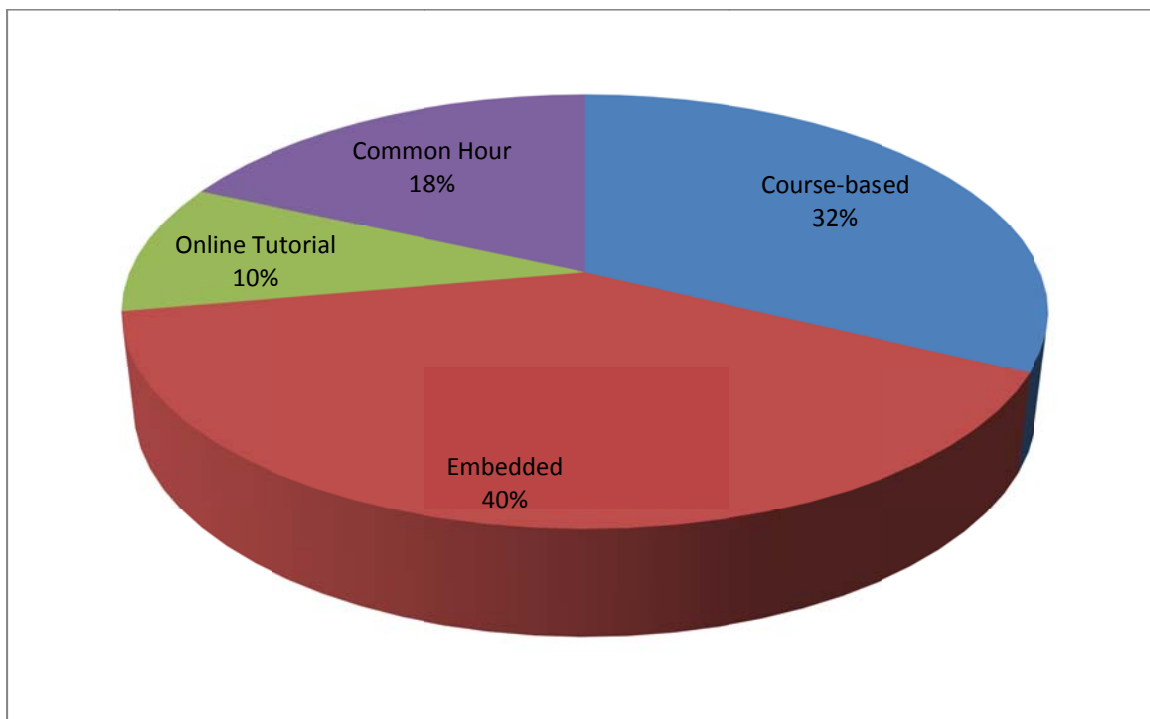
Survey Response Rates and Participation Rates

The online surveys yielded excellent response rates. However, there was attrition across this research study. Table 2 displays each survey's response rate. The highest response rate was observed in the first survey (35.2%) and then the rate declined in subsequent surveys. The response rate was calculated based on the number of students approached (N=503).

Table 2: Response rates for online surveys

Response Rate	Number of Respondents (n)	% of Students N=503
Survey One	177	35.2%
Survey Two	154	30.6%
Survey Three	127	25.2%
Survey Four	62	12.3%

Program Participation by Surveys

Participants were asked to indicate their program when they completed every survey. The following table provides a breakdown of participation by survey and program (Table 3). Across all surveys, the Embedded model (represented by the B.Sc.N. Nursing program) had the highest participation rates. The Embedded model (represented by the Automotive Management program) did not return an adequate number of responses across the four surveys for analysis. Only one to two participants from the program completed any of the first three online surveys.

Table 3: Delivery model and program participation by survey

Delivery Model	Program	Participation (%)			
		Survey One (n=177)	**Survey Two (n=154)**	**Survey Three (n=127)**	**Survey Four (n=62)**
Common Hour	Dental Hygiene	19.8%	22.7%	24.4%	22.6%
	Model Total	**19.8%**	**22.7%**	**24.4%**	**22.6%**
Course-based: College Communications	Early Childhood Education	12.4%	8.4%	8.7%	8.1%
	Child and Youth Worker	0.6%	0.6%	0.8%	0.0%
	Developmental Service Worker	1.1%	1.3%	0.8%	1.6%
	Police Foundations	4.0%	4.5%	3.9%	4.8%
	Social Service Worker	0.6%	0.0%	0.0%	0.0%
	Veterinary Technician	3.4%	2.6%	3.1%	0.0%
	Model Total	**22.0%**	**17.5%**	**17.3%**	**14.5%**
Course-based: REAS 2002	Law Clerk	13.0%	11.0%	15.0%	27.4%
	Model Total	**13.0%**	**11.0%**	**15.0%**	**27.4%**
Embedded	B.Sc.N. Nursing	36.2%	40.9%	35.4%	30.6%
	Automotive Management	0.6%	0.6%	0.8%	0.0%
	Model Total	**36.8%**	**41.7%**	**36.2%**	**30.6%**
Online Tutorial	Laurentian@ Georgian programs	7.3%	5.8%	6.3%	4.8%
	Model Total	**7.3%**	**5.8%**	**6.3%**	**4.8%**

Delivery Model	Program	Participation (%)			
		Survey One (n=177)	Survey Two (n=154)	Survey Three (n=127)	Survey Four (n=62)
Other	Program not specified	1.1%	1.3%	0.8%	0.0%
	Model Total	**1.1%**	**1.3%**	**0.8%**	**0.0%**
Totals		**100.0%**	**100.0%**	**100.0%**	**100.0%**

3.2   Faculty Interviews

Interview questions were developed to gather additional perspectives on students' information literacy skills (see Appendix E for a complete listing of the faculty interview questions). Questions were derived from existing literature (Gullikson, 2006; Hardesty, 1991; Head & Eisenberg, 2009; Islam & Murno, 2006) and adapted to reflect Ontario's postsecondary education system. Three interviews were scheduled within the time frame of the current research study: one after completion of the first two student surveys, one after the third student survey, and one after the fourth student survey. Questions were similar among all the interviews but were adjusted to reflect the time lapse between the information literacy intervention and the survey period. Interview questions were reflective of the ACRL Information Literacy Standards so a comparison could be made with the student survey results and Information Literacy Framework (Appendix A).

Figure 3 documents the timelines of both student surveys and faculty interviews.

Figure 3: Timeline of surveys and interviews
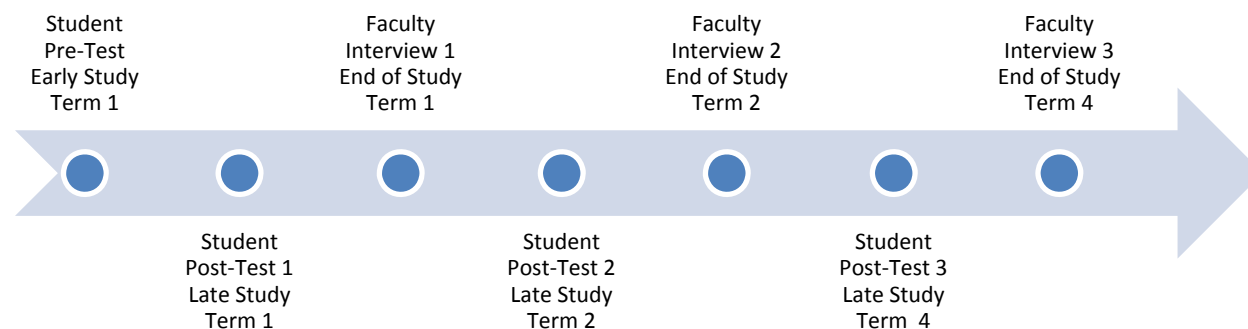
A total of 34 interviews were conducted, transcribed, double-coded by the researchers, and then entered into the qualitative software Ethnograph v6 for final analysis. Each comment was coded to identify the information literacy delivery model associated with the faculty member and whether the comment was from Interview One, Two or Three. This coding enabled the researchers to identify if there were any differences or similarities among the information delivery models and identify any changes as the research study progressed. Several themes emerged from the interviews. Table 4 below shows the number of faculty members interviewed in each round of interviews and which information literacy model they represented.

Table 4: Number of interviews by information literacy model

	Course-based	Embedded	Common Hour	Online Tutorial	Totals
Interview One	5	2	2	5	14
Interview Two	4	3	2	2	11
Interview Three	3	2	2	2	9
Totals	12	7	6	9	34

- The Course-based model included faculty members who taught College Communications or Communications at Work, faculty members who represented several programs (e.g., ECE, DSW) in which recruited students were enrolled, and faculty members who taught Foundations of Canadian Business Research or represent the Law Clerk program.

- The Embedded model included faculty members who taught in either the Nursing (B.Sc.N.) or Automotive Management programs.

- The Common Hour model was represented by Dental Hygiene faculty members.

- The Online Tutorial model was represented by faculty members who taught ENGL1541 or ENGL1542 and faculty members who represented a couple of the degree majors from the recruited students.

In both the Course-based and Online Tutorial models, it was more difficult to identify faculty members to interview in Interviews Two and Three, as the initial courses where the model was introduced had students from multiple programs.

A number of questions, ranging from 10 to 13, were asked in each of Interviews One, Two, and Three and can be found in Appendix D. Once the transcripts were read and coded, the following themes emerged:

- Information literacy definition

- Importance of information literacy

- Average skill levels

- Readiness

- Course assignments

- Students' reactions to research assignments

- Barriers to information literacy

- Information literacy enhancement

- Contributions of library staff

- Ideal model of information literacy instruction.

4.   Findings

4.1   Student Survey

Four online student information literacy skills assessments and perceptions surveys were completed throughout the study period. Demographic information of survey participants was collected, as were students' experiences with information literacy activities.

Results of the skills-based assessments were reviewed through the use of Accuracy indices, which were used to calculate the percentage of correct responses in each survey. The Accuracy indices for each survey included: overall accuracy, citation identification, search strategy, and copyright. Accuracy scores across the four surveys and by model are discussed below.

Two additional indices were created to evaluate student engagement and comfort with information literacy activities. These indices were created to quantify the scales of participation and comfort level questions and aid in the comparison of the information literacy models studied. Finally, student reactions to their research activities were explored. Table 5 describes the variables used in the online student survey.

Table 5: Variable measures

Variable	Description	Measurement
Demographic and Profile	To identify program, educational credential, age, and experience with IL in current semester.	Multiple choice and multiple response questions
Student Research Behaviour	Eleven questions in each survey that examined student research behaviour related to article selection, article evaluation, ease of use of the library, feelings regarding IL skills, and plagiarism.	Multiple response (perception questions)
Accuracy Assessment Indices	*Citation Identification Accuracy:* Ranging from six to twelve questions on a given survey that required the students to identify: citation components (e.g., author, date, etc.), missing citation components, and citation type (e.g., book, journal article, etc.).	Multiple choice (assessment questions)
	Search Strategy Accuracy: Four questions on each survey that required students to recognize the best search terms and search strategies for a given topic and to identify components of a citation record that could be used to improve searches.	Multiple choice (assessment questions)
	Copyright Accuracy: Ranging from six to eleven questions on a given survey that required students to identify whether they could reproduce a series of government and non-government documents on a website they created.	Multiple choice (assessment questions)

Variable	Description	Measurement
	Overall Skills Accuracy: Average of all skills-based questions.	Multiple choice (assessment questions)
IL Comfort Index	Series of eight questions that related to their comfort level at various stages of the research process.	3-point scale (Comfortable, Somewhat comfortable, Not at all comfortable) (perception questions)
IL Engagement Index	Two series of questions asked students about their frequency of information literacy behaviours: 1) Frequency the student completed various aspects of the research process, 2) Use of search skills (e.g., search operators).	4-point scale (Always, Sometimes, Rarely, Never) (perception questions)
Students' Reactions to Research	Two questions asked students about their reactions to research related activities.	Single selection from pre-determined list (perception questions)

4.1.1 Demographics

Information on the gender and ethnicity of our participants was not collected. However, participants' birth years were collected during every survey cycle and were used to calculate the age of the participants. At the commencement of the study, the mean age of students in Survey One was 22.8 years, and the average age of participants increased as the surveys progressed (Survey Two: 23.1 years, Survey Three: 24.3 years, and Survey Four: 26.6 years). Participant ages ranged from 18 to 61 years in the first two surveys, 19 to 62 years in the third survey, and 20 to 48 years in the final survey. A high percentage of participants who completed the surveys were between the ages of 18 and 24 years, ranging from 51.6 per cent (Survey Four) to 77.3 per cent (Survey Two), consistent with Georgian College's demographics.

In Survey One, participants were asked to select the educational credentials that they currently possessed. A majority of the sample (87.4%) reported that they had obtained at least a secondary school diploma or equivalent. This value may be underreported, as the admission requirements for most Georgian College and Laurentian@Georgian programs require the Ontario Secondary School Diploma or equivalent. Other participants noted that they also completed: college certificate (21.3%), college degree (8.6%), trade or apprentice certificate (2.9%), college diploma (1.1%), university bachelor degree (1.1%), graduate certificate (0.5%), and university master's degree (0.5%). The responses were not mutually exclusive, meaning that participants could have more than one educational credential.

4.1.2 Research Behaviour

Where do students find current information?

Participants were asked to select sources they would use to find current information and were encouraged to select more than one source. As expected, a majority of participants consulted online resources via the World Wide Web to obtain current information. The percentage of students who reported using online resources via the World Wide Web decreased after Survey One and then increased in Surveys Three and Four. Television and radio news was another popular resource reported by participants. Interacting with professor/teachers and use of Abstracts and Indexes (database), either electronic or print, were also cited by participants.

Oddly, participants also reported that they relied on newspaper archives and television and radio transcripts for current information. In all surveys, a small percentage of students identified encyclopaedias as a source of current information. Table 6 displays the resources participants used to obtain current information throughout the four surveys.

Table 6: Where do students find current information? (multiple response)

	Survey One (n=176)	Survey Two (n=154)	Survey Three (n=127)	Survey Four (n=62)
Online (World Wide Web)	89.9%	81.8%	87.0%	96.8%
Television or radio news	38.7%	53.2%	54.2%	54.8%
Newspaper archives	41.9%	42.2%	37.0%	43.5%
Professors/teachers	42.2%	45.4%	47.3%	37.1%
Abstracts and indexes (electronic or print databases)	31.7%	39.0%	27.5%	46.8%
Friends/colleagues	19.9%	37.0%	43.5%	33.9%
Library staff	24.7%	31.2%	22.9%	30.6%
Television/radio transcripts	17.7%	19.5%	19.8%	27.4%
Magazine	18.8%	20.8%	21.4%	21.0%
Podcasts	5.3%	8.4%	6.1%	11.3%
Encyclopaedias	4.3%	4.5%	6.9%	2.0%

Where do students find information for assignments?

In a multiple response question, students were asked on all four surveys what resources they would use when researching assignments and course work. Participants reported that they used the Georgian Library Commons web page, search engines such as Google and Yahoo, and their course website (e.g., Blackboard Learn™) resources. Other resources included discussions with professors/teachers, friends, and library staff. It is interesting to note that Wikipedia was not a common resource used by students, and that its use varied across the surveys. Table 7 displays the resources that subjects used when researching assignment and course work in the four surveys.

Table 7: Where do students find information for assignments? (multiple response)

	Survey One (n=176)	Survey Two (n=153)	Survey Three (n=127)	Survey Four (n=62)
Go to Library Commons web page	68.3%	89.6%	86.3%	90.3%
Use a search engine (Google or Yahoo)	72.6%	67.7%	70.2%	75.8%
Use a course website (Blackboard™)	50.5%	44.5%	56.5%	51.6%
Ask a Professor/ teacher	50.5%	44.5%	48.9%	19.4%
Ask library staff	32.3%	18.7%	26.7%	19.4%
Ask a friend	17.7%	22.6%	20.6%	21.0%
Consult with a peer tutor/ learning skills assistant	22.0%	27.7%	16.0%	17.7%
Consult with Wikipedia	15.1%	15.5%	10.7%	17.7%

Where did students learn about IL skills?

Participants were asked to report in Surveys Two, Three, and Four where they received information literacy instruction that term. In this multiple response question, a majority of participants acknowledged that they received one or more opportunities to learn information literacy skills throughout the study period. Participants' involvement in information literacy instruction models decreased in Survey Three and again slightly in Survey Four. A majority in all surveys reported attending in-class library sessions presented by library staff, while the percentage of students learning information literacy skills through interaction with professors in the Survey Four group was greater than the percentage in the Survey Three group. Figure 4 presents how students learned information literacy skills through engagement in various activities involving courses and the library.

Figure 4: Where did you learn library research skills this semester? (multiple response)

	Survey 2 (n=154)	Survey 3 (n=126)	Survey 4 (n=62)
Attended in-class seminars by Library Staff	77.9%	61.2%	59.7%
Interacted with Professors	71.4%	39.8%	53.2%
Wrote course assignment/ tests requiring research	63.6%	44.5%	51.6%
Asked for assistance from library staff myself	--	31.2%	32.3%
Referred by Professor to library for instruction/ assistance	--	15.6%	14.5%
Participated in Online Tutorials	42.2%	21.1%	12.9%
Attended library seminars (outside of class times)	41.6%	10.9%	11.3%
Did not receive library research instruction	1.9%	14.8%	16.1%

-- Question was not asked on survey.

Evaluating Reliable and Relevant Sources

All four surveys asked subjects to identify types of articles as reliable and relevant for an assignment. Figure 5 displays the results for this multiple response question. Participants reported reliable and relevant articles from the following sources: a professional organization, association, or government; articles written by well-known scholars in the field; and articles from a website ending in .edu and/or connected to a school, college, or university. Approximately one-quarter of students from Survey One, Two, and Three reported that they only used one type of reliable and relevant articles listed on the surveys (Survey One: 25.0%, Survey Two: 25.4%, Survey Three: 19.5%). However, in the final survey, only 12.9 per cent of students reported using one article type. This suggests that a majority of students used multiple sources to complete assignments and course work.

Figure 5: What types of articles are reliable and relevant to use for an assignment? (multiple response)

	Survey 1 (n=177)	Survey 2 (n=153)	Survey 3 (n=126)	Survey 4 (n=62)
■ Article found on a professional organization, association, or government website	72.8%	69.3%	73.4%	85.5%
■ Article written by a well-known scholar in the field	76.1%	69.3%	72.7%	93.5%
■ Article available from a website ending in .edu and/or connected to a school, college, or university	58.9%	68.0%	76.6%	72.6%
■ Full text of article is available	46.1%	42.5%	60.0%	33.9%
■ Article published as part of a conference proceedings	20.6%	23.5%	25.8%	25.8%
■ Articles written by an individual with no known subject-related credentials	7.2%	11.8%	8.6%	9.7%

How students select the best articles for their projects is reported in Figure 6. Students reported on all four surveys that they use articles from scholarly journals. Furthermore, students were reading abstracts and reviewing subjects and descriptors more frequently as their academic career progressed. It is also important to note that the percentage of students who only used one method to select the best articles gradually decreased across the four surveys (Survey One: 24.2%, Survey Two: 22.7%, Survey Three: 20.2%, Survey Four: 17.7%). The reliance on selecting articles based on full text availability lessened throughout the survey period while students reported greater use of other evaluation criteria such as reading abstracts, selecting recent articles, and selecting articles published in scholarly journals.

Figure 6: How do students select the best articles for their projects? (multiple response)

	Survey 1 (n=177)	Survey 2 (n=154)	Survey 3 (n=127)	Survey 4 (n=61)
■ Look for articles published in scholarly journals	80.8%	81.2%	80.0%	86.9%
■ Read the abstracts and review the subject/descriptors to find the articles most relevant to your topic	69.8%	76.0%	76.7%	85.2%
■ Select the most recent articles	61.5%	66.9%	71.3%	72.1%
■ Select articles with full text only	38.5%	42.2%	38.0%	32.8%
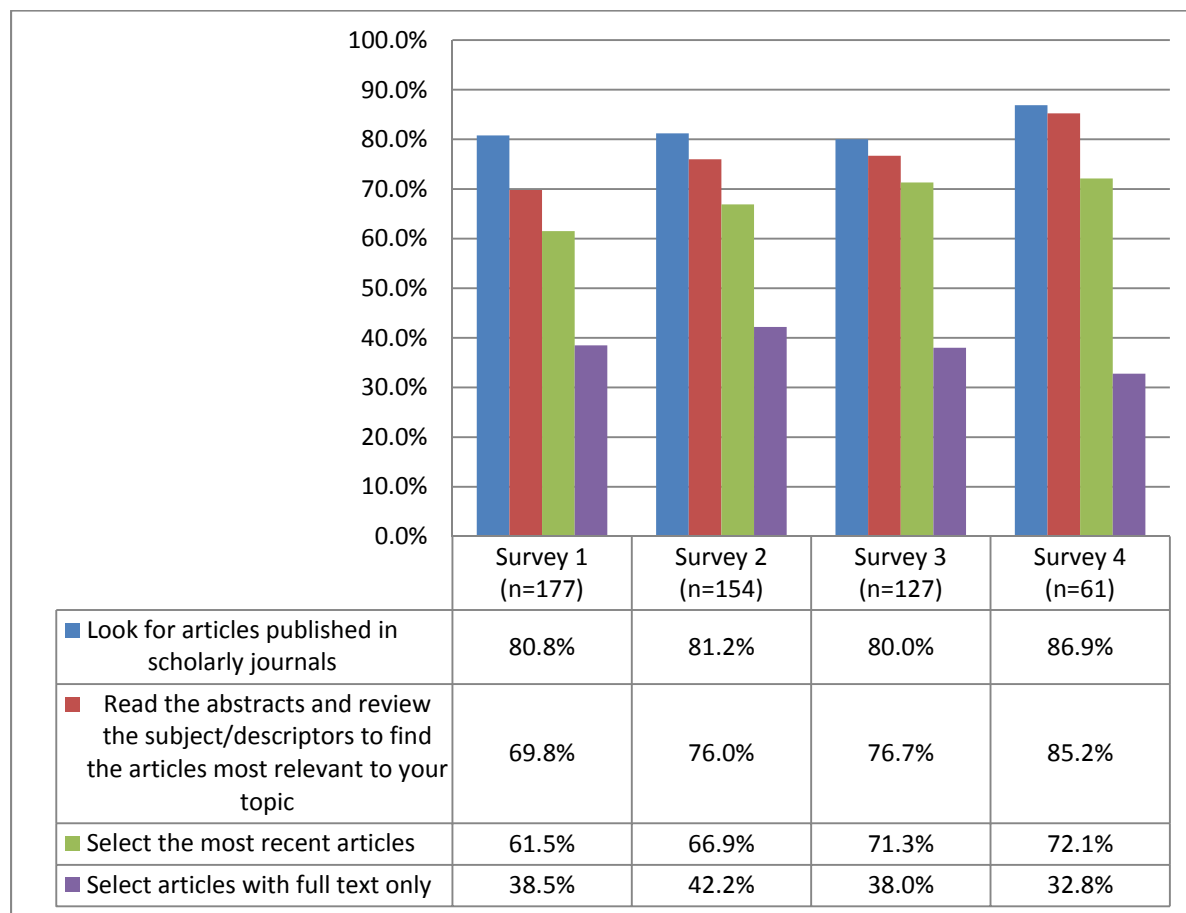
Students were asked to rate the importance of evaluating web pages as sources of information on a three-point scale: very important, important, or not important. Questions asked participants how important it was to evaluate a web page on currency, authority, accuracy, and relevance to the course. Table 8 displays these results. The table displays students' responses to how essential source evaluation is when evaluating web pages to compile research for school work. A majority of participants felt that it was either very important or important to evaluate web page sources that will be used for coursework throughout the study period. Minimal or no subjects responded that evaluating web page sources was "not important."

Table 8: Importance to evaluate web pages by survey

		Survey One (n=177)	Survey Two (n=153)	Survey Three (n=127)	Survey Four (n=62)
How important is finding the author or source?	Very Important	75.8%	66.9%	66.7%	72.6%
	Important	17.6%	29.2%	30.2%	27.4%
	Not at all Important	6.6%	3.9%	3.1%	0.0%
How important is finding up-to-date information?	Very Important	60.8%	63.0%	72.9%	80.3%
	Important	29.3%	32.9%	26.4%	19.7%
	Not at all Important	9.9%	3.2%	0.8%	0.0%
How important is finding accurate information that can be confirmed in other sources?	Very Important	85.7%	73.5%	74.4%	80.6%
	Important	12.1%	21.9%	24.0%	16.1%
	Not at all Important	2.2%	3.9%	1.6%	3.2%
How important is finding information that is acceptable or approved for course assignments?	Very Important	84.6%	77.3%	74.6%	77.4%
	Important	14.3%	18.2%	21.5%	22.6%
	Not at all Important	1.1%	4.5%	2.3%	0.0%

Ease of Use at the Library

In Surveys Two, Three, and Four, participants shared how easy it was to find articles at the library and Figure 7 reports these results. A majority of students reported that they can find articles, but it takes time. Other students reported finding articles easily. A minimal number of students reported asking for assistance to find articles and not using libraries. In Survey Four, there was an increased percentage of students who reported finding articles easily (58.1%) and a decrease in the percentage of students who can find articles but it takes a while (32.3%). Figure 7 displays the shift in the ease of use at the library across Surveys Two to Four.

Figure 7: Ease of use in the library
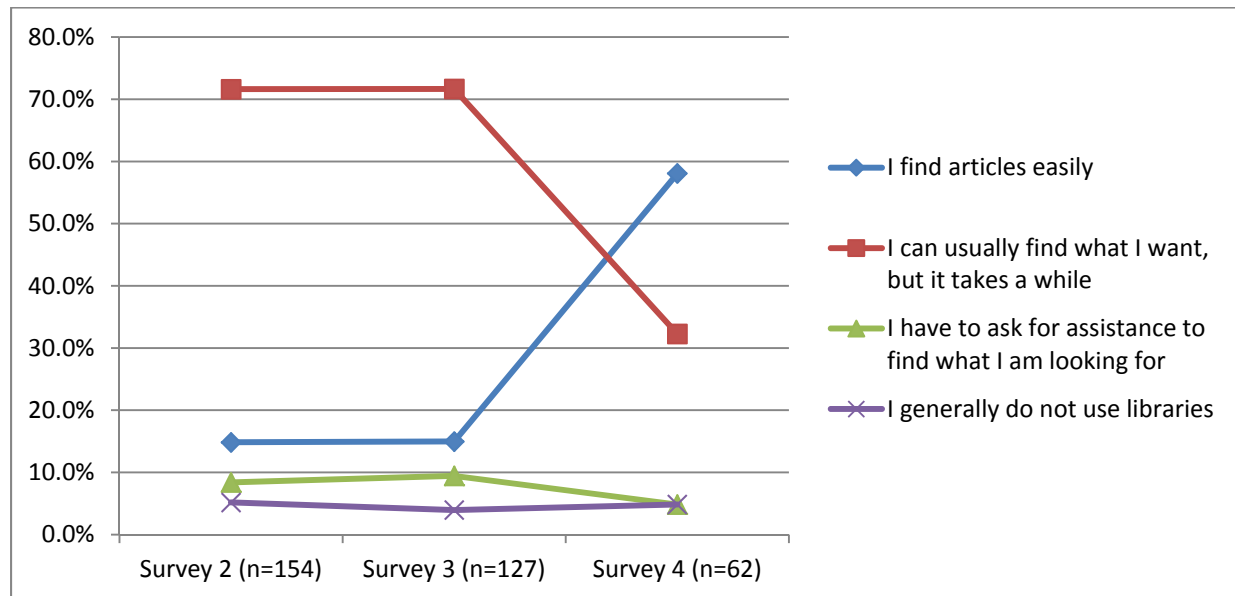
Where do students use research skills outside course work?

Students were asked in Surveys Two, Three, and Four to report areas other than school where they use their research skills. This was a multiple response question with ten areas listed: employment opportunities, medical information, technology, travel information, financial information, entertainment, popular and historical events, politics, famous people, and family genealogy. An examination of the responses for this multiple response question revealed that the top six topics that participants researched were: employment opportunities, medical information, travel information, entertainment, technology, and financial information. The use of research skills to look for employment opportunities was greater in Survey Four. Figure 8 examines the student uses of information literacy skills outside of school work.

Figure 8: **Where students use research skills outside of school work (multiple response)**

	Survey 2 (n=154)	Survey 3 (n=127)	Survey 4 (n=61)
Employment opportunities	69.5%	74.8%	83.6%
Medical information	72.9%	75.6%	68.9%
Technology	39.0%	30.7%	49.2%
Travel information	70.1%	56.7%	55.7%
Financial information	47.4%	49.6%	49.2%
Entertainment	59.7%	55.9%	50.8%
Popular and historical events	41.6%	33.9%	41.0%
Politics	24.7%	18.9%	31.1%
Famous people	39.0%	30.7%	24.6%
Family genealogy	21.4%	18.9%	16.4%
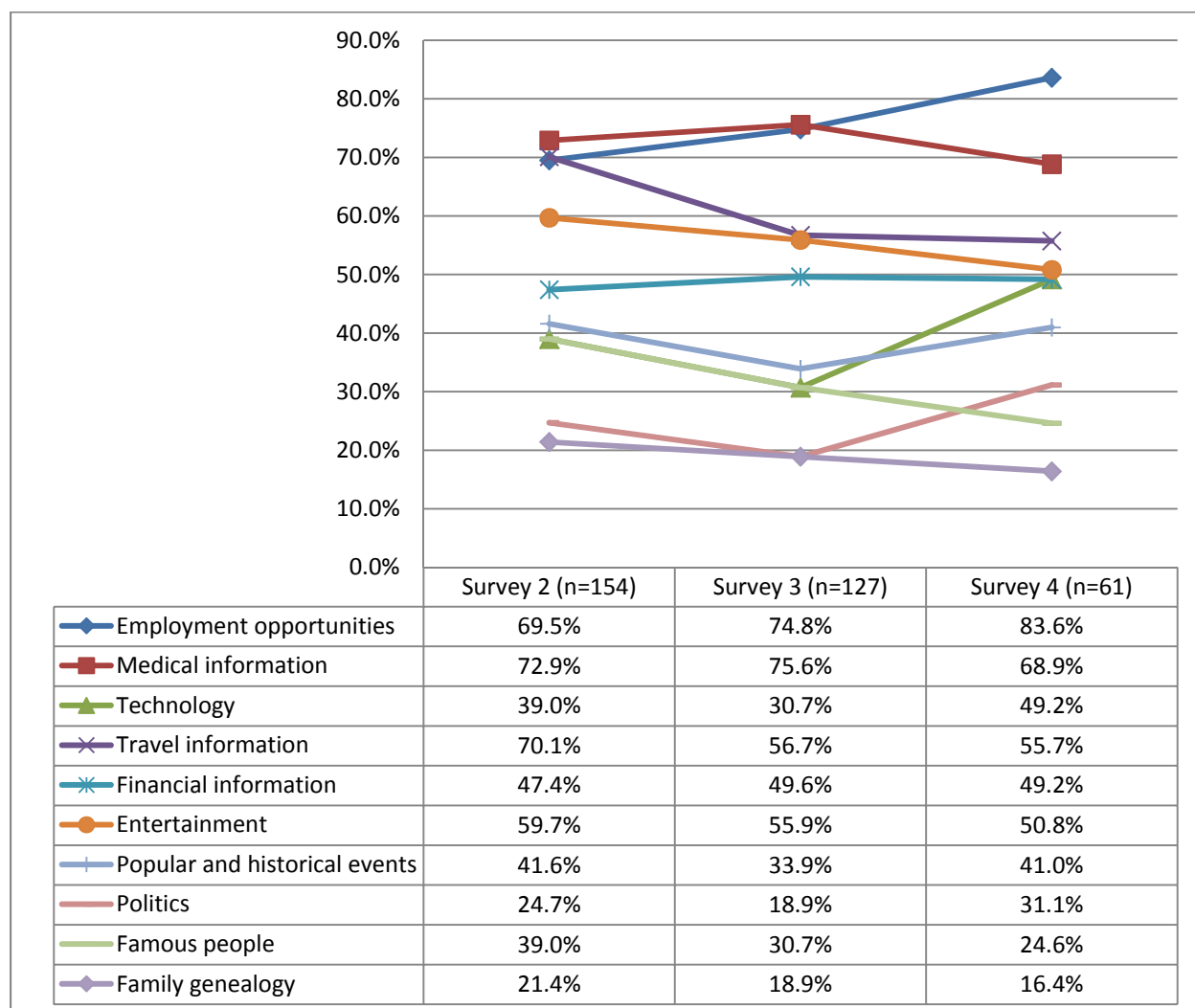
Plagiarism Knowledge-based Question

Students were asked to identify examples of plagiarism from a list of five choices. One choice, copying text using quotation marks, was used as a distracter as it is not an example of plagiarism. The graph indicates that participants have knowledge of examples of plagiarism. However, subjects incorrectly identified copying text and using quotation marks as plagiarism as noted by "**" on Figure 9.

Figure 9: Identifying examples of plagiarism by survey

	Survey 1 (n=177)	Survey 2 (n=154)	Survey 3 (n=127)	Survey 4 (n=62)
Using phrases & sentences of others as if they were your own without giving credit (to the author)	95.5%	92.2%	85.2%	93.5%
Using ideas of others as if they were your own without giving credit (to the author)	84.4%	90.3%	85.0%	93.5%
Copying text written by someone else and using it with quotation marks**	47.5%	40.3%	49.6%	51.6%
Rewording someone else's information and using it without giving credit (to the author)	72.6%	85.1%	77.5%	82.3%
Using copyrighted images from the Web without giving credit (to the creator)	87.7%	81.2%	81.4%	88.7%

** Question that is not an example of plagiarism.

While the surveys did not generate a lot of student comments, the majority of comments received were related to citation use and plagiarism. Students appeared to recognize both the need for and importance of citing references but also acknowledged their need for more assistance. Here are some examples of the students' comments:

> I find the APA very difficult and find that citing things properly can be very confusing. (Survey One)

> I'm fearful of APA. I'm scared I'm going to screw up and forget to cite something. I consider myself a good student and a good writer, but the APA citing has me rattled. (Survey Two)

I am still unsure and fearful that I didn't use APA properly and plagiarize. I think I do, but I'm always apprehensive that I did it properly. (Survey Three)

The skill that I seem to need to work on every year is my APA citing. As this is always changing, and the format is different year to year, it can be hard to cite properly. (Survey Four)

4.1.3 Accuracy Assessment

To examine the skills assessment survey questions, four objective accuracy variables were calculated for each survey. In order to calculate these variables, related skills assessment questions were scored as correct and incorrect. The Overall Accuracy Score was calculated based on the correct responses to all skills-based questions which were totaled and averaged. The three components of the Overall Accuracy Score were Citation Identification, Search Strategy, and Copyright. Similarly, correct responses to the appropriate skills-based questions were totaled and averaged to calculate these three component indices. Table 9 lists the skills-based questions associated with the accuracy variables.

Table 9: Survey questions associated with accuracy variables

Accuracy Indices Name	Description of Questions
Citation Identification	Ranging from six to twelve questions on a given survey that required the students to identify: citation components (e.g., author, date, etc.), missing citation components, and citation type (e.g., book, journal article, etc.).
Search Strategy	Four questions on each survey that required students to recognize the best search terms and search strategies for a given topic and to identify components of a citation record that could be used to improve searches.
Copyright	Ranging from six to eleven questions on a given survey that required students to identify whether they could reproduce a series of government and non-government documents on a website they created.
Overall	All skills-based questions.

Accuracy Variables by Survey

Figure 10 presents the results of the citation identification, search strategy, copyright, and overall accuracy variables for the four surveys, which represent the average percentage of correct responses to the skill-based questions. Averages for these variables ranged from 61.4 per cent (Survey Three Copyright) to 78.0 per cent (Survey Four Search Strategy). The overall accuracy score was highest in Survey Four (79.1%). The following sections will explore the question results for each of the accuracy variables.

Figure 10: Averages of citation identification, search strategy, copyright, and overall accuracy variables by survey
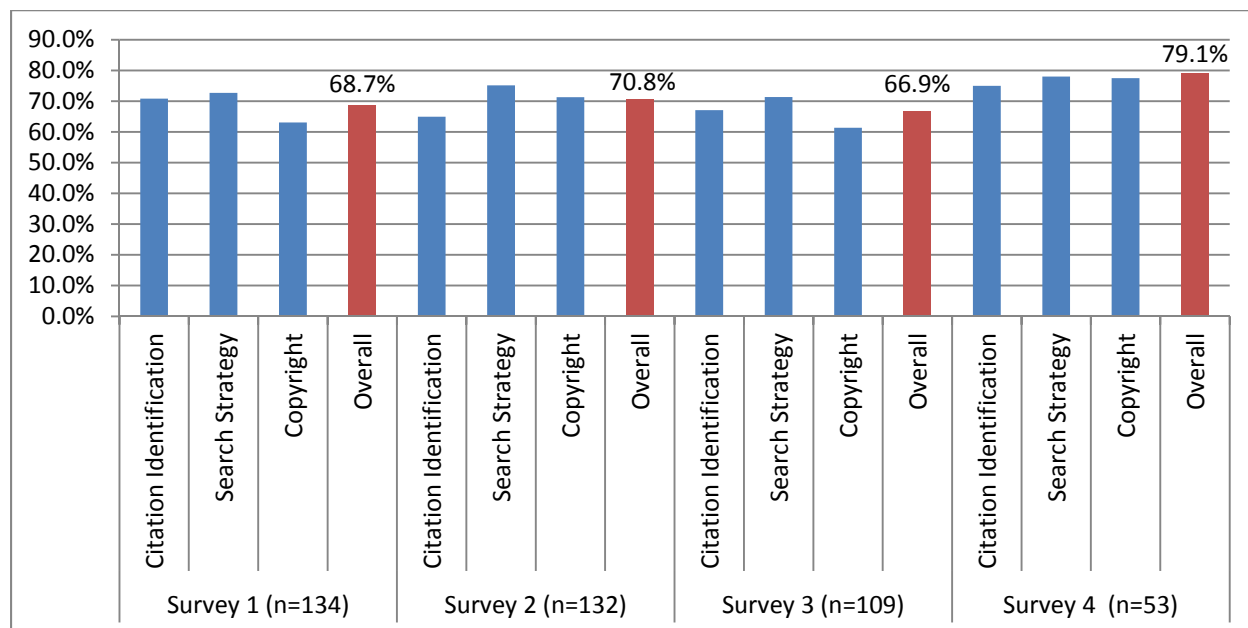
Citation Identification

The Citation Identification Accuracy variables consist of six to twelve questions on a given survey that required the students to identify: citation components (e.g., author, date, etc.), missing citation components, and citation type (e.g., book, journal article, etc.). Each question was graded as correct and incorrect to calculate Citation Identification Accuracy and as part of the Overall Accuracy variable. The average scores of the Citation Identification Accuracy variables ranged from 65.0 per cent (Survey Two) to 75.0 per cent (Survey Four) correct responses (Figure 10).

One question asked on Surveys One, Three, and Four required participants to identify a missing component from a journal citation. The percentage of students who correctly identified that the date was the missing component from the citation was lowest in Survey One (47.8%) and highest in Survey Four (74.0%).

Subjects were also requested to identify citation components (author, title, date, journal title, volume, page number) from a journal article. The question was presented within a jumbled sentence question with eight distracters (two incorrect distracters) (Figure 11).

Figure 11: Citation component identification question (jumbled sentence)

Students were challenged by this question in the four surveys. However, the percentage of students who correctly identified all components of the citation improved across the surveys. In Survey One, 22.0 per cent of participants correctly identified all the components of the citation. The percentage points rose in Survey Two (38.1%), Survey Three (43.5%), and Survey Four (45.2%).

Figure 12 demonstrates the percentage of correct answers per citation component. It was observed that subjects were able to identify aspects of the citation, but had difficulty answering the fourth component (none of the above). It should be noted that the "none of the above" response was used as a difficulty factor in this question, in place of the "journal title" response.

Figure 12: Citation component identification (multiple response)

	Answer 1: Author	Answer 2: Date	Answer 3: Article Title	Answer 4: None of the above (Journal Title)	Answer 5: Volume of Journal	Answer 6: Page Number
■ Survey 1 (n=177)	95.7%	90.8%	87.0%	32.6%	73.4%	78.3%
■ Survey 2 (n=154)	93.5%	87.1%	90.3%	50.0%	86.3%	85.8%
■ Survey 3 (n=127)	93.8%	89.3%	89.8%	53.6%	84.3%	86.7%
■ Survey 4 (n=61)	98.4%	95.1%	96.7%	50.8%	93.4%	91.8%
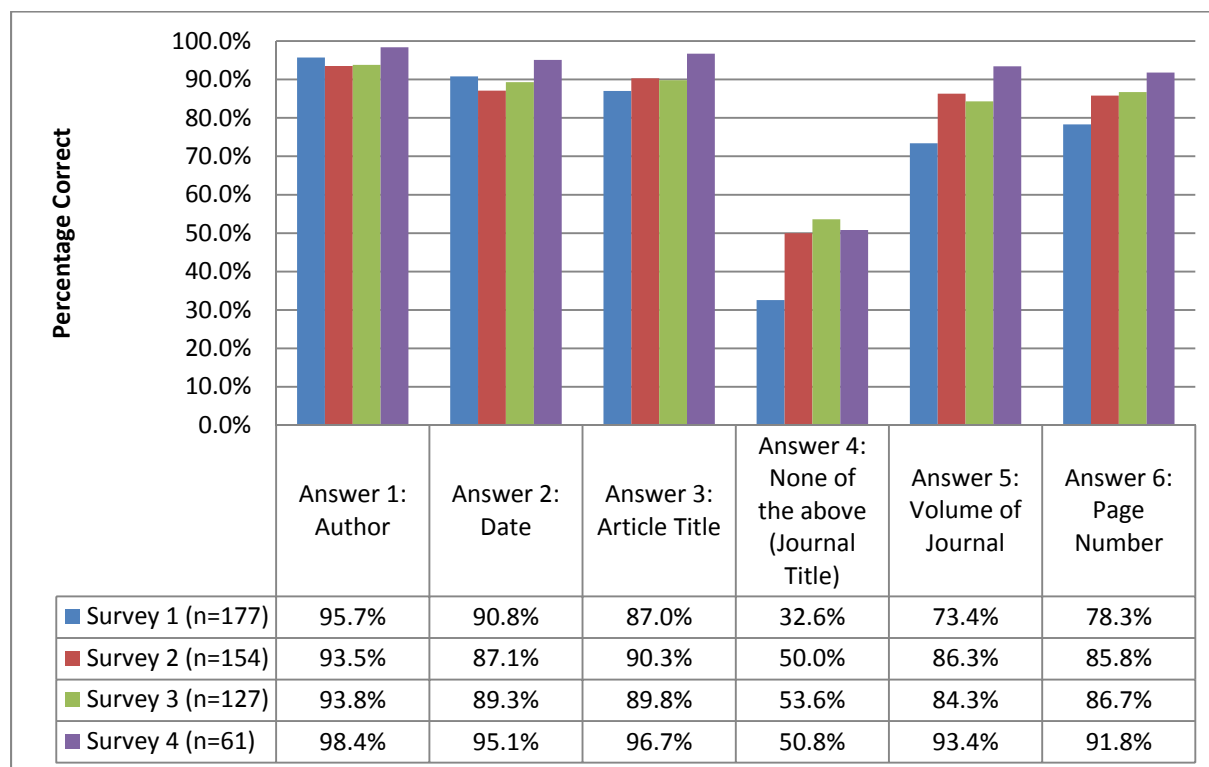
Participants were also asked a series of questions that required them to identify types of citation formats that varied by survey and included: books, journal articles, book chapters, government documents, newspaper articles, blogs, podcasts, and online periodicals. Note that not all questions were asked on a given survey. Students were able, for the most part, to identify journal articles (81.7% to 91.4%), newspaper articles (75.5% to 93.5%), blogs (79.1% to 87.1%), podcasts (70.8%), and online periodicals (85.7% to 91.8%). Students had difficulties identifying book (50.0% to 67.4%) and book chapter (42.3% to 67.7%) citations in all surveys.

It is interesting to notice the difference in accuracy for the two different question types for citation identification. Questions in which subjects were requested to identify the type of citation format (e.g., blog, journal article, etc.) were easier to answer and yielded high accuracy rates, with the exception of book and book chapter questions. Questions requesting specific terminology for parts of the citation and identifying a missing citation component required a higher skill level and therefore had lower accuracy rates.

Search Strategy

Accessing information effectively and efficiently is the second ACRL Information Literacy Standard. It considers the construction of a search strategy, which includes keyword or controlled vocabulary identification and search strategy construction (e.g., using Boolean operators). The students' skill at completing searches for information was assessed in the online surveys. The average correct response scores of the search strategy accuracy variables ranged from 71.4 per cent (Survey Three) to 78.0 per cent (Survey Four) (Figure 10). There were four questions that were asked on all surveys. Subjects were required to examine a citation record that had various database fields numbered. Students were asked to identify components such as subject terms and publication currency. On the four surveys, a majority of participants were able to identify currency and alternate search terms for the provided

citation record (Survey One: 79.0% to Survey Four: 93.5%).

The final two questions in this grouping addressed the use of search terms and search strategy (e.g., use of Boolean operators) based on a thesis statement within the survey. Participants' ability to select keywords to complete searches varied across the four surveys (Survey Two: 63.4%, Survey Three: 55.8%, Survey Four: 63.9%). In Survey Four, participants were able to correctly answer these two questions more than in previous surveys.

A similar response pattern was observed when students were asked to identify the search strategy. Students had challenges identifying and potentially creating search strategies that included the combination of keywords and Boolean operators (Survey One: 43.5%, Survey Two: 49.7%, Survey Three: 46.9%, Survey Four: 54.1%).

Copyright Use

The ethical and legal use of information is the fifth ACRL Information Literacy Standard and is an important component of information literacy knowledge. Students were asked six to eight questions on a given survey that required them to identify whether they could reproduce a series of government and non-government documents on a website they created. The average scores of the copyright variables ranged from 60.4 per cent (Survey One) to 76.5 per cent (Survey Four) correct responses (Figure 10). This section will explore the accuracy of the individual skills based questions related to copyright use. Note that not all questions were asked on a given survey.

For the most part, students recognized that they could not reproduce others' work on websites without credit. Participants were questioned if they could use pictures of Don Cherry and Sidney Crosby, the theme song from *Titanic*, text from a book and newspaper article, embed a YouTube video, and post a professor's lecture notes. Accuracy ranged from 74.2 per cent (Survey One: Picture of Sidney Crosby) to 91.9 per cent (Survey Four: Text from book).

Students erred on the side of caution when deciding whether government documents could be reproduced, which is allowed under copyright. The survey questions included examples such as the Governor General's speech or the text from a Bill or a government document pertaining to the Sponsorship Scandal. Accuracy ranged from 19.7 per cent (Survey Two: Sponsorship Scandal document) to 45.9 per cent (Survey Three: Text from a Bill).

Comparative Analyses by Information Literacy Models Studied

A series of analysis of variance (ANOVA) calculations was conducted to determine the influence of the information literacy delivery models on Accuracy indices across the four surveys. A main effect of delivery model affecting citation identification accuracy was found in Survey Four. Post hoc analysis revealed that the Embedded model had higher citation identification accuracy than the Course-based model. Upon closer examination of the questions related to citation identification accuracy, it was noticed that the Course-based model had a lower accuracy score than the Embedded model on the citation component identification question (Table 10).

Table 10 displays the average correct scores by information literacy delivery model and survey. In Survey One, it was found that students following the Online Tutorial and Embedded models had higher citation identification scores than those following the Common Hour and Course-based models. Similarly in Survey Two, students following the Online Tutorial model had higher citation identification scores than all other models. In both cases, these results approached statistical significance, as outlined in Table 10 below.

Finally, another result that approached statistical significance was observed in Survey Four, where students following the Course-based model had lower search strategy scores than those following the Common Hour model (Table 10).

Table 10: Overall accuracy by information literacy delivery model and survey

	Citation Identification				Search Strategy				Copyright				Overall			
	Survey One	Survey Two	Survey Three	Survey Four	Survey One	Survey Two	Survey Three	Survey Four	Survey One	Survey Two	Survey Three	Survey Four	Survey One	Survey Two	Survey Three	Survey Four
Course Based	69.1%*	63.2%*	65.4%	70.9%**	71.1%	75.0%	76.6%	71.4%*	64.0%	70.6%	65.4%	81.6%	67.3%	68.9%	67.9%	79.9%
Common Hour	70.5%*	62.5%*	60.8%	80.4%	72.1%	70.5%	72.2%	87.5%*	59.8%	70.2%	55.0%	76.5%	66.4%	67.4%	61.1%	80.5%
Embedded	75.7%*	67.8%*	73.9%	89.8%**	74.5%	77.5%	70.7%	84.4%	64.4%	74.9%	62.7%	77.7%	70.9%	72.9%	68.8%	84.2%
Online Tutorial	76.5%*	81.5%*	75.0%	68.8%	70.5%	75.0%	78.1%	87.5%	62.0%	72.2%	57.1%	64.3%	69.7%	76.4%	68.8%	71.1%
All Models	70.8%	65.0%	67.1%	75.0%	72.7%	75.2%	71.4%	78.0%	63.1%	71.3%	61.4%	77.5%	68.7%	70.8%	66.9%	79.1%

p<0.01**; p<0.10*

4.1.4 Information Literacy Comfort Index

The Information Literacy Comfort Index was developed to understand the comfort level of students when they complete activities at the various stages of the research process. Students were asked a series of eight questions. In the online surveys, students rated their comfort level on a three point scale coded into numerical values: comfortable = 2, somewhat comfortable = 1, and not at all comfortable = 0. The Information Literacy Comfort Index score is the average score of the eight comfort questions. Table 11 displays the questions associated with the Information Literacy Comfort Index. A comparison of the Comfort Index and information literacy delivery models will also be discussed.

Table 11: Information Literacy Comfort Index questions

How comfortable are you at developing research questions?
How comfortable are you at evaluating information found from searches?
How comfortable are you at identifying search terms to be used?
How comfortable are you at identify sources of information required for a project?
How comfortable are you at referencing and citing sources?
How comfortable are you at searching library databases?
How comfortable are you at summarizing new information found from a search?
How comfortable are you at writing a research paper?

Figure 13 displays the Information Literacy Comfort Index average for each survey. Averages across the surveys indicate that most students are somewhat comfortable when completing the various stages of research process. The Comfort Index average was the highest in the first (1.4) and fourth survey (1.5), and the lowest in the second survey (1.3) immediately after delivery of the information literacy models. In the fourth survey, the Comfort Index average was slightly higher as students used more stages of the research process with some comfort. Individual questions relating to the different stages of the research process were also examined and the averages of these questions are presented in Figure 13. An examination of the question response averages reveals that students felt somewhat comfortable completing various stages of the research process.

Figure 13: Comparison and examination of Information Literacy Comfort Index and related questions for all surveys
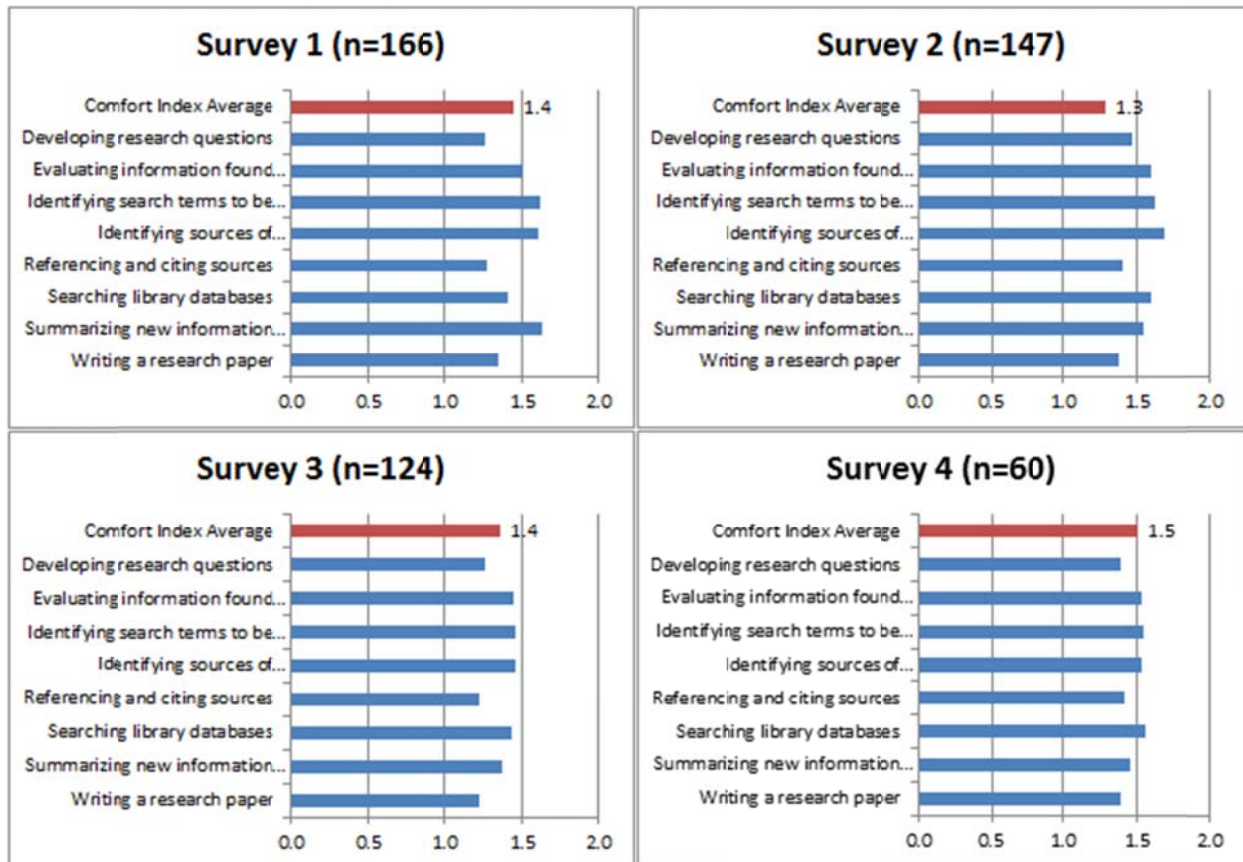
0 = Not comfortable at all; 1 = Somewhat comfortable; 2 = Comfortable

As illustrated by these student comments from the surveys, students in the later surveys reported slightly greater comfort and confidence levels:

> I feel that some more help in regards to writing scholary [sic] papers should be given.. this is all new to most people. (Survey One)

> Thank you for this opportunity. It has given me food for thought in regards to my research skill level. There are some areas for me to improve upon. (Survey One)

> Compared to the first survey I took, I have become much more comfortable with the research process and citing, & paraphrasing. (Survey Two)

> It took a little while to get used to searching proper articles but now I seem to get the hang of it. (Survey Three)

> It feels as if each time I do a new survey I am getting better at answering the questions quicker (ex. database journals periodicals and the parts of each)! and that feels great. (Survey Four)

A series of analysis of variance (ANOVA) calculations was conducted to determine the influence of the models on overall comfort indices across the four surveys. No significant differences were observed on any comfort index by model, indicating that the delivery model did not affect the students' perceived comfort level.

4.1.5 Information Literacy Engagement Index

To measure engagement in information literacy activities, two series of questions asked students about their frequency of information literacy behaviours. The first set of questions asked about the frequency with which the student completed various aspects of the research process; this series was asked on all four surveys. The second set of questions related to the use of search skills (e.g., search operators); this series was only asked on Surveys Two, Three, and Four. Table 12 displays the questions that comprise the Information Literacy Engagement questions. To quantify engagement, the two Engagement series questions were coded into numerical values in order to calculate the Information Literacy Engagement Index: always = 3, sometimes = 2, rarely = 1, and never = 0. The Information Literacy Engagement Index score is the average score of the engagement questions. Responses to individual questions and the comparison of the Information Literacy Engagement Index to the information literacy model used will be examined in this section.

Table 12: Information Literacy Engagement Index questions

Research Process	Search Skills
Before you start to work on your assignment, how often do you make a (search) plan/outline to gather information?	When looking for books or articles using electronic databases for homework or assignments, how often do you use the truncation searching technique (conduct search using * or $ as the last letter(s) of word, e. g., child*)?
After you have done your initial research, how often do you discuss findings with friends and teachers?	When looking for books or articles using electronic databases for homework or assignments, how often do you use the *Boolean operator "and"* (e. g., rivers AND pollution) while searching?
After you have done your initial research, how often do you make an outline (paper layout)?	When looking for books or articles using electronic databases for homework or assignments, how often do you use the *Boolean operator "or"* (e.g., Aboriginals OR Natives) while searching?
After you have done your initial research, how often do you review the original research questions to determine if additional information is needed?	When looking for books or articles using electronic databases for homework or assignments, how often do you use the *Boolean operator "not"* (e.g., raptors NOT basketball) while searching?
After you have done your initial research, how often do you discard irrelevant or useless information?	When looking for books or articles using electronic databases for homework or assignments, how often do you use *Limiters* (Limit search by date, publisher, language, type of material, full text) while searching?
After you have done your initial research, how often do you revise your outline based on research findings?	When looking for books or articles using electronic databases for homework or assignments, how often do you search more than one field at a time (such as publisher, journal title, author, descriptors, etc.)?
	When looking for books or articles using electronic databases for homework or assignments, how often do you use descriptors or some other controlled vocabulary specific to a database while searching?

Figure 14 displays the Information Literacy Engagement Index average for each survey. Averages across the surveys indicate that most students are sometimes using search strategies and the stages of research process. Survey One students recorded the highest engagement index at 2.2, Survey Two students the lowest at 1.8, and the fourth survey group was slightly above the second at 1.9.

Figure 14: Information Literacy Engagement Index by survey
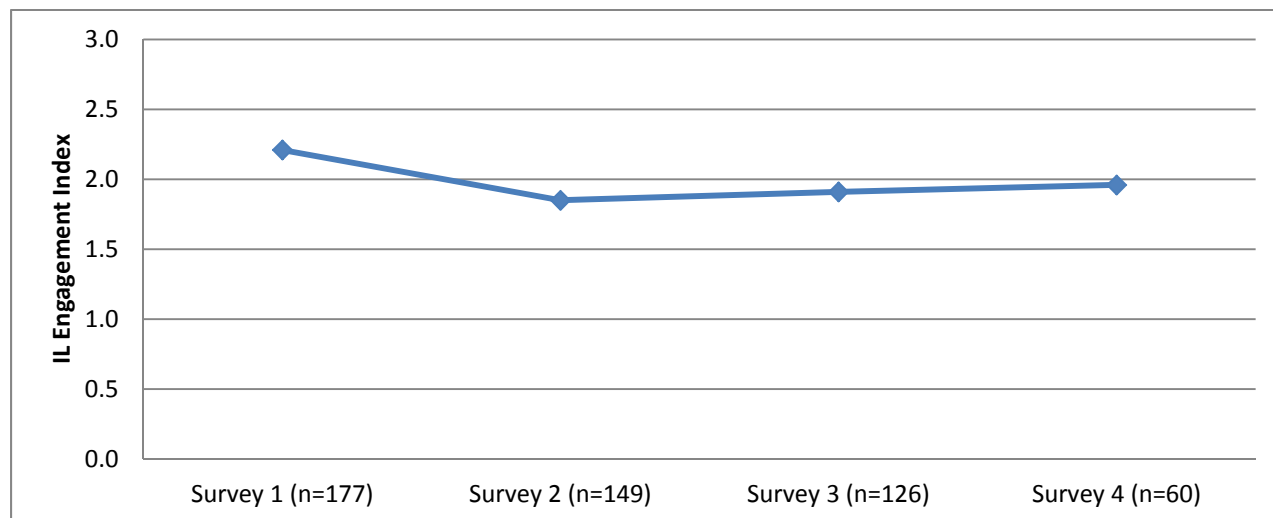
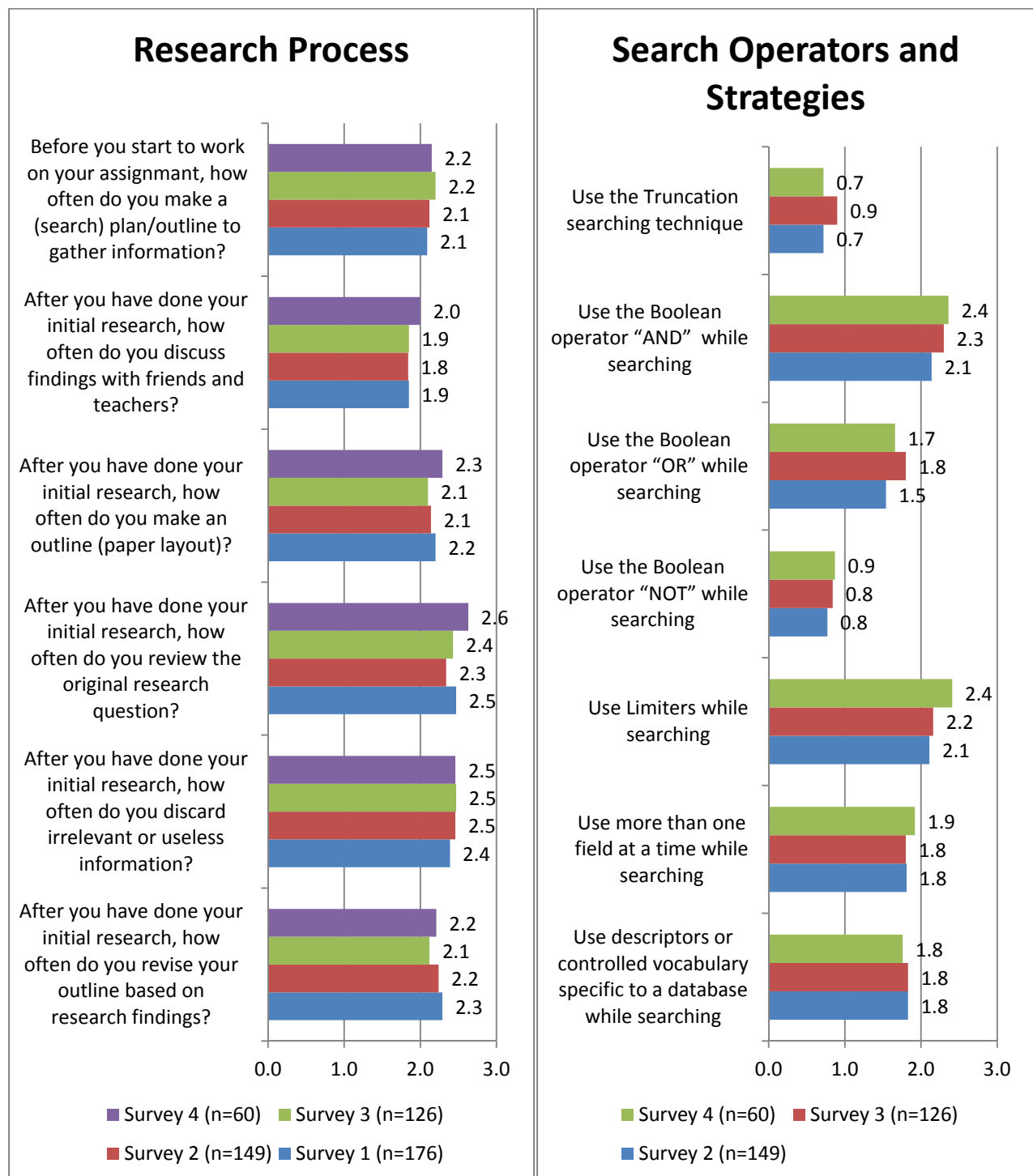0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Always

Questions related to activities associated with the research process were examined as part of the IL Engagement Index. Participation in planning activities before and after gathering research, discussing research, and evaluating information obtained were looked at over the course of the research period. Results (Figure 15) demonstrate higher engagement in the first survey and in the last survey in the individual questions related to the research process: reviewing the original research question to determine if there is a need for additional information, revision of outlines based on research findings, and discussing findings with others.

Some of the highest engagement scores were observed in Survey Four. On average, Survey Four students sometimes participated in the following activities: reviewing original research questions to determine if more information is needed (2.6), making an outline (paper layout) (2.3), and discarding irrelevant or useless information (2.5).

The average use of search skills was also examined in the calculation of the Information Literacy Engagement Index. This series of questions was asked in Surveys Two, Three, and Four. Students were asked to rate the frequency they use search skills, such as truncation, Boolean operators, and controlled vocabulary. Students reported that they use limiters, Boolean operator "and," searching more than one field at a time, and controlled vocabulary while searching; these techniques were given greater emphasis in library research sessions. Participants rarely used the Boolean operator "not" and truncation; these techniques are generally not demonstrated as frequently and students may not be aware of them for that reason (Figure 15).

Student Engagement Index scores in the following search skills gradually increased from Survey Two to Survey Four: use of the Boolean operator "and" (Survey Two: 2.1, Survey Three: 2.3, Survey Four: 2.4), use of limiters while searching (Survey Two: 2.1, Survey Three: 2.2, Survey Four: 2.4), and use of more than one field at one time (Survey Two: 1.8, Survey Three: 1.8, Survey Four: 1.9).

Figure 15: IL Engagement Index: Research process; Search operators and strategies

0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Always

A series of analysis of variance (ANOVA) calculations was conducted to determine the influence of the models on engagement indices across the four surveys. No significant differences were observed on any engagement index by model, indicating that the delivery model did not affect the students' engagement in research activities.

4.1.6 Students' Reactions to Research

The following two figures display students' reactions to receiving an assignment requiring research and information gathering using library databases. Students were asked to associate an emotion to the action: anxious, at ease, challenged, confused, interested, and intimidated.

Figure 16 displays students' responses to receiving a research assignment, measured on all four surveys. As the project progressed, more students felt *interested* and *at ease* after receiving research assignments. More students felt *anxious* in Survey One than the three remaining surveys. The percentage of students feeling *challenged* was the highest in Surveys Two (21.3%) and Three (20.5%).

Figure 16: Students' emotions when they receive a research assignment
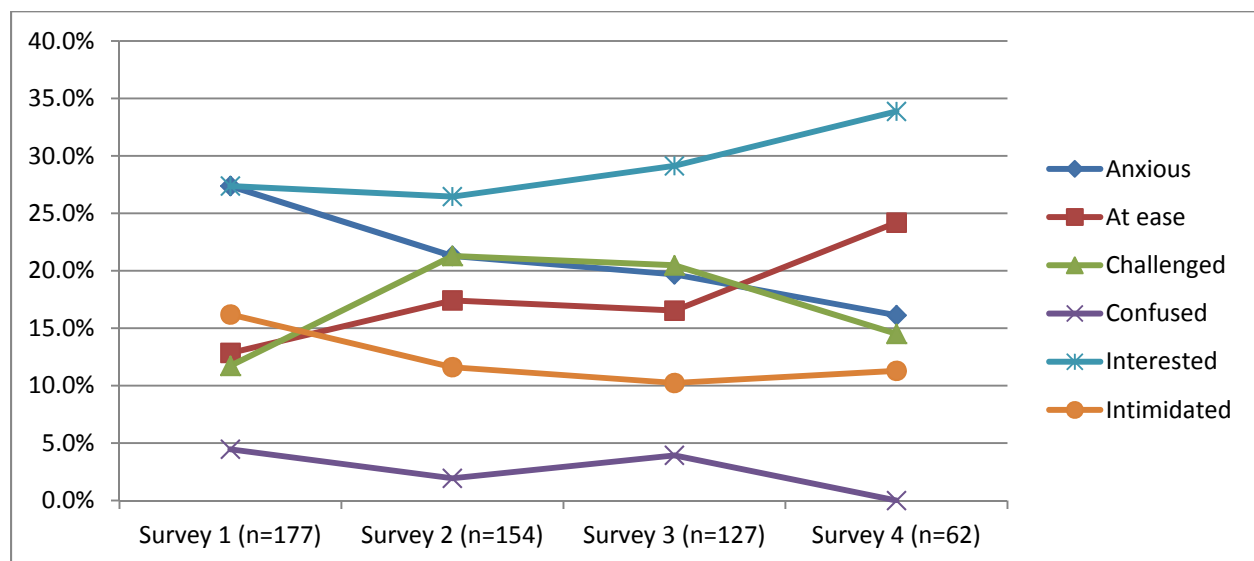
Student reactions to using library databases to gather information was collected in Surveys Two, Three, and Four (Figure 17). As the project progressed, more students reported feeling *at ease* in gathering information. Their feelings of *interest* were similar across Surveys Two, Three, and Four. It should be noted that the percentage of students that felt *anxious* was lower in Survey Three than compared to Survey Two and Survey Four.

Figure 17: Students' emotions when they gather information using library databases
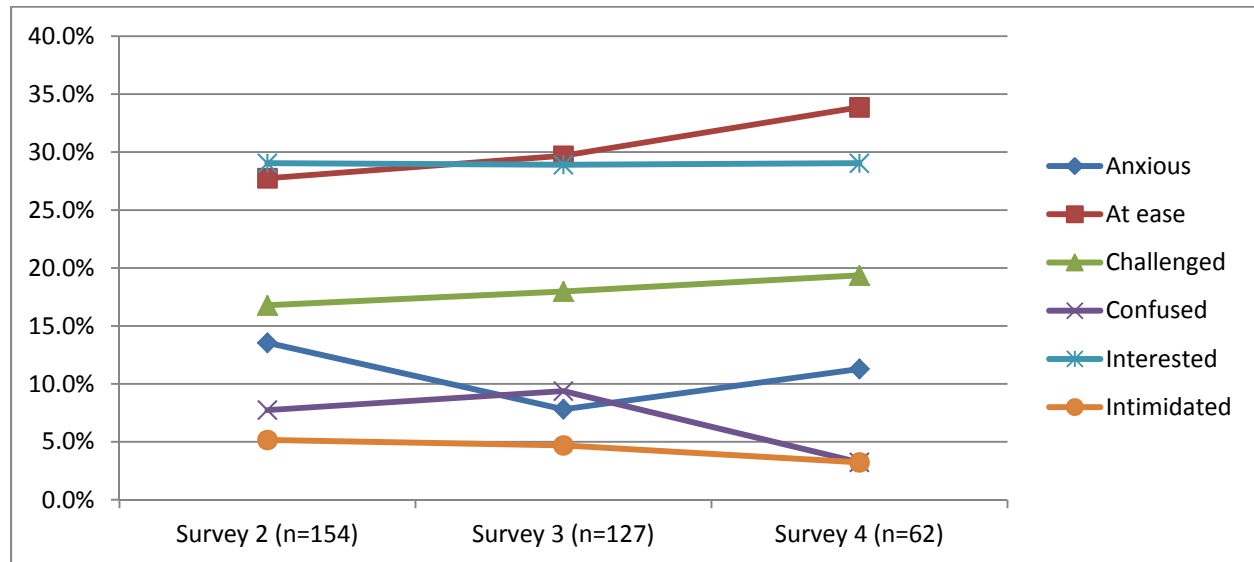
4.2   Faculty Interviews

Information Literacy Definition

In order to establish a point of reference, faculty members (N=34) were asked to define information literacy. Generally, responses revealed that faculty members know some components of the information literacy definition as defined by ACRL. A majority of faculty members commented that information literacy involved accessing information. Accessing information involves skills related to finding and accessing a variety of resources (e.g., book, journal article, picture, etc.). Different from ACRL's information literacy definition, faculty members commented that it also includes a measure of students' confidence and comfort with the process. Faculty members' definition focused primarily on the skill components and not the higher level knowledge components. For example, some faculty members reduced the definition to conducting research and getting information and neglected to mention other steps of the research process, such as determining the information needed, evaluating sources, and the appropriate or legal use of information. Some faculty members expressed the importance of evaluating sources in their definitions. For faculty members, evaluation involved both the assessment of credibility, reliability, authority, and point of view of a source, as well as how the source was related or relevant to the assignment or class discussion. Reading and writing as components of information literacy were reported as a means to understand and to demonstrate that understanding.

Faculty members' definitions of information literacy point to a need to provide better education about the breadth and depth of information literacy. Their definitions could also illustrate the components traditionally associated with library instruction.

Importance of Information Literacy

Library staff members believe in and promote the benefit and importance of information literacy skills. It was clear that faculty members do as well and many discussed employers' expectations, workplace success, or life-long learning as an outcome of an information literate student or graduate.

In reference to helping students understand the importance of the research, one faculty member added that they "connect for them what skill they do have so that when they go to market themselves with an employer, or they go on to university or they go to another program, then they have a sense of confidence and

confidence within themselves" (Interview One, Course-based model). This same faculty member referred to previous students who have returned from a placement and noted that "they have connections with employers who expect information literacy skills" (Interview One, Course-based model).

Another faculty member reported that students have discussed in class "how you can use research to change practice and support what you do at work and to let other people know what's out there so that they can get on board and change with you" (Interview Three, Embedded model). Programs that have professional requirements to maintain currency need to develop the skills while in the academic setting. Both the Dental Hygiene and Nursing programs are regulated with entry to practice competencies. The *Entry-To-Practice Competencies and Standards for Canadian Dental Hygienists* (2010) identify a 'critical thinker' as one of the core abilities expected of a dental hygienist. This competency is further described and reflects many of the ACRL Information Literacy Standards. Similarly, *National Competencies in the Context of Entry-level Registered Nurse Practice* (2008) guidelines document that entry-level registered nurses will understand nursing informatics and nursing information systems, and will use critical inquiry.

Most faculty members felt that it was important for students to understand that information literacy was necessary to complete academic assignments and that many careers "are going to require people to research effectively and to research critically" (Interview One, Online Tutorial model). Many faculty members stressed that employers have an expectation that employees are providing an informed response.

Average Skill Levels

Using the ACRL Information Literacy Standards as a guide, faculty members were asked if students could demonstrate particular information literacy skills.

Some faculty members identified that in first semester courses, assignments are fairly descriptive and prescriptive around the concepts or key terms. Therefore, students are not necessarily required to identify the key terms required in a search. A few faculty members indicated that students do demonstrate a wide range of knowledge about different types of resources, including books, journals, magazines, and the web. Some faculty members confirmed that some students have no concept of the difference between a magazine and journal, having had no previous exposure to journals. Unless the model or course had an assignment with a search strategy, faculty members could not comment on students' ability to construct a search strategy.

Some faculty members identified several skills that may not be a first-semester or first-year skill. This included the ability to compare and contrast information found in multiple sources. Faculty members generally agreed that evaluating for credibility, reliability, validity, accuracy, and point of view was a skill that required time to practice and develop. One faculty member commented that students "might be more skilled at looking at validity for a period of time and forget about currency" (Interview One, Course-based model). Another faculty member reported that students "read something and that's somebody's opinion... that's gospel truth" (Interview Two, Embedded model). Students have not yet developed a critical approach to information. Other skills identified as requiring time to develop include recording citation information for referencing and finding relevant information for a given assignment.

According to most faculty members, students exhibit confusion around copyright, intellectual property, and plagiarism. As one faculty member said, "If it's written on the Internet, it's theirs...They have no sense of the fact that somebody owns the ideas on the Internet" (Interview One, Online Tutorial model). Some faculty members commented that students are afraid that they will plagiarize because they do not understand the grey areas and the penalties.

Most faculty members expressed the expectation that students would arrive with basic information literacy skills. Faculty members commented on the range of abilities they noticed in first-year students that might be related to past academic or life experience. A couple of faculty members did comment that transferability of skills from course to course, semester to semester, or high school to postsecondary was not a consistently exhibited skill. The concept of readiness for postsecondary education is addressed in the next section.

Readiness: Literate, Fluent, Master

Faculty interviewees were asked to comment on how ready students were to complete research-related assignments. Their comments have been segmented into the levels of information literacy used by the study researchers in the Information Literacy Framework (Appendix A). These levels are *literate*, *fluent*, and *master* (see Glossary). Most faculty members also described other experiences and characteristics that are noted separately.

Students who could be identified as information *pre-literate* or *literate* are those who are learning a new language – a library or research language, discipline/program specific jargon – and who are learning new student expectations. One faculty member said, "I guess I have an expectation that they're at a certain level of preparedness and I'm not seeing that very consistently... you're just starting with such a variety that [it] can be a challenge" (Interview One, Embedded model). Some faculty members replied that some students are generally unaware of the process of finding information or understanding the variety of resources available. One participant from the Common Hour model said, "I think most postsecondary students are coming into the college and university system poorly prepared to even access the information" (Interview One, Common Hour model). Some faculty members also identified lack of awareness in the following areas:

- General news or current events knowledge,
- Interpretation skills to understand articles,
- How to communicate findings,
- Services available to assist them,
- Presuming that a source is reliable and not evaluating the source for credibility, and
- Importance of acknowledging another person's work (plagiarism, paraphrasing).

Some faculty members reported that students were unmotivated and would put forth the least amount of effort required and would want their teacher to provide explicit directions. These same faculty members reported that students would demonstrate little effort but expect to do well. Least effort was described as students limiting their search to full text items, failing to evaluate articles, or restricting their search to Google or Wikipedia.

Another characteristic mentioned by most faculty members was a lack of confidence that can manifest itself as fear. Some faculty members noted that students were nervous about the process of finding information. Many faculty members commented about emotional reactions hindering the students' learning abilities. One faculty member remarked on how students do not take the time to conduct research and said, "I think our high schools are orienting them towards being word processors rather than critical thinkers. And part of that critical thinking is understanding the methodology to do the research, and to assess the information they're getting" (Interview One, Course-based model). A faculty member associated with the Online Tutorial model in Interview One noted that students are unlikely to view research as a process with repeatable steps and are reluctant to take the time to do it thoroughly.

With greater exposure to and practice in information literacy skills, students become more *fluent* and sophisticated with research. Some faculty members noticed students' skills beginning to consolidate and saw that students began to access those skills at a quicker pace. But most faculty members noted that students still have challenges with finding relevant information, understanding and interpretation, how to use the literature to support an argument, referencing, or critical thinking. A faculty member reported that "finding the article is becoming the least of our worries. [It is] more about how they're using the literature. How they're using it to support their thinking, to challenge their thinking. And how they're... referencing that literature" (Interview Three, Embedded model). Many faculty members, on the other hand, saw increasing self-confidence, comfort, confidence with the language, effort, and dedication to learning. They noted that students are less resistant and more open to using the library databases to access resources.

Mastery of information literacy is a specialized level of ability in a particular discipline. A few faculty members commented that some students reached a point of self-directed learning. One faculty member indicated that while students could apply the skills in their discipline, they may still have difficulties transferring the skills

outside of the discipline. Some faculty members described students in later semesters getting excited and enthusiastic about researching and having moments of clarity when the skills all come together at the same moment. They noticed students using their own initiative to ask questions or to question an existing practice. Faculty members observed that student writing improved as they began to synthesize information and express their ideas in a logical progression. Students became critical thinkers making informed decisions based on the research evidence. Perhaps this is best summarized by this faculty member's comment:

> It's understanding the pyramid of the thinker so that, as a first level thinker, they believe that everybody's opinion is the right opinion. And then they start, as they progress through the pyramid of thinking, then they understand that, well I can start to question that authority. I can start to question that opinion. Until they get to a point where they're a constructivist. So I think we have to be really cognizant of that and bring them along in that pyramid with each year. (Interview Two, Embedded model)

Students enter college and university from unique starting points. The following discussion reflects the summarized viewpoints expressed by many faculty members. Many faculty members commented on the differences perceived between students entering from high school and those entering postsecondary as mature students. Students' maturity and experiences affect their willingness to learn. For some, their priorities, responsibilities, and time commitments (families, part-time jobs) are quite different and affect their commitment to education. Mature students bring life, work, and other educational experiences that influence their learning and ability to make connections. Younger students may have not yet had those experiences that contribute to connecting information. And yet those younger students are more computer literate, which can be a hurdle for some older students. Mature students were noted as having different reasons for attending postsecondary education, sometimes reflected in their motivation and eagerness to learn. Someone who has had previous postsecondary education is also likely to be more aware of the academic requirements necessary to succeed.

Some faculty members noted that a familiarity with technology, while a benefit for students, can also be a hindrance. Faculty members noted that students who are dependent on electronic communication appear to have surface level skills and are unable to transfer those skills to postsecondary research. "There is in general a benefit to the technological abilities, to the Internet for students, but there's also some serious drawbacks. The main being students not knowing which sources to use and there being this overwhelming mass of sources. You get lost in the sea" (Interview One, Online Tutorial model). Generally, faculty members recognize that although the web has made information accessible at any moment, the sheer volume of it makes finding quality information difficult for some.

This research study examined students in diploma and degree programs, leading some faculty members to comment on the differences they perceive between the two. Some faculty members expressed an expectation for students in university to be more self-directed and to figure out research on their own. Students should be critical thinkers, analytical, and able to adapt a process. The faculty members contrasted college education as being more focused, practical learning that is directed to a specific job. Teaching is more procedural, while subject matter is relevant and current for a particular job. These faculty members had experience in teaching both college and university students and noted that college academic semesters and courses are generally organized with pre-requisites to develop a logical progression of skill and knowledge in the subject area, unlike the university organization of courses.

Several faculty members identified their concerns about direct entry high school students. These faculty members noted that the type of writing expected in high school did not transfer well to the writing expected in their course. Faculty members were not clear how much research instruction might have been received in high school and recognized that it could vary by high school or high school teacher. Most obvious to many faculty members was that students were taught referencing quite differently than what was expected in college or university.

And finally, students with learning disabilities and international students were mentioned. Faculty members recognized that students with learning disabilities need more assistance. Several faculty members noted the different attitudes towards referencing from international students. For some cultures, it appeared that using

someone else's ideas or words would be considered honouring the originator, and credit or a reference was not required.

Course Assignments

In order to understand whether students had sufficient opportunity to practice information literacy skills, interviewees were asked to describe the types of assignments required in their course.

The majority of faculty members included a marking rubric with their assignment to give the students criteria for what is required. Rubrics included the types of resources required, how many resources were needed, and the format of the paper. All faculty members described relatively structured assignments that were prescriptive in nature in their first-year courses. Some faculty members had developed a series of smaller assignments that culminated in a larger paper or project. These types of assignments helped students frame their thoughts in a step-by-step approach.

Most faculty members expressed concerns about assignments and research related activities. Plagiarism was mentioned many times, sometimes in the context of students being challenged to paraphrase, and sometimes in the context of students not understanding the need to reference their sources. Some faculty members suspected that students limited themselves to full text articles for the quickest results without evaluating the results for relevancy. Some of the articles were questioned if they were not at an appropriate level for the assignment, such as, a student using a newspaper or magazine article when a journal article was needed.

Many faculty members felt that students did not evaluate their sources. Evaluation includes examining sources in a number of ways: the author's credentials, the relationship to the chosen topic, and the validity and reliability of the information. Some faculty members did not always see a balance of viewpoints in the sources, leading to sources being chosen because the facts suited the argument in the paper. A few interviewees remarked that some students would try to force the evidence to fit their argument or not use a balanced source list of books, journals, and websites. Lastly, a few faculty members remarked that some students did not demonstrate the ability to use critical thinking skills in order to understand the assignment and its rubric, provide appropriate depth of information, and express original thoughts.

Another area of concern for the majority of faculty members was the ability of students to express themselves in the written form. Writing a paper with a logical progression – with an introduction, presentation of the argument(s), and a conclusion – was identified as an area where students struggled. Basic sentence structure, grammar, punctuation, and spelling were other issues. Some students had difficulties with paraphrasing, in-text citations, and other components of citation styles.

Students' Reactions to Research Assignments

Faculty members commented on students' reactions to research assignments as: challenged, bored, inexperienced, resistant, resigned, tedious, unprepared, not confident, reluctant, lost, not enjoyable, unmotivated, or stressed. Faculty members also observed emotional reactions: fear, frustration, intimidation, or overwhelmed.

Interviewees described a range of emotions associated with the research process. While some students were eager and positive about researching, others found the process complicated and complex. One faculty member expressed it this way:

> ... until they can clarify the expectations for the assignment, there's some general rumbling about this is very hard. It's going to slow us down. It's too much work. When they unveil the process and see that it's not as deep or as wide as they thought it was, then they're okay. So research is still kind of a four letter word for them (Interview Two, Course-based model).

Another faculty member described the students as "kicking and screaming" (Interview One, Course-based model) initially. They believed it was important for the research process to be broken into smaller, more manageable pieces. Some faculty members reported students being proud of their accomplishments as they

began to learn the language of research and their discipline. Generally, faculty members reported an increase in confidence and comfort as students' abilities to make connections improved. While not speaking directly about the students in this research study, a faculty member commented that students exposed to the Embedded model come back and "[tell] us how valuable that those sessions were for their learning in [another institution]. They tell me how valuable my marking has been on the scholarly paper because when they go to [another institution] they know how to research. They know how to write a paper" (Interview One, Embedded model). Another faculty member from a Course-based model reported the frustration students experience and that "they'd hit their head against the wall a few times until they began to realize that's what this is all about, [it's] learning how to get past that point" (Interview One, Course-based model).

It is clear that some students do not have the skills needed to undertake research and have told some faculty members, "We never learned this in high school" (Interview One, Online Tutorial model). For some faculty members, their reply is, "Research is part of learning and if you're not into it, you're not going to learn anything" (Interview One, Online Tutorial model). Students need to hit roadblocks in research, as one faculty member observes, "because it shows that they're actually trying some of the skills. They're actually trying to expand the way they go around things and the way they go about things and how they problem solve" (Interview Two, Online Tutorial model). Some faculty members noted that students are afraid to ask for help, particularly from library staff, even though they understand the library staff is there to help. Students also often do not know what help to request.

Barriers to Information Literacy

Faculty members were asked to describe any barriers to the development of information literacy skills in students. Students' engagement with their education and their reactions to research assignments were a barrier expressed by faculty members. One faculty member commented about "students who weren't in class or weren't part of the discussion or didn't buy a textbook... or didn't do the reading" (Interview Three, Embedded model) as having greater difficulty due to a lack of motivation or engagement. A faculty member said, "Many of them are quite challenged... to write in a way, perhaps their thinking is there, but their writing skills don't enable them to show their thinking" (Interview Two, Embedded model). A faculty member commented on "how uncomfortable... just the lack of confidence that they do have even in this stage" (Interview Three, Course-based model) and that "unless a teacher brings the expert into the classroom, in my estimation, a small percentage of students would ask for assistance and access those resources" (Interview Three, Course-based model). Faculty members mentioned student characteristics like age (e.g., high school, mature) and technological abilities that also contribute to the development of information literacy skills. This dialogue between the interviewer and a faculty member illustrates the importance of critical thinking:

> Professor: The next step to take them to a very analytical paper is where they get challenged.
>
> Interviewer: What is the challenge? …
>
> Professor: I think it's a couple of challenges. One is we don't at this point have a foundational course in aspects of research. So there's a lot to learn in this one course. It's all the information literacy plus all the research and I think that's one. I think the other thing is the time they have to do it. You know, they start to compromise when they can't find what it is they think they're looking for. I think there's a culture that you know, there's one right article and I need to pick it and I need to hand it over and that's we certainly found this year, is they wrote excellent papers if it was just an overview of the topic.
>
> Interviewer: A critical thinking piece, right.
>
> Professor: And they just didn't integrate it into their written work. (Interview Three, Common Hour model)

In their comments, faculty members often reported that students did not understand plagiarism as it pertains to paraphrasing, citing, and referencing.

Within their comments, faculty members addressed barriers for themselves. Many faculty members, especially those representing college programs, referenced an inconsistency among faculty members with regards to citation expectations. They felt that this created confusion for students. Some commented that faculty members within a program may not require a consistent demonstration of research skills. Some faculty members also had the expectation that incoming skill levels be relevant for postsecondary education and the expected postsecondary research. However, they perceived that incoming students from high school were not prepared to conduct academic research at the postsecondary level.

Lastly, faculty members discussed institutional or academic program barriers. Time was consistently mentioned as being insufficient to address research skills. Time was mentioned in the context of time for course content, information literacy instruction, and practicing research skills. As one faculty member said, "There's a lot crammed in... there's a short period of time where we expect them to get a lot, develop a lot of skills [and] they need a little bit more practice and time" (Interview Three, Common Hour model). A faculty member commented that time is a critical component in information literacy as reflected in "constant integration and reinforcement" (Interview Three, Common Hour model). One faculty member mentioned the support of a program champion as "it does take time so the commitment to this course or information literacy tends to fall outside of any one person's [responsibility] which means if you don't have a champion, if you don't have someone in a program, [information literacy] is not going to happen" (Interview Three, Common Hour model).

Information Literacy Enhancement

In the interviews, faculty members were asked if they could identify any improvements in students' information literacy skills by the end of the semester or year. While faculty members did comment on positive changes, these changes cannot be directly attributed to the information literacy models.

In the Course-based model, a faculty member noted that "they [students] had a better understanding and less frustration" (Interview One, Course-based model) with completing research as the semester progressed. In the Foundations of Business Research course, one faculty member noticed "their ability to think through a process improved... their logic, the application of logic... the dexterity of their minds to make connections to come up with keywords... improved over the term" (Interview One, Course-based model). At the end of the first year, the faculty member commented that at least 50 per cent of the class were able to comfortably tackle a research assignment. One faculty member noted, "They're much more open to actually going into the library to look up materials, to use the databases there" (Interview Two, Course-based model) rather than using the web.

Within the Common Hour model, a faculty member noted that students "learned how to recognize when they were having trouble earlier" (Interview One, Common Hour model), which enabled them to ask more pertinent questions. Because students were more prepared, "they had a number of weeks to get the information together and with me checking... if they were off on one tangent... [then I could] re-focus them a little bit" (Interview One, Common Hour model). One faculty member described a sample class activity where students are given a topic and asked to find information to share: "At the end of the semester they've come back with valid journal articles... [and] they aren't anxious when they do it... they're confident in the abilities" (Interview Three, Common Hour model). This faculty member summarized by saying, "So not only are you seeing their skills develop in the sources and credibility that you're looking at, but their competence level" (Interview Three, Common Hour model). During student presentations, a faculty member noticed that "[the students] felt very confident, very proud of themselves when they... did their presentations" (Interview One, Common Hour model).

Within the Embedded model in Automotive Management, the faculty did not notice any direct, corresponding result in the first semester. Students were better prepared if "they have paid attention" (Interview One, Embedded model), but multiple messages from library staff and faculty members are required. In the B.Sc.N. program, the number of hours dedicated to information literacy instruction and the assignment value were increased "which seemed to motivate them" (Interview One, Embedded model). A faculty member noted an improvement in research skills from past years. This faculty member commented that "if I look at a student

who maybe missed a session or missed a couple sessions, and then tried to do that work, their work is not as well done" (Interview One, Embedded model). A faculty member described students' portfolios in second year and "they were really engaged with the issues, it made the writing very easy... they were really interested, they'd been in practice a little bit so it had some meaning for them" (Interview Three, Embedded model). The faculty member commented that, by the end of their second year of study, students "were able to take the evidence that they were reading out of an article and make it real" (Interview Three, Embedded model).

In the Online Tutorial model, students were asked by core faculty members to provide feedback on the tutorials. Student feedback was that they could see how they would "use the information in their research in other courses" (Interview One, Online Tutorial model) and that they "made the point... if they could access this module on an ongoing basis, they could use them as a reference tool" (Interview One, Online Tutorial model). One faculty member commented that "if I were to assign them a research paper right now, I'd have confidence that they would approach it with some process, with some skills, with calmness" (Interview One, Online Tutorial model). It was difficult for faculty members to identify a difference in skills in first semester students, but in second semester "they're... trying different databases, they are really exploring their electronic world much more broadly" (Interview 2, Online Tutorial model). In the companion course the following semester, a faculty member reported students having had "experience working with the librarian" and then students reported that their first step after exploring the topic would be to "contact the librarian" (Interview Two, Online Tutorial model).

Contributions of Library Staff

Overall, faculty members commented that library staff contributed positively in either an implicit or explicit way to students' information literacy skills. The partnership between library staff and faculty members was mentioned in most of the models. Some faculty members recognized the importance of maintaining their understanding of information literacy skills. The student responsibility to request assistance was also a common thread in their comments.

Within the Course-based model, faculty commented on the willingness of library staff to provide individual consultations or small or large group presentations. Involving librarians in the development of assignments ensured resource availability and familiarity with assignment requirements, leading to an increase in student success. One faculty member commented, "I don't think we'd be able to take the students as far along in their skill development without the library" (Interview Three, Course-based model).

Communication was a key component to the Common Hour model. Faculty members were confident that they could ask library staff to present to their classes but felt that the information was generally covered in the Common Hour sessions. A faculty member commented, "We expect that our students go to the library and... they get very well supported" (Interview Three, Common Hour model). But this same faculty member said, "We try to prepare the library... for what's coming... [so] they're not relying on the students' understanding of the assignment" (Interview Three, Common Hour model). While library staff was not as involved in assignment development beyond those specifically requiring information literacy skills, some faculty members saw the benefit of speaking with library staff to ensure an alignment of information literacy skills with the assignment goals.

There was little to no involvement of library staff in the development of assignments for the university students in the Online Tutorial model beyond the information literacy tutorials. Some faculty members encouraged their students to use the library staff's expertise, but the onus remained on the student to approach the staff for assistance.

A faculty member from the Embedded model (B.Sc.N.) felt that "[the model is] a partnership that we're engaged in" (Interview Three, Embedded model) with library staff. A faculty member reported that "students have absolutely told me based on their experiences that the librarians are really helpful" (Interview Two, Embedded model). Beyond the information literacy assignments, library staff was not involved in designing other assignments. However, "[the librarian] comes to our team meetings" and provides "new articles for courses" (Interview Three, Embedded model).

Ideal Model of Information Literacy Instruction

Faculty members were asked to describe what they felt the ideal circumstances were for information literacy instruction given no restrictions on physical, human, or financial resources. They were also asked to choose the best delivery model from the options of Course-based, Embedded, Common Hour, or Online Tutorial.

Many faculty members noted that students need the hands-on practice in order to learn: "You have to provide some opportunity for them to actually engage in doing" (Interview One, Embedded model). Even having additional computers in the classroom would be helpful to address research questions at the point of need: "I think computers in all of the classrooms would be great so that they could do more research" (Interview One, Course-based model). Another faculty member noted that "[d]emonstration is great, but unless their hand is on a keyboard and thinking it through [for] reinforcement ... challenge [them] a bit to put some effort on their side" (Interview One, Course-based model).

Connections and collaboration among students, faculty members, and library staff were commented on frequently. The collaboration could be between faculty members and library staff, but the connection between students and library staff was also important. A faculty member from the Course-based model reported that "students who have connected with a librarian absolutely do better. There's no doubt about it in my mind. They're not afraid to up and say, I've got this assignment. It's not just my class, but all their other ones. They're not afraid to ask how I find this. Those students do better" (Interview One, Course-based model). One faculty member suggested that "having the librarian as the primary deliverer is the best way and to have someone... to show how this would apply... to give the practical application" (Interview One, Course-based model) would be an ideal method. One faculty member felt that "it's really important when [the students] see their faculty using the materials as well" (Interview Two, Course-based model). A few faculty members suggested having library staff visit multiple times throughout the course, for example at the beginning of the semester, "then another session midterm and then a session closer to the end" (Interview One, Course-based model).

Some faculty members addressed the need for assessment and used assignments to develop information literacy skills. In the Common Hour model, a faculty member identified how they "set it up so that each instructor's assignment parallel[ed] how the IL [was] being introduced to the students" (Interview One, Common Hour model). That helped the students make a connection from the presentation to the assignment. Coordination and context were identified as important for information literacy classes to be applicable to students. A level of consistency within a program was identified, or as one faculty member said, "The same message is being communicated and the same standards are being applied on a consistent basis and the same kind of information requirements and skills are being referred to throughout the process" (Interview Two, Online Tutorial model).

Other faculty members commented on the types of delivery that they would like to see. For example, more tutorial sessions dealing with specific databases would be welcome, as would printable or electronic reference guides and access to previous presentations. Self-paced tutorials would address the need for simple and discrete concepts that could be viewed in a timely manner for "in the moment learning" (Interview One, Embedded model). Yet face-to-face sessions were still considered important for faculty members and students.

Additional ideas expressed were sessions, workshops, a foundations or student success course that would address the skills to be a successful student, small group sessions, program faculty members devoted to library research, skill development opportunities for full- and part-time faculty members, and improved consultation on assignments.

Faculty members were asked to identify the best delivery model in the third interview. One faculty member's comment, among others, states that information literacy instruction is most effective when "it's a combination of models used" (Interview Three, Common Hour model). One faculty member specifically asked, "Can I pick

two?" (Interview Three, Online Tutorial model). The following paragraphs explain the benefits of the Embedded, Online Tutorials, and Common Hour as explained by faculty members interviewed.

Several faculty members recommended the Embedded delivery model. Embedded was identified as being beneficial because it allows students to connect the skills to their program content: "It ends up being relevant to your course material, and then you can build it with your semesters" (Interview Three, Common Hour model). The Embedded model provides context, and information literacy is not seen as a separate skill because it is "trying to make it [IL] real, connect it with what they're doing" (Interview Three, Common Hour model). Several faculty members inferred that within the Embedded model, information literacy should be delivered every semester with a strong foundational start in the first year. In addition, there needs to be information literacy instruction related to the hands-on application of the skills.

Online Tutorials were also considered effective as they are self-paced and self-directed. One faculty member, experienced with information literacy online tutorials from her own studies, supported using online tutorials because "[you] just skip over the parts that you knew or go faster... And then you would just go in those tutorials that you needed help on" (Interview Three, Embedded model). Online tutorials were also cited as a resource that students could review as needed.

Finally, Common Hour workshops were also suggested as an effective delivery model by some faculty members. The Common Hour model would help address the just-in-time personality characteristics of our students. However, as one faculty member from the Common Hour states, "My concern with the common hour is it is not a requirement of the course" (Interview Three, Common Hour model).

5. Discussion

Consistent with McGuiness (2003), this study observed that faculty members use assignments to evaluate information literacy skills. Faculty members reported that assignments are effective when they are descriptive and explicitly state expectations, possibly through a rubric or marking scheme. Assignments tend to be more prescriptive early in the students' academic career. Context and knowledge of the subject improve understanding of what is required and expected for assignments. Faculty encourage continuous skill development throughout the students' academic career, as demonstrated in the faculty interviews by the extra information literacy learning activities provided throughout the duration of this project. As students develop more complex research skills, their comfort level increases, and so does the complexity of their assignments. To develop information literacy skills, students require consistency, context, and continuity in a curriculum. It is suggested that "Embedded" is not a delivery model, but rather a method of articulating learning outcomes which will be further discussed under best practice.

Faculty members commented that students enter their courses with a wide variety of skills and life experiences. This makes instruction challenging as some students know how to complete research, some think they know how to complete research, and some have not reached a pre-literate level of information literacy. The diversity of the postsecondary population encourages faculty members to use multiple learning strategies to deliver content. This approach can be extended to information literacy curriculum delivery models. Faculty members described a combination of the delivery models as an ideal approach to information literacy instruction, and students reported experiencing a variety of information literacy learning opportunities (Figure 4).

Faculty members described students' reactions to research as resistant, challenged, intimidated, frustrated, and fearful. Some faculty members did indicate that some students were eager and positive. Students were asked in the survey to select a word that most described how they felt when receiving a research assignment from a prescribed list (anxious, at ease, challenged, confused, interested, and intimidated). In Survey One, 55.3 per cent of the students felt anxious, challenged, or intimidated. The Survey Two group (students near the end of the first study term) reported similar feelings at 54.2 per cent. These survey results support the comments from faculty members. In Survey Four, 41.9 per cent of students still felt anxious, challenged, or intimidated. This reflects faculty comments that students still feel frustration further along in their educational career, possibly due to the complexity of the tasks which may include more source evaluation or critical thought that requires a higher skill level.

Faculty members were asked to report their concerns while marking student research papers. Plagiarism was mentioned by many faculty members. They were concerned with paraphrasing and whether the plagiarism was intentional or not. Students were asked to identify examples of plagiarism in a multiple response question (Figure 9). While students were able to successfully identify examples of plagiarism, their responses varied across the surveys. The highest scores were in Survey Four. Half of the students thought that copying text written by someone else and using it with quotation marks was an example of plagiarism when it is not.

Another concern of faculty members was the combination of students evaluating sources, selecting articles at the appropriate level for the research question, and balancing viewpoints found in sources. Students were asked how comfortable they were with evaluating information found from sources in the Information Literacy Comfort Index (Figure 13). Students reported feeling somewhat comfortable throughout the survey period, however, scores were highest in Surveys Two (1.6) and Four (1.5). Students also rated the importance of evaluation characteristics of sources (for example, finding the author or source, finding up-to-date information, finding accurate information that is confirmed in other sources) as very important or important (Table 8).

The Information Literacy Engagement Index contained a question asking students if they discarded irrelevant or useless information after their initial research was completed. Students reported that they sometimes completed this task. A higher percentage of this behaviour was noticed from Survey One to Two, but thereafter it remained consistent. It appears that student survey responses reflect faculty concerns because

both groups realize the importance of using quality sources, though students may not consistently apply evaluation criteria.

Both student and faculty comments suggest the challenges of presenting research and writing research papers. Among the Information Literacy Comfort Index questions, developing research questions, writing a research paper, and referencing and citing sources scored the lowest comfort levels. While these levels were still within the somewhat comfortable range, a student from Survey Two stated, "Am I confident in writing a research paper? I ask myself that all the time" (Survey Two). Furthermore, students expressed difficulties referencing and citing sources. Faculty members reported that students were challenged with basic writing skills like sentence structure, grammar, punctuation, and spelling which impede the student from presenting their work coherently. Some faculty members reported that their assignments are structured in a way that allows students to prepare a larger paper or project by breaking it into smaller segments. Despite this assistance, almost all faculty members observed students struggling with the organization of the final product and would therefore spend time in or out of class with students reviewing construction of research statements, synthesizing information, and organizing the final document.

In the first interview, faculty members were asked to describe students' readiness for postsecondary education from an information literacy perspective. They reported that students lacked confidence or comfort in their research abilities. This included general knowledge of current events, evaluation skills, communication skills, and the importance of acknowledging another person's work. In Survey Three, the Information Literacy Comfort Index was 1.4 and 1.5 in Survey Four. Survey Three represents the end of the study term two and Survey Four represents the end of study term four. When students were asked to select a statement that described their ease of use at the library, more participants in Survey Four were able to find articles easier (58.1%) as compared to Survey Three (15%) (Figure 7).

Faculty members who were surveyed and interviewed in Bury's (2010) study expressed concern with students' actual abilities as compared to their perceived abilities. Faculty members also reported that students have challenges meeting ACRL Information Literacy Competency Standards. During the interviews for the current study, faculty members were asked to identify if students could perform specific information literacy tasks, for example, identify search terms as described in the ACRL Information Literacy standards. In many cases, faculty members could not confidently report on students' abilities as faculty members do not witness the task unless it is specifically evaluated as part of an assignment. However, some faculty members did indicate that not all tasks are expected of a first-year student and that other skills take time to develop or mature. The student surveys yielded similar results that corroborate faculty members' comments. The overall accuracy score was 68.7 per cent in Survey One and 79.1 per cent in Survey Four. The individual component accuracy score was 70.8 per cent in Survey One and 75.0 per cent in Survey Four for Citation Identification, 72.7 per cent in Survey One and 78.0 per cent in Survey Four for Search Strategy, and 63.1 per cent in Survey One and 77.5 per cent in Survey Four for Copyright. Only one significant difference was observed in Citation Identification between Embedded and Course-based models. The Embedded model yielded higher scores in citation identification questions in Survey Four than the Course-based models.

The surveys confirmed that students rely on web-based tools to look for current information and information for assignments. These web-based tools consist of the library webpage, electronic databases, and search engines. This is consistent with other research projects (Bury, 2010; Head & Eisenberg, 2009; Neely, et al., 2003), which identify web-based tools as common resources for postsecondary students, and the Neely et al. (2003) study, where participants identified newspaper archives as a source of current information.

Students reported using information literacy skills outside of course work, which demonstrates a transferability of skills. However, faculty interviews revealed student difficulties in transferring their research skills into their discipline of study, especially upon entry into the program prior to developing knowledge of their field. This could be a result of their lack of knowledge in the topic being researched, with the student being unable to associate their information literacy knowledge with the topic area they are trying to transfer these skills to. Through discussion groups and student surveys, Head and Eisenberg (2009, 2010) reported that U.S. college and university students use research for personal inquiries as well as for course-based assignments. Students also considered non-course-based research to be of personal interest and easier to find information

on as compared to course-based research, which could yield fewer results and increase frustrations (Head & Eisenberg, 2009, 2010). It is interesting to note that students pair negative emotions to course-based research, despite using similar research skills as those employed in their everyday research. Future research into the transferability of everyday research skills to course-based research skills should be investigated. The need for additional information literacy skill development for faculty members is seen through the faculty members' often limited definitions of information literacy. Faculty members limited the definition of information literacy to the students' ability to gather information and perform research activities. McGuiness (2003) also expressed this concern of generalizing and limiting the information literacy definition to searching activities. The current study demonstrates the importance of faculty members understanding all components of information literacy.

Based on faculty interviews and student survey results, no one particular information literacy delivery model was found to be more effective than another. Several faculty members stated that a combination of delivery models is the best model for student success, employability, and to encourage life-long learning. The interview results indicate that information literacy skills develop and improve over time. Faculty members stated that information literacy skills need to be developed and applied in a meaningful way. These skills need to be reiterated and reinforced over the entire academic program. Therefore, we suggest the following best practice and recommendations to improve and enhance student skill development, comfort, and engagement with information literacy and employability skills, while encouraging an institutional implementation and accountability for student success.
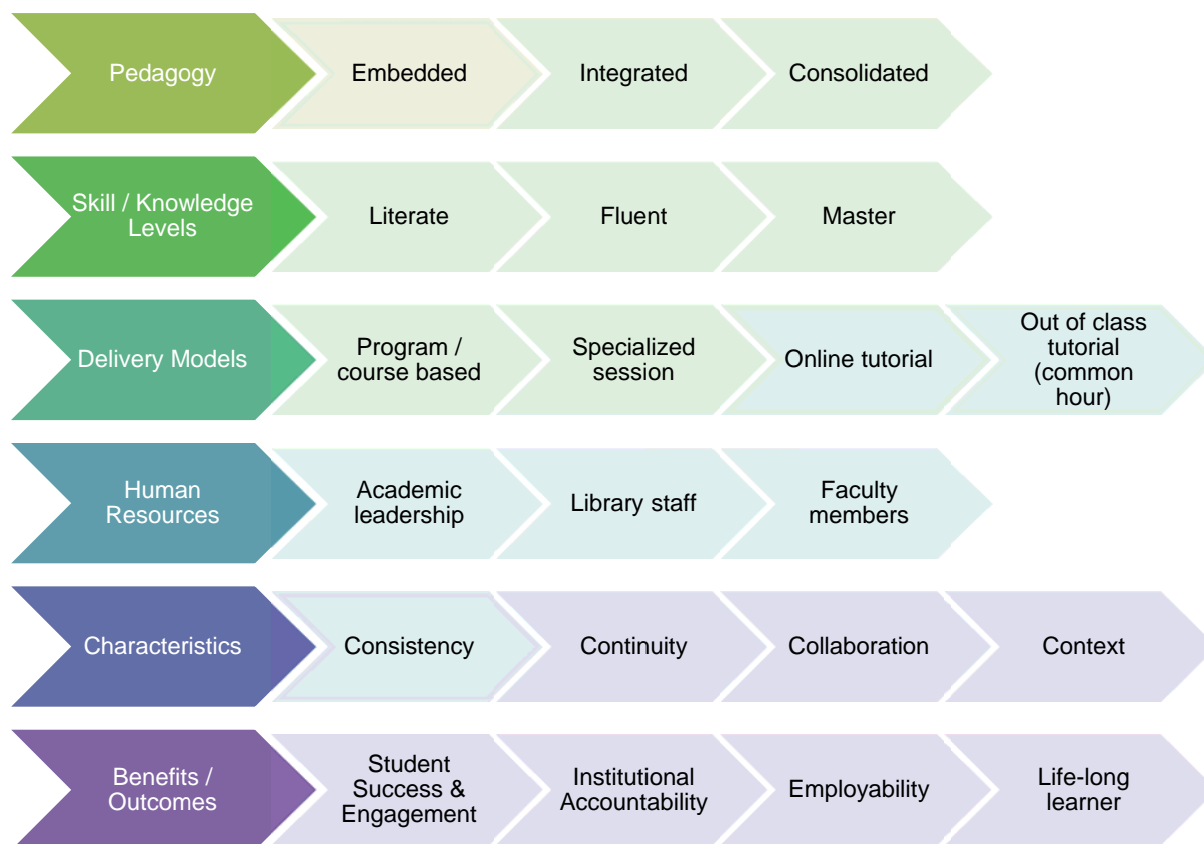
5.1   Best Practice

The development of an information literacy curriculum is a best practice based on this study's survey results and faculty interview themes. Similar curricula have been discussed or developed. The Middle States Commission on Higher Education (2003) produced a document entitled *Developing Research & Communication Skills: Guidelines for Information Literacy in the Curriculum* that explains how to plan for information literacy at the institution, how to develop learning goals and teaching strategies, and how to assess information literacy. This report complements the Middle States' standards for accreditation.

A curriculum can be described as a series of subjects or courses in a particular subject or discipline. Information literacy should be seen as a component of any educational experience and be developed as a curriculum that complements the subject. Proposed components of this information literacy curriculum (Figure 18) are as follows:

- Pedagogy,
- Skills/knowledge levels,
- Delivery models,
- Human resources,
- Characteristics, and
- Benefits/outcomes.

Figure 18: Components of an Information Literacy Curriculum

Pedagogy	Embedded	Integrated	Consolidated	
Skill / Knowledge Levels	Literate	Fluent	Master	
Delivery Models	Program / course based	Specialized session	Online tutorial	Out of class tutorial (common hour)
Human Resources	Academic leadership	Library staff	Faculty members	
Characteristics	Consistency	Continuity	Collaboration	Context
Benefits / Outcomes	Student Success & Engagement	Institutional Accountability	Employability	Life-long learner

As this research study evolved, it became clear that embedding and integrating were two different methods of articulating learning outcomes. Embedding information literacy outcomes in assignments, courses, and programs enables students to develop the language of research in a similar way that they learn the language of their discipline. Distinct or explicit attention is given to discreet information literacy skills which allow students to develop a basic to advanced level of skills. Many faculty members recommended a hands-on approach to student learning which supports an initial skill development.

When information literacy outcomes are implied and integrated into assignments, courses, and programs, they are not easily discernible. At this stage, information literacy concepts are reinforced through assignments and instruction. Consolidation is about using information literacy skills and knowledge united with discipline knowledge. Information literacy is no longer a skill that is separate, but it is assimilated and part of the students' repertoire. A progression from embedded to integrated to consolidated is recommended to achieve the greatest learning outcome.

As discussed earlier in this report, the Information Literacy Framework has assigned three skill and knowledge levels to information literacy: literate, fluent, and master. As students progress through the levels, they demonstrate higher-order thinking and application of the knowledge to their discipline. The researchers propose that the embedded teaching method be used to instruct pre-literate and literate learners. Explicit teaching of information literacy skills helps students learn and practice the basic skills that will form the foundation for growing their knowledge. Students advance to the level of fluent information literate learner as they become more sophisticated in their knowledge comprehension and synthesis. Information literacy can be more implicitly taught and reinforced at this stage as learners have a foundation of skills. This means that the information literacy standards are not as easily discernible in learning outcomes, but are still an expectation

from the course or program. Advanced skills and knowledge will be explicitly taught. And finally, some students will achieve a master level of information literacy in their discipline. This implies that they are very skilled at researching within their discipline or subject area and are able to demonstrate a transferability of research skills in interdisciplinary areas.

In order to achieve a desired skill level, appropriate delivery methods are utilized dependent on the program and course material and the intended library or institutional outcome. This research study suggests that no one delivery method is sufficient, but rather a hybrid of delivery models leads to the best outcome. Information literacy skills can be delivered or incorporated through specific courses in a program throughout the duration of a program. As required, a specialized session targeted to specific resources or concepts may be delivered to fulfil a just-in-time need. Students could access other content through videos or modules available when they need it in their course management system or on the library website. Additionally, workshops or sessions can be offered to students outside of their regularly scheduled class times. Any combination of these delivery models will support the development of information literacy skills.

An information literacy program can only be successful when the appropriate individuals are involved. Repeatedly in the faculty interviews, the collaboration between faculty members and library staff was mentioned, whether in the context of expertise in information literacy, course or program knowledge, or the relationship between faculty members and library staff.

Within the ACRL's (2003) *Characteristics of Programs of Information Literacy that Illustrate Best Practices: A Guideline*, "elements of exemplary information literacy programs" are documented. One category is dedicated to administrative and institutional support. As stated in this document, this support can include:

- Assigning information literacy leadership and responsibilities.

- Placing information literacy in the institution's mission, strategic plan, policies, and procedures.

- Recognizing and encouraging collaboration among disciplinary faculty, librarians, and among institutional units.

- Communicating support for the program (ACRL, 2003).

The ACRL's document (2003) recommends using the "governance structures" of the institution to "ensure institution-wide integration into academic" programs. For most Ontario community colleges, the academic division at the vice-president or associate vice-president level would be responsible for enacting this type of academic policy.

The underlying characteristics of an information literacy program are consistency, continuity, collaboration, and context. Both the literature and the faculty interview themes described these program qualities. At Georgian College, the collaboration and partnership between faculty members and library staff was mentioned many times in the interviews. The Embedded model in Nursing was described as a partnership between the program and the library. When reporting on survey results from York University faculty, Bury (2010) found that 78.7 per cent felt that information literacy should be a collaborative endeavour between librarians and faculty members. Within the library literature, there are differing faculty member viewpoints about information literacy instruction and library involvement in the classroom (Bury, 2010; McGuiness, 2003). However, collaboration at Georgian is seen as a core institutional value (Georgian College, 2010). The faculty interviewees expressed concerns about the lack of consistency of expectations within a program. One faculty member recommended that "the same message is being communicated and the same standards are being applied on a consistent basis and the same kind of information requirements and skills are being referred to throughout the process" (Interview Two, Online Tutorial model). Both the Common Hour model and the Embedded model (Nursing) demonstrate consistency and continuity through program competencies or learning outcomes and assignment requirements. Context for students is also important. By illustrating information literacy in the context of their academic program, students see the relevance of the skills and knowledge. ACRL's document for information literacy program characteristics (2003) recommends "linking information literacy to ongoing coursework and real-life experiences appropriate to program and course level."

And finally, there are several benefits or outcomes to developing an information literacy curriculum. The Conference Board of Canada's *Employability Skills 2000+* identified "managing information" as a fundamental skill for the workplace and daily life. These essential employability skills are part of the basic components in the Ministry of Training, Colleges and Universities' program standards (MTCU, 2009). ACRL (2000) describes information literacy as the "basis for lifelong learning. It is common to all disciplines, to all learning environments, and to all levels of education. It enables learners to master content and extend their investigations, become more self-directed, and assume greater control over their own learning." Georgian's *Curriculum Handbook* (2009) identifies seven core academic principles, one of which is information management for "both our internal management of data and the commitment to ensure our students are provided with multiple experiences to develop information literacy" (p. 3). Currently, academic institutions are examining and "making increasing efforts to ensure that a quality learning experience is being offered to students throughout their PSE experience, one that includes solid and effective teaching, strong levels of student engagement, deep learning, and value-added skills development" (Wiggers & Arnold, 2011, p. 2).

In reviewing a student experience initiative at Georgian College (Beaudoin, 2011), information literacy supports student success and student engagement in the following benchmarks based on NSSE's benchmarks and Tinto's integration concepts:

- Academic integration,

- Level of academic challenge,

- Active and collaborative learning, and

- Student-faculty interaction.

The information literacy curriculum illustrates a best practice based on all of the findings presented in this research report. The recommendation section identifies strategies to achieve this evidence-based practice.

6.   Recommendations

The recommendations that follow are written in a format based on Gilchrist and Zald's (2008) assessment cycle. Each recommendation is written as an outcome and further explained by criteria for success, assessment, analysis, and continuous improvement.

This research report recommends that a postsecondary institution should:

Create an information literacy strategic plan in order to support student success and engagement in research activities both academically and personally.

This recommendation has four components.

1. Develop and implement an institutional information literacy assessment plan in order to measure the readiness of the institution and identify disparities in the expectation of entering students' skills and opportunities in program curricula for information literacy.

    Using the Information Literacy Framework (Appendix A) and ACRL's *Analysing your Instructional Environment: A Workbook* (2010), document the current status of information literacy in the institution. Program learning outcomes and graduate profiles will be examined. Consultation and collaboration with faculty, library staff, students, and academic leadership will take place to discuss implementation of information literacy institutionally. Measurement tools will be used to gauge student satisfaction, student performance, and student engagement. Examples of measurement tools include: LibQual, KPI results, graduate outcomes, and student information literacy surveys. A successful information literacy assessment plan will contribute to an institutional information literacy strategic plan.

2. Improve faculty information literacy development in order to support student engagement in research activities.

    Faculty should be aware of the ACRL Information Literacy Standards and how these standards can be applied in an academic program. Faculty can acquire these skills through self-directed learning, collaboration with library staff, and professional development through an entity like a Centre for Teaching and Learning. Integrating information literacy into the course will provide evidence of the association of information literacy performance outcomes and course content providing a contextual environment for student research skill development. These outcomes would be measured by faculty as part of an assignment evaluation rubric.

3. Create and implement an information literacy curriculum for each academic program based on this report's best practice in order to support student success, engagement, employability, and life-long learning.

    Using the information literacy standards mapping document (Appendix B), review program courses for instances where performance outcomes match information literacy performance outcomes. Develop classroom sessions and/or assignments that will explore information literacy at various stages of the curriculum. Progression through the Information Literacy Framework will be evaluated through in-class contributions, tests, and/or assignments.

4. Update and re-evaluate the institutional information literacy strategic plan in order to document information literacy activities and plans, and identify next steps.

The adoption of our suggested best practice and recommendations by postsecondary institutions will contribute to student success, student engagement and the development of skills that are transferable to the workplace. Further investigation and monitoring of the Information Literacy Curriculum and Strategic Plan should be considered to ensure that postsecondary students receive the best information literacy instruction possible at their academic institution and that it encourages life-long learning and inquiry.

7.   Conclusion

This research study posed seven research questions to examine the effectiveness of students' information literacy skills and comfort levels in four different information literacy delivery models. Faculty members were interviewed to further understand the students' use of information literacy skills and how these skills are developed in an academic program.

Four information literacy delivery models were studied to determine if any of these models enhanced the information literacy skills of postsecondary students. No significant differences in model efficacy could be determined in this study since the information literacy delivery model could not be identified as the sole influence for accuracy score changes. Other factors that could affect the scores include individual assistance, prior knowledge, acquired knowledge, requirement and reinforcement for information literacy in an academic program, and evaluation methods for information literacy in an academic course.

The study looked for gaps in student knowledge of information literacy skills. Faculty interviews identified a diversity of student preparedness and readiness for postsecondary research. Faculty members' comments supported the continuum of literate to fluent to master levels of information literacy as presented in the Information Literacy Framework. Student survey results identified areas for development such as plagiarism, citation identification, research process, and copyright.

Both student survey and faculty interview results collected information on how comfort and confidence enabled students to develop and acquire information literacy skills. The study observed that the self-assessment of students' comfort and engagement in information literacy activities was greater in the student groups further along in their studies. However, the study recognizes that there could be other influences in the students' success other than the effect of the delivery model. Faculty members commented that as a student's confidence level improved, it gave students the impetus to continue practicing and improving their research skills. Faculty members identified student self-confidence as a barrier to learning and embracing information literacy skills.

Faculty members were asked to comment on the importance of information literacy development for students. Faculty members linked information literacy to a student's employability and life-long learning mindset. While the importance of information literacy was identified, faculty members discussed institutional, student, and faculty barriers to skill development. For example, faculty members suggested more time be allotted to information skill development or additional resources, such as online tutorials and other self-paced materials. Time is a significant barrier to the incorporation of information literacy skills into a content heavy curriculum.

Information literacy skills are generally assessed through assignments and presentations. Some faculty members reported using rubrics to quantify information literacy skill development. Students reported practicing information literacy skills through a variety of activities: attending in and out of class seminars directed by library staff, interactions with faculty, asking for assistance from library staff, and participating in online tutorials.

Finally, this study discussed and recommended the use of an Information Literacy Curriculum that would strategically contribute to student success and engagement in information literacy. This curriculum would address pedagogy, skill/knowledge levels, delivery models, human resource requirements, underlying characteristics, and the benefits and outcomes for the student, institution, and employer. This research report recommends that a postsecondary institution create an information literacy strategic plan to monitor improvement and to support student success and engagement in research activities both academically and personally.

Glossary

Consolidated: Information Literacy (IL) standards and/or performance indicators *may be present* in the program and/or course outline learning outcomes *or implied* using similar language *or implied* in the expectations of course assignments. Students combine the use of information literacy skills and knowledge with their academic program knowledge in learning activities.

Embedded: Information Literacy (IL) standards and/or performance indicators are present in the program and/or course outline learning outcomes. Information literacy content is explicitly taught, assessed, and reinforced by the teacher and/or librarian. For student success, information literacy content is presented that is relevant and specific to the program/course.

Engagement: Active participation and quality of effort in academic and other activities as they related to information literacy.

Fluent: Sophisticated comprehension and synthesis beyond the basic ability to determine information is needed, to access information, to evaluate and incorporate information into knowledge base and value system, to use information effectively to accomplish a specific purpose, and to understand the economic, legal, and social issues surrounding the use of information with an ability to transfer the skills**.**

Integrated: Information Literacy (IL) standards and/or performance indicators *may be present* in the program and/or course outline learning outcomes *or implied* using similar language *or implied* in the expectations of course assignments. Information literacy content may be reinforced by the teacher and/or librarian through course content and assignments. For student success, information literacy content is presented that is relevant and specific to the program/course.

Literate: Basic ability to determine information is needed, to access information, to evaluate and incorporate information into knowledge base and value system, to use information effectively to accomplish a specific purpose, and to understand the economic, legal, and social issues surrounding the use of information.

Master: Specialized ability in a particular discipline or narrowly defined subject area with a sophisticated comprehension and synthesis beyond the basic ability to determine information is needed, to access information, to evaluate and incorporate information into knowledge base and value system, to use information effectively to accomplish a specific purpose, and to understand the economic, legal, and social issues surrounding the use of information and the ability to actualize the skills in an interdisciplinary environment**.**

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