An Online Information Literacy Course for Undergraduates: Early Experiences[1]

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Abstract:

This paper discusses the conversion of a longstanding popular course that is designed to teach information literacy skills to undergraduate students and that has been taught for the last twenty years in a face-to-face format. Both the face-to-face and the newly designed online course address the recommended learning outcomes put forward by the Association of College and Research Libraries (2000), including the effective articulation of a relevant researchable question, the ability to access the needed information effectively and efficiently, the critical evaluation of sources, the integration of selected, pertinent information into one's knowledge base, and the utilization of this new understanding to accomplish a specific purpose. The lessons learned following the completion of two sessions of the online version are discussed.

Introduction

Key components for the development of new literacy skills for the 21st century include an emphasis on information and media literacy, critical thinking and problem solving, and self-direction (Partnership for 21st Century Skills, 2006; Conference Board of Canada, 2000). According to the American Association of School Librarians (2007), skilled readers should not only have decoding and comprehension skills in familiar contexts but also the ability to interpret and to develop new understandings in far-ranging learning contexts and situations. In this

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increasingly global world of information, students must be taught to seek and evaluate diverse perspectives, and to use technology as an important tool for learning, both now and in the future. Therefore, the skills that students need include, how to: develop and refine a range of questions to frame the search for new understanding; find, evaluate, and select appropriate sources on the basis of accuracy, reliability, validity, and appropriateness; make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, and points of view or bias; maintain a critical stance by questioning the validity and accuracy of all information; and monitor gathered information to assess gaps and weaknesses. As technology and the Internet become increasingly pervasive parts of everyday life, the importance of developing these skills is critical.

A range of North American associations recognize the critical importance of information literacy skills (Canadian Association for School Libraries, 2006; Association for Research Libraries, 2000; Canadian Association for Research Libraries, Conference Board of Canada, 2000, American Library Association, 1998), nevertheless, few school curricula specifically address the teaching of the skills as in many cases the teachers lack basic information literacy skills themselves (Henry, 2005). Severe cutbacks in provincial school library staff and teacher-librarian programs have also contributed to a gap in the teaching of information literacy (Whitehead & Quinlan, 2006). In her comprehensive review on internet searching, Henry (2006) summarizes the results of 84 studies, nine literature reviews, and four theoretical publications. Findings revealed significant weaknesses in students' skills as they moved through the planning, searching, monitoring and evaluating stages of the research process. For example, with novice searchers research questions were poorly defined, search queries too broadly described, and the advanced features on retrieval tools rarely used. Additionally, comprehension of information found was weak if literacy skills were poor, and students who lacked conceptual knowledge had difficulty assessing the relevancy of the information found. The impact of this is that over the past decade, the majority of Canadian academic libraries (and elsewhere) have taken on the role of the teaching of these skills.

Teaching Information Skills at Concordia University – INST 250: *Introduction to Library Research Practices*

The ongoing debate in terms of who should be responsible for the teaching of these skills at the postsecondary level suggests that the ideal approach is a partnership between faculty and librarians (Albitz, 2007). However the situation at Concordia University was a unique one as the university offered a Library Studies Programme, taught by professional librarians who were also tenured faculty. Over twenty years ago, a faculty member within this Programme, designed *INST250 - Introduction to Library Research Practices* and directed it to undergraduate students outside of the Library Studies Programme, as a means to teach fundamental research skills. Over the years this course has been significantly adapted and revised as the information literacy sub-skills have evolved, along with the technologies.

For the past twenty years four sections of INST 250 have been offered annually, with each section being capped at 55 students. Student enrolment is drawn from all four faculties in the university – Arts and Science, Engineering and Computer Science, Fine Arts and the John Molson School of Business. About five years ago, the course was adapted for Education students, and two sections of EDUC 250 are offered annually as a required course to Child Studies students.

In line with the recommended *Standards* put forward by the Association of College and Research Libraries (ACRL) (2000), INST 250 addresses the following broadly stated learning

outcomes: the effective articulation of a relevant researchable question, the ability to access the needed information effectively and efficiently, the critical evaluation of sources together with the integration of selected, pertinent information into one's knowledge base, the utilization of this new understanding to accomplish a specific purpose, and the ethical and legal use of the information.
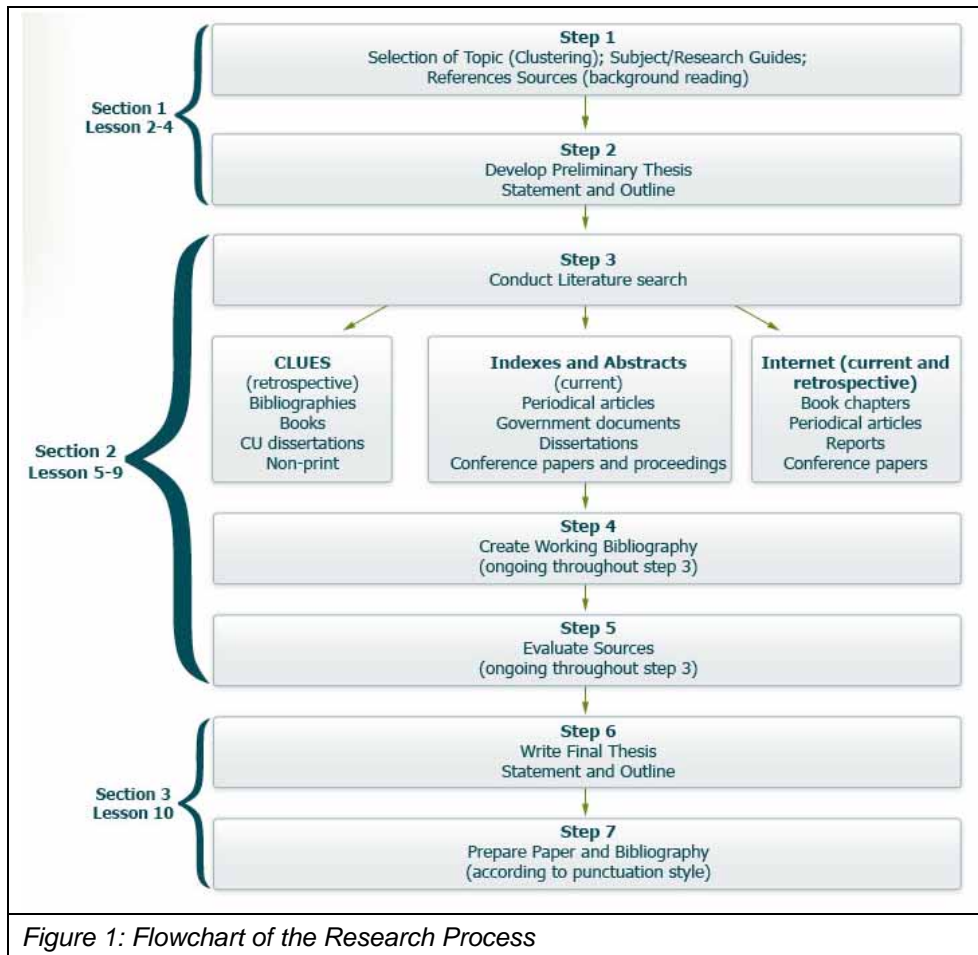

Figure 1: Flowchart of the Research Process

In order to accomplish these learning outcomes, the course follows a *Flowchart of the Research Process* (see Figure 1) and is divided into three sections, incorporating nine content lessons. Although in total there are ten lessons, Lesson 1 *Overview of the Course* focuses on the mechanics of the course, deadline dates, and navigation of the website. Section 1 **(Planning)** includes lessons 2 through 4, Section 2 **(Searching)** encompasses lessons 5 through 9, while Section 3 **(Using)** includes lesson 10.

Actual content begins with Lesson 2 which defines information literacy employing the definitions of both the American Library Association and the Society of College, National and University Libraries based in the United Kingdom; introduces students to a research process flowchart (Figure 1), which is actually the flowchart that serves as the roadmap for their research experience throughout the course; and introduces the publication cycle. Aligning with ACRL's Standard One, and based on the publication cycle (University of New Brunswick, 2010), students have their initial foray into the various types and formats of information and how they can be accessed.

Again, in keeping with ACRL's Standard One, Lesson 3 focuses on the articulation of a relevant research question. To accomplish this, students are shepherded through a series of steps meant to assist them in choosing a topic of interest, narrowing down that topic and developing a preliminary thesis statement and preliminary outline, and identifying some critical concepts and the keywords associated with these concepts. Various exploratory techniques such as brainstorming what they already know on a topic (clustering) and background reading in reference and textbooks are employed by the students.

Lessons 4 and 5 combine a series of actions that incorporate the outcomes specified in ACRL's Standards 1, 2 and 3. Following a brief introduction to primary and secondary sources and using the publication cycle as a guide, Lesson 4 begins by identifying the various types of information that students are apt to find during their actual searching experience in Lessons 6 through 9. It then goes on to illustrate how to recognize the many publication types by their representation in the various databases and catalogues, or on the Web. Over the years, it has been our experience that this recognition of material type is not only fundamental for its correct entry in the references list, but is an essential component of the reliable evaluation of a source. Lesson 5 then introduces students to the concept of reviewing the information sources they have discovered, identifying those of potential value and extracting main ideas (note-taking) from these sources. Further, students learn how to identify the bibliographic information needed for the creation of a list of references or a bibliography.

Lessons 6 through 9 focus on the theory and practice of searching, emphasizing ACRL's Standard 3. While students typically begin their information searches on the web, the published literature research process is reversed in this course, with the introduction to the focused searching process beginning with a search of materials available through the library holdings and identified in the online public access catalogue (OPAC). The OPAC approach was chosen as within a finite searching environment, the concepts of keyword searching (Lesson 6), and controlled vocabulary searching with the aid of a thesaurus or subject heading list (Lesson 7) can be introduced incorporating the fundamentals of searching such as Boolean logic and proximity operators. Within this finite environment, comparisons of these types of searches, the application of limits, and the analysis of records and results is much clearer to differentiate. Lesson 8 expands on the use of keyword and subject searching by examining its application to both bibliographic and full text databases, while Lesson 9, the final lesson in section 2, uses a three-fold approach to searching through the use of directories, search engines, and meta- or multi-search engines.

Directed by ACRL's Standards 4 and 5, Section 3 of the course includes Lesson 10, and concentrates on using the found information effectively and ethically. It focuses on ensuring that credit is given where it is due, through the use of in-text references and the formulation of a list of references. In addition, students study the basic questions to be asked and answered when formulating an annotation. Table 1 provides a summary of the linkages between the ACRL standards and the lessons covered within the course.

ACRL Standard	ACRL Statement	INST250 Lesson
Standard One	The information literate student determines the nature and extent of the information needed.	2 Information Literacy 3 My Research Topic
Standard Two	The information literate student accesses needed information effectively and efficiently.	4 Types of Materials 5 Conducting the Literature Search 6 Keyword Searching 7 Subject Searching 8 Searching the Databases 9 Searching the Web
Standard Three	The information literature student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.	4 Types of Materials 5 Conducting the Literature Search
Standard Four	The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.	10 Putting the Information to Work
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.	10 Putting the Information to Work
Table 1. ACRL (2000) Standards linked to INST 250 Lessons		

Rationale for the Creation of INST 250 in an Online Format

During the 2010-2011 school year, the authors discussed the feasibility of transforming the course into an online version. The design and development work unfolded at eConcordia over the summer.

eConcordia was established in 2002 as a self-sufficient entity in charge of designing and delivering all online courses for Concordia University. In the academic year that ended in April 2012, they had an enrolment of approximately 28,000 students across 45 online courses offered throughout that year.

Students opting to enroll in the online version of INST 250 were either already enrolled in an undergraduate program at Concordia University, or were taking the course as an independent student (no program). The enrollees consisted of both full-time and part-time students with the majority falling in the 19-24 year-old age group.

One obvious reason to transform INST 250 to the online format was the desire to extend the reach of the teaching of information literacy to a wider audience beyond the four sections of INST 250 and the two sections of EDUC 250. By offering an online section, the course instantly

became more appealing to students seeking a flexible alternative to their schedule, given that the course is offered asynchronously via eConcordia's proprietary learning management system. In addition, the online format offered a means to deliver content in a consistent fashion to a large number of students geographically dispersed, and across different time zones.

Another important reason for the move to an online version of the course is the fact that the target learners are increasingly dependent on online search engines and web-based resources for their research, and much less on the more traditional bricks-and-mortar libraries. This shift entails learning a specific skill set required to efficiently sift through the multitude of digital resources freely available online or through a university library database, and perhaps more importantly, developing the ability to evaluate those resources. Offering the course in an online format facilitated the integration of authentic activities and active learning (e.g., searching through the university's digital archive for a given resource after watching a recorded demonstration of a similar activity) and just-in-time demonstrations on the usage of search applications.

But there were also other reasons why the authors were anxious to transform INST 250 into an online format. To begin with, the structure of the lessons, as well as the pedagogical strategies that were implemented in the face-to-face version, lent themselves well to the online format. For example, technology had been used extensively as a means to model and encourage student experimentation with a variety of web-based resources and retrieval tools. This started with the use of a stationary lab about 15 years ago, followed by the use of a portable lab about ten years ago, and the use of the students' own laptops in the last couple of years. The integration of technology into INST 250 was in keeping with the findings of a recent comprehensive systematic review of studies that looked at effective uses of technology in postsecondary education, Schmid et al (in preparation) found significant gains when technology was used to teach information search and retrieval strategies.

Levels	k	$g+$	Lower 95th	Upper 95th	$Q_{Between}$
Major Purposes of Technology Use					
Cognitive Support	186	0.357	0.28	0.44	
Presentational Support	113	0.152	0.07	0.23	
Communication Support	27	0.236	0.12	0.35	
Search and Retrieval	9	**0.637**	0.15	1.12	
Mixed Purposes	485	0.235	0.21	0.26	
Between Groups, $df = 3$					15.66, $p = .004$

Table 2. Schmid et al (2012) - Systematic Review of Technology Use and Student Achievement in Postsecondary Education

Building on this, the authors felt that there were opportunities to enhance the students' e-learning experience by applying more effective technology-based pedagogical approaches to the teaching of information literacy and critical thinking skills (Schmid et al, 2009). For example, one of the primary goals of the course is to ensure that students fully understand that the need

to be information literate does not disappear with convocation but continues as an essential skill throughout life. To this end, interspersed with the lessons are short video clips extracted from interviews conducted with real people in real work situations. The first features a graduate student who has completed the course work for her Master of Arts degree and is now working on her thesis. During the interview she speaks of having employed a research strategy that has enabled her success in her academic career. The second interview is with a practicing paediatrician with both an MD and a Doctorate (PhD) in Medicine. As a medical specialist in a rapidly changing environment, the interviewee speaks to how he literally relies on published information on a daily basis, whether he is researching a surgical procedure or a research experiment, and how his iPhone keeps him in touch with what is taking place in the medical world, allowing him to use the latest information in his practice and his research. The third interview features an information specialist who is responsible for the management of internally created information of a large multinational consulting organization. She speaks to the use of published literature in a corporate financial consulting environment.

Instructional Design Principles Used

Decisions related to the design of the online INST 250 lessons were guided by evidence-based pedagogical techniques and strategies. For example, Mayer (2001, 2008, 2009) describes a cognitive theory of multimedia learning organized around three core principles: a) **dual channels**—the idea that humans possess separate channels for processing visual and verbal material; b) **limited capacity**—the idea that each channel can process only a small amount of material at any one time; and c) **active processing**—the idea that deep learning depends on the learner's cognitive processing during learning (e.g., selecting, organizing, and integrating). According to Mayer the central challenge of instructional design for multimedia learning is to encourage learners to engage in appropriate cognitive processing during learning while not overloading the processing capacity of the verbal or visual channel.

During the design process, the authors were paired with an instructional designer who worked with them to ensure that the design of this course would be faithful to the above-mentioned cognitive processing theory, along with effective e-learning strategies. To this end, eConcordia makes use of the ADDIE model for the design of instruction, combined with the theories proposed by Bloom (1956) and Gagné (1985) in the creation of all of its courses. ADDIE is an acronym that represents the five main stages of the model: Analysis, Design, Development, Implementation and Evaluation.

The instructional designer aided the authors in the creation of new content, the repurposing of existing content (transferring it from its original medium to the online environment), and served as the project leader to coordinate a team comprised of a graphic designer, a multimedia designer, a content analyst, and a videographer. The sequencing of the lessons, the level of complexity and quality of the content, the use of external resources (textbooks, readings, etc.), the design of the assessments, and all other content-related matters were the responsibility of the instructors. The instructional designer's job was to assist the instructors in organizing and delivering this content, and to find the best way to present it in an asynchronous (self-paced) online course.

General Structure of the Course: From the INST 250 Course home page (see Figure 2), students are able to access the:

- **Lessons**: The heart of the site as this provides access to the course content
- **Discussion Board:** An online forum for exchanging information with classmates or for posing questions to the instructors
- **Resource Centre:** Includes a glossary, list of websites referred to in the course, and quick access to all the videos
- **My Agenda:** A schedule of deadlines and important university dates
- **Assessments:** Access to the assignments
- **Publication Cycle:** A quick link to the visual representation of the flow of the dissemination of research results
- **RefWorks:** A shortcut to this bibliographic management system, to which all Concordia students have access
- **Concordia Libraries:** A shortcut to the Concordia Libraries home page which is used as a springboard to the majority of resources used in the course.
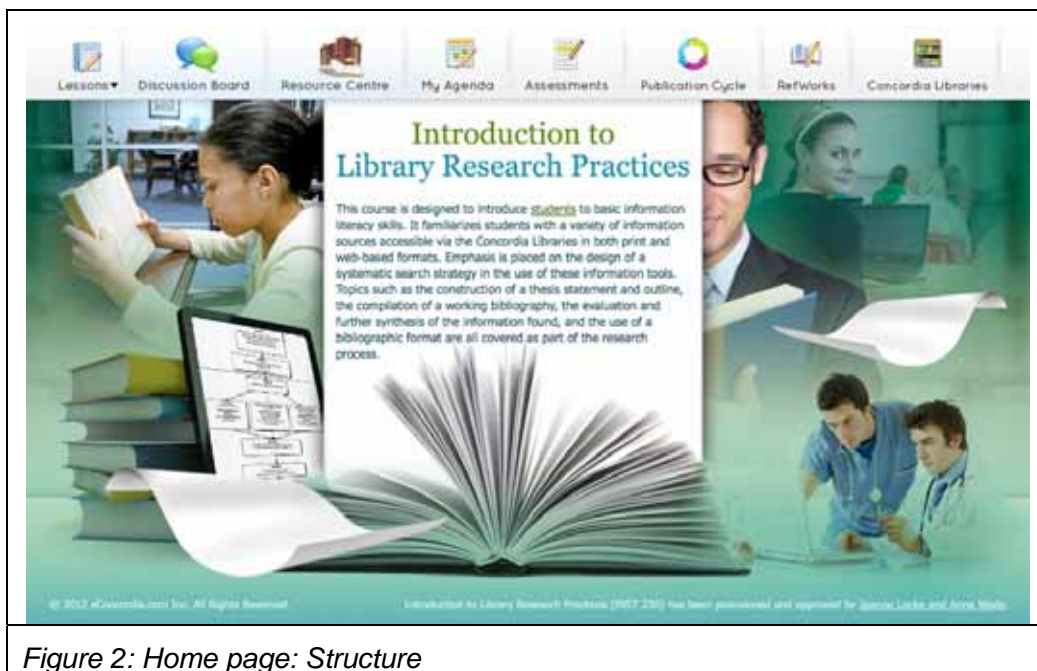

Figure 2: Home page: Structure

Lessons: Each lesson is structured according to the following: 1. Introduction to the Lesson; 2. Pre-test; 3. Study Materials (lessons); 4. Readings; and 5. Post-test (see Figure 3).

The *Introduction to the Lesson* is a short video given by the instructor that summarizes the lesson objectives and the structure for the lesson. The *Pre-tests and Post-tests* are used to help students gauge their level of understanding prior to, and following completion of the lesson. The *Study Materials* are the course lessons and explanation of these follows. Finally the *Readings* section provides a list of resources for further clarification of the course content.

2. **Pre-tests** and **Post-tests** employ the same questions. At the pre-test stage, these questions serve as indictors of key elements included in the lesson. As post-test questions, they confirm the students' knowledge after having completed the lesson.
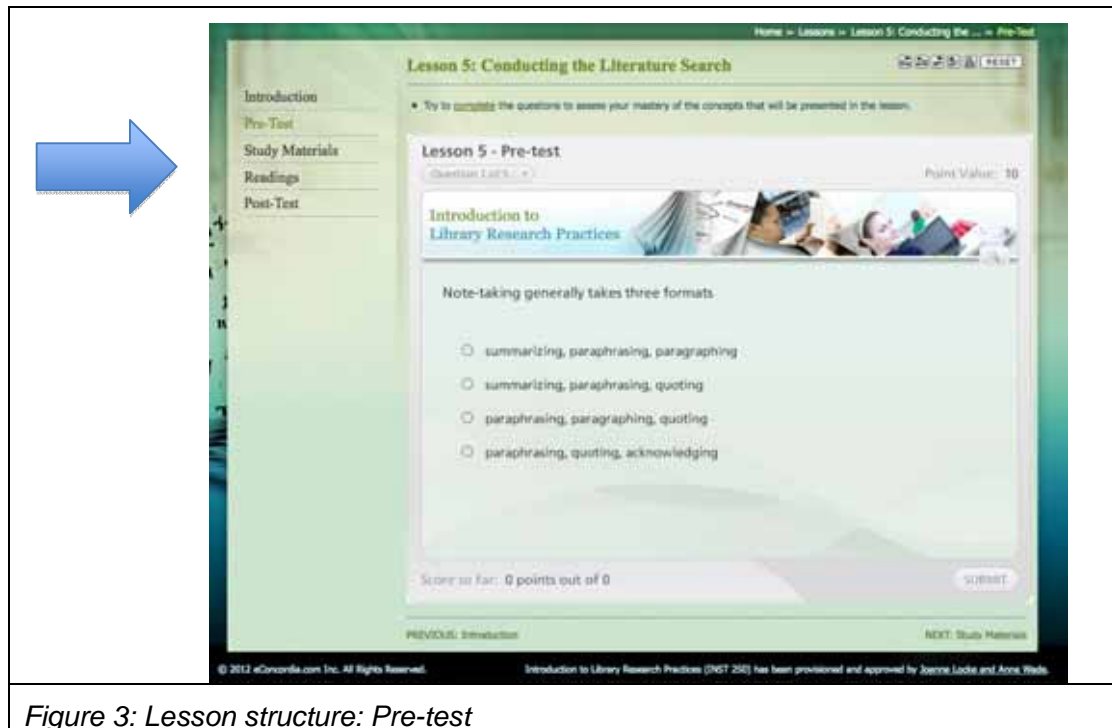

Figure 3: Lesson structure: Pre-test

3. Study Materials include a number of tools to help the student navigate the lesson and remain organized and to enable learning. These include advance organizers and review; a combination of text, audio and visuals; interactive presentations; use of media; and interactive exercises.

Use of Advance Organizers and Review act as a table of contents to facilitate the students' studying of the material. Students can proceed through the lesson in a linear fashion, can check back where they are in the lesson, and can use the links in the contents to select specific sections.
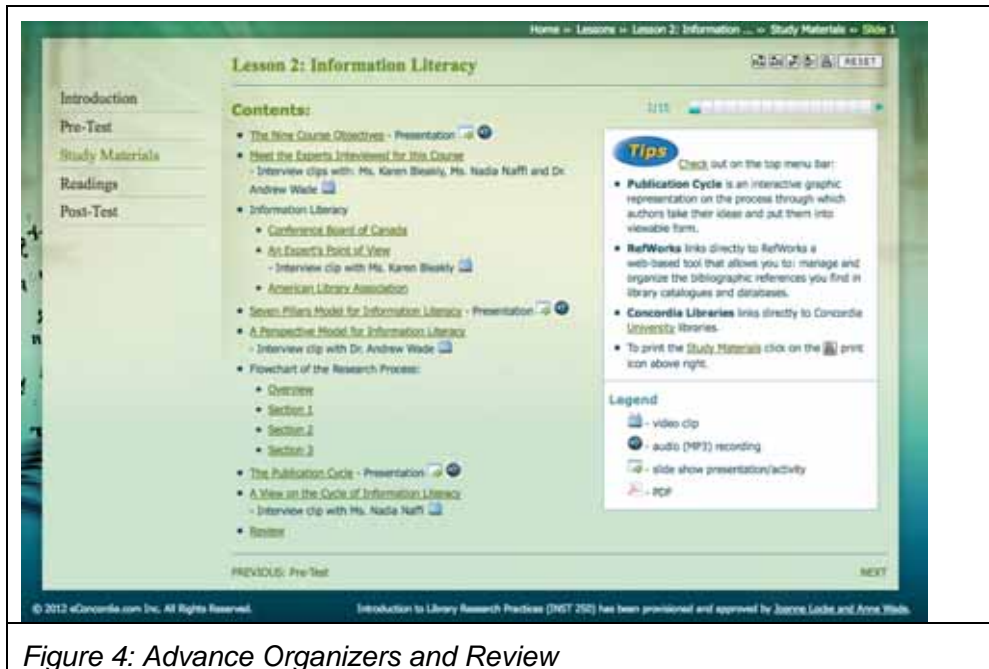
Figure 4: Advance Organizers and Review

Study Material: A combination of text, audio, and visuals are used for instruction. Narration is accessible to the learner as needed.
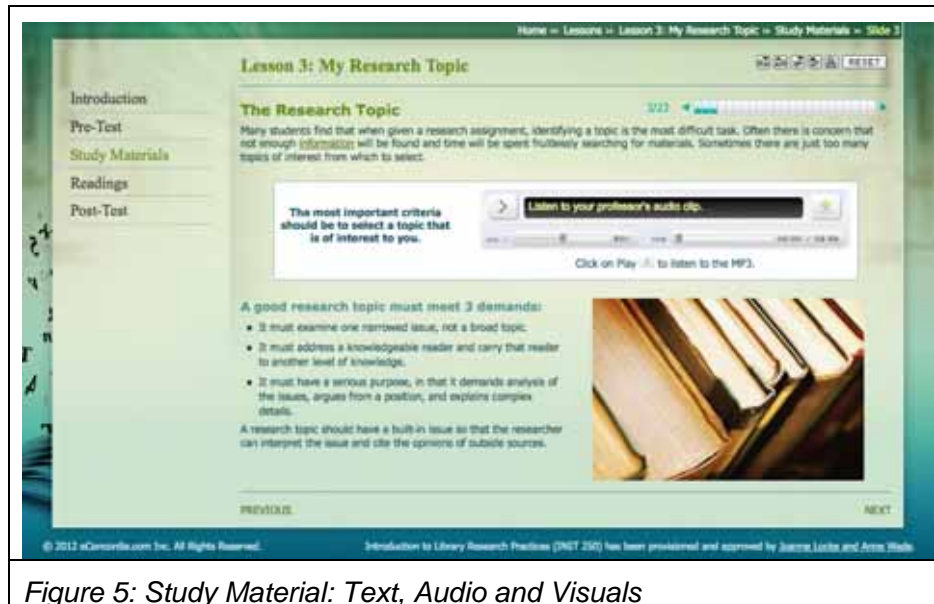

Figure 5: Study Material: Text, Audio and Visuals

1. **Study Material**: Interactive presentations are used to illustrate complex concepts.

Figure 6: Interactive Presentations

2. **Study Material**: Use of media (i.e. videos) bring practical experience to life through interviews.

Figure 7: Integration of Multimedia throughout

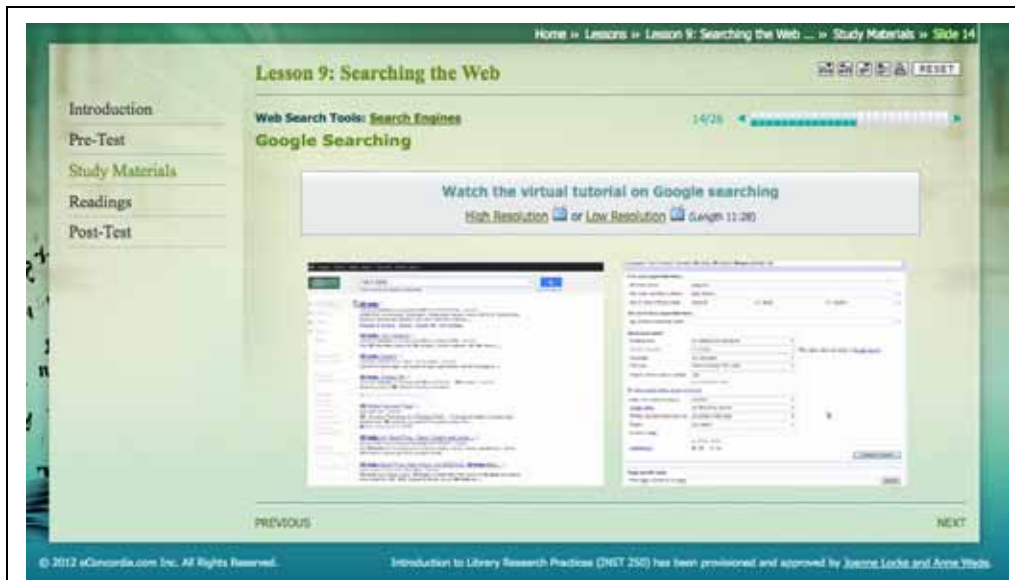3. **Study Material**: Use of media (i.e. virtual tutorials) to demonstrate and model behavior emulate a search.

Figure 8: Integration of Multimedia - Virtual Tutorials

4. **Study Material**: Interactive exercises help to reinforce understanding.

Figure 9: Integration of Multimedia - Interactive exercises

Discussion

The online format INST 250 was co-taught by the authors in 2012. Two teaching assistants (TA) were used in the Fall session and three in the Winter session, thereby providing considerable resources attached to the teaching and provision of support to the students. Student enrolment in online INST 250 mimicked that of INST 250 in terms of the heterogeneity of the students. All four faculties were represented and students ranged from first year students to graduating ones. It is expected that the enrolment numbers will continue to climb as word spreads about the value of this course.

As first time distance education instructors, this was a huge learning experience for the authors. Shortly into the first couple of weeks, it became clear that teaching an online course is substantially different from teaching in the classroom. Not surprisingly, developing a rapport with the students required different strategies and these take time to develop and master. However, like any first time implementation, there were successes and challenges.

Successes: The first section of the online version was taught in the Fall of 2011 with the enrolment ceiling placed on new courses of 100 students, quickly achieved. With this ceiling removed in the Winter session 2012, 197 students enrolled of which 160 completed the course, a retention rate of over 80%. It is expected that enrolment will continue to climb.

Although the completion of course evaluation was done by only 10% of the students in the first term, the response was positive. (As of this date, the evaluation has not been received for the winter term section). A sample of student comments include:

"I enjoyed the class and I will recommend it to others."
"I am in my third year, but wish I had taken this in my first year at Concordia."
"The best part of this course was learning new ways of researching material- ways that simplify the process and make it more effective yielding to more relevant results."

Finally, although marks were not assigned to the Discussion Board, the majority of students signed on to it. The Board was moderated by the authors as they were keen to discover the extent to which this tool was being used and in what capacity. Dialogue was continuous with the majority of communication focusing on students' requests for clarification of a concept or an assignment question.

Challenges

	Graded Components	Percentage
1	Assignment 1 (upload - see Submission Procedure) - Starting the Research Process Review: Assignment 1	10%
2	Assignment 2 (upload) - The Literature Search: Database Searching Review: Assignment 2	10%
3	Assignment 3 (upload) - The Literature Search: Searching the Web Review: Assignment 3	10%
4	Final Project (upload) Review: Final Project	25%
5	Final Exam (in class) Instructions - Final Exam Preparation	45%

Figure 10: Assessments

Assessment: Much of what the students learn through the lessons can only be fully appreciated when practiced and applied. The assessments were formulated with this in mind and included three assignments (each focusing on the *Planning* and *Searching* phases of the process), culminating in a final project *(Using the Information),* and a final exam. Assignment one involved the identification of a viable research question, both the keyword and subject searching of the Concordia University Libraries' online public access catalogue entitled CLUES, the selection and application of evaluative criteria to items found through these searches, and the creation of a preliminary thesis statement and outline. By searching a series of databases, Assignment two provided additional opportunity for the students to hone their searching skills and to retrieve and identify additional material types such as scholarly journal articles, theses, dissertations, and reports. Assignment three required students to search the Web. Past surveys have indicated that the majority of students consider themselves if not masters of searching the Web, at least at a high level of proficiency. It is this assignment however which they find to be the most challenging in terms of the identification and evaluation of the materials retrieved. The final project required the application of the information gathered throughout the semester to create a final thesis statement, formal sentence outline with parenthetical reference, and a formal annotated bibliography of their best sources. While the assignments and final project provided an opportunity for students to apply those theories, concepts and skills they have learned throughout the term, a final exam, devised to exhibit understanding and knowledge of the various theoretical concepts and definitions, also formed the final component of the assessments.

As enrolment in the course scaled up in the winter term, it became clear however, that this level of continuous student assessment could not be managed nor could it be sustained. Even with a team of three teaching assistants and two faculty members, the time consuming nature of marking the research process for individual students and providing extensive formative assessment, for each, made the task exceptionally difficult, especially since the assignments were cumulative, hence had to be returned to the students quickly.

Consequently the authors are restructuring all of the assessments, placing a focus instead on the use of multiple online quizzes and a final project. The challenge will be to design these in such a way that there will be an authentic display of the students' information literacy and critical thinking skills using a multiple choice format.

Categories of Overall Interaction Strength for Achievement Outcomes			
Interaction Strength	k	$g+_{adj.}$	SE
Low Strength	31	0.27	0.04
Moderate Strength	28	**0.54**	0.05
High Strength	15	**0.38**	0.06
Total	74	0.39	0.03
(Q) Between-class*		20.93**	
*χ^2_{crit} (2) = 5.99, **$p < .01$			
Table 3. Bernard et al (2009) – Systematic review of uses of technology within DE settings			

Interaction with Students: Also, greater attention needs to be given to interactively with the students. In a comprehensive review of studies on effective instructional strategies used in distance education courses, Bernard et al (2009) found that the between-class comparison involving categories of interaction treatment (IT) strength was significant (see Table 3), and post hoc comparisons revealed that both *moderate* and *high strength* ITs outperformed *low strength* ITs, and that *high strength* ITs were not significantly different from *moderate strength* ITs. These results suggest that increasing the strength of interaction treatment affects student achievement.

In line with these findings, we will be placing greater effort on both synchronous and asynchronous interaction with the students through the use of the Discussion Board (see Figure 11) and more frequent web conferencing sessions (see Figure 12). As previously mentioned, the Discussion Board was quite active with the instructor, TAs or classmates responding to the questions that were posted. However, in the Fall student evaluations it was noted that little was done to facilitate dialogue between the students. This is something that could be improved.
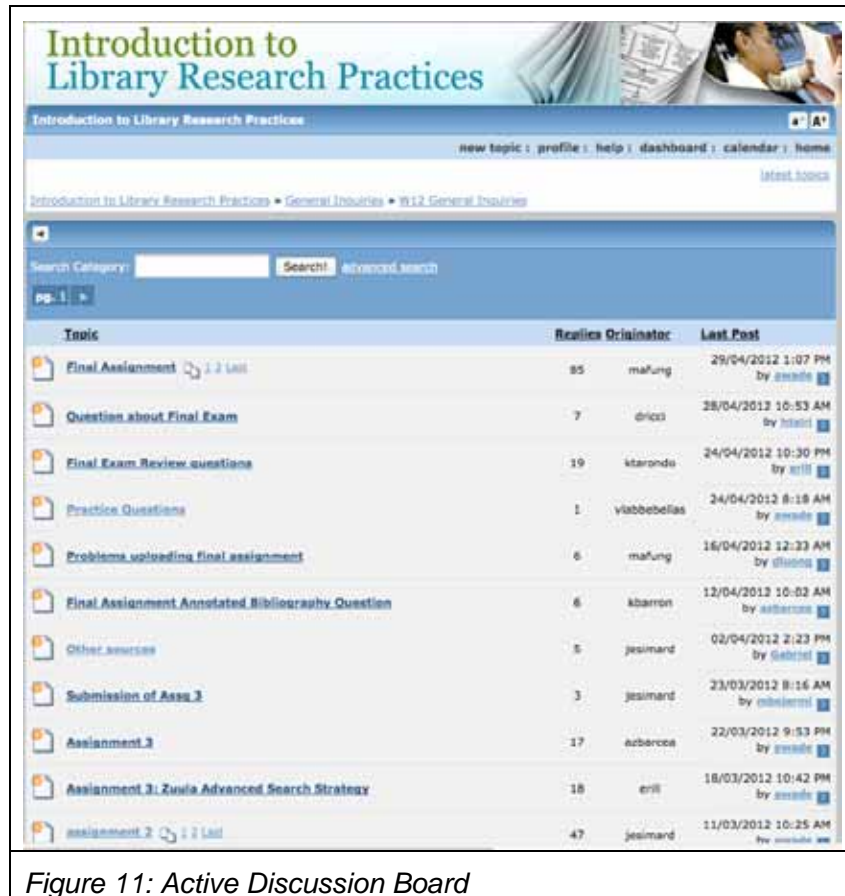
Figure 11: Active Discussion Board

Additionally next year, a greater focus will be placed on the number of web conferencing sessions that are offered as these provide the opportunity for synchronous dialogue with the students, along with more exposure to demonstrated successful practices. These sessions will be scheduled prior to each of the quizzes.
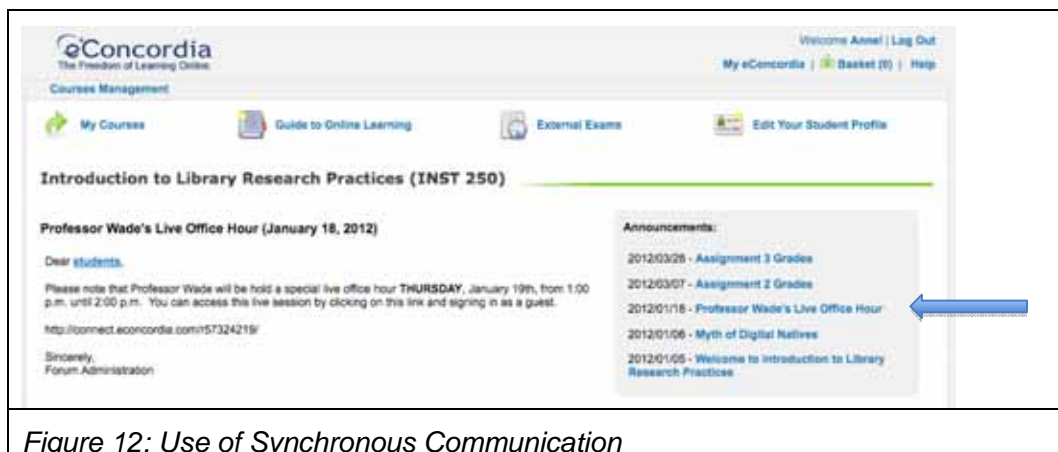

Figure 12: Use of Synchronous Communication

So these are some immediate improvements that can be made to INST 250 EC. Having said this, the design and implementation of this course is a work in progress. It is expected that substantial annual revisions and improvements will be made to the course on a continuous basis, as we learn more about how to effectively teach these critical information literacy skills through e-Learning. Ultimately we hope to conduct a study that will measure to what extent there are gains in student achievement.

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