

Journal of Information Literacy

ISSN 1750-5968

Volume 6 Issue 1

June 2012

Article

Gunn, M. and Miree, C. E. 2012. Business information literacy teaching at different academic levels: an exploration of skills and implications for instructional design. *Journal of information literacy*, 6(1), pp. 18-34.

<http://dx.doi.org/10.11645/6.1.1671>

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Business information literacy teaching at different academic levels: an exploration of skills and implications for instructional design

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Abstract

This study investigates the difference among students' discipline-specific information literacy (IL) skills by studying first-year and final-year undergraduate business students. An online IL tutorial was designed and delivered to both student groups with a two-fold goal.

First, the researchers wanted to compare students' IL skills to test academic staff's assumptions that business students who are about to graduate have already acquired the requisite IL despite the lack of mandatory business-specific IL sessions. The findings suggest that first-year and final-year business students are not significantly different in their performance and that both groups received a significant positive impact as a result of taking the same IL tutorial online.

Second, the study analyses how well the online IL tutorial, with its focus on combining instructional videos with active learning exercises, performs in delivering content related to different elements of IL, as defined by the Association of College and Research Libraries (ACRL 2010). The findings indicate that the online IL tutorial is more effective for some skills than for others, suggesting that it will be beneficial to explore different instructional designs in collaboration with academic staff to improve the current IL tutorial in these areas.

This study adds to research on the effectiveness of online IL tutorials and raises questions related to their design. The findings can inform librarians' decisions on how to design online learning targeting students from different academic levels.

Keywords

information literacy; higher education; business; online learning; instructional design

1. Introduction

Librarians and academic staff often consider final-year undergraduate students to be advanced, discerning users of information sources. This belief may be based on any number of assumptions, such as that final-year students may have been exposed to research sessions led by a librarian, that they have taken a number of research-intensive classes (i.e. semester-long modules), or that they may have been required to complete significant research work in their final year, which typically involves a semester-long research project equivalent in its scope to a scholarly article. Whatever students' specific experiences, librarians and academic staff often expect final-year undergraduate students to have developed the requisite skills to be discerning consumers of, if not participants in, the scholarship of their academic disciplines.

Several years of experience in working with final-year students on research projects for their final classes in the business school and delivering face-to-face IL sessions to these students, however, has led the authors of this paper to question common assumptions about these students' IL. In IL sessions for final-year business classes conducted by the authors (over the past 10 years), students have displayed a diverse mix of skills, with some being very familiar with the research process in general and with business-related resources specifically, while others have struggled with various aspects of both the research process and the business resources available at the university. While their skills at the beginning of the session may have been diverse, these students have been consistently appreciative of the IL session and occasionally have expressed regret mixed with anger that they had not received such guidance earlier in their academic careers.

Most incoming first-year students at Oakland University (a university of about 15,000 students located in Michigan, USA) receive general face-to-face IL instruction integrated in their first-year writing classes. The librarians visit these writing classes for one or two face-to-face sessions and require the completion of online tutorials in addition to the face-to-face instruction. A test is administered after all instruction is completed and students' performance on that test can become part of their grade for the class at the departmental faculty's discretion. After their first year, students may receive subject-specific IL instruction through the library liaison programme wherein academic staff, especially ones teaching research-intensive classes, may invite librarians to teach IL usually for one face-to-face session. Each of the ten librarians at Oakland University is responsible for several subject areas and has developed working relationships with academic staff that lead to many IL sessions in their classes. It should be noted, however, that in the current structure of the library liaison programme at the university, students can go through their academic course receiving either repeated or hardly any subject-specific IL sessions depending on their class selections.

Academic staff assumptions about the IL skills that students need may be a factor in their decision to integrate a librarian-led IL session into their classes. According to a study of academic staff perceptions at York University, Canada (Bury 2011, p. 49), business and law staff ranked the IL skills of undergraduate students higher than staff from other academic disciplines. This may be the case for Oakland University as well. For example, in the business school some academic staff realise the value of business-related IL instruction and always include IL sessions in their classes. Others consider general IL instruction sufficient for business research for 'technologically-savvy' undergraduate students who, they believe, have the necessary IL skills and do not need formal instruction, especially in the latter years of their academic programmes. Nevertheless, witnessing mixed levels of IL skills among final-year students over the past ten years has led the authors to believe that a more systematic inclusion of IL earlier in business-specific classes is needed in order to expose students to business resources and set the foundation for their research projects.

In implementing the IL online learning tutorial for first-year business students, the authors wanted to test if the assumptions that some business academic staff hold about final-year students' ability to conduct business-related research even without systematic instruction were valid. To achieve the greatest possible contrast in student skill levels, the study needed to focus on first-year and final-year students. Therefore, an arrangement was made to deliver the exact same online learning tutorial to final-year students who had not benefited from the existence of a mandatory discipline-specific session when they had started their education. Each of the final-year students was drawn from a mandatory business class, called Strategic Management, which final-year students take before graduation. The class is case-based and requires students to analyse organisations and their strategies. Almost all of the assignments for this class are designed to necessitate further research that stretches well beyond searching the web for basic company information. The library instruction within both classes was mandatory. Nevertheless, students were free to choose whether their responses would be included in this study. Approximately thirty days after the data was collected, the online tutorial was supplemented for final-year students by face-to-face sessions to address their more advanced research needs.

The proliferation of fully online, distance learning classes across the academic disciplines motivated the second facet of this study. Moving IL instruction to the online environment is necessary in order to offer research support to online classes. Librarians are now facing the dilemma of selecting and evaluating approaches to their teaching that will transfer face-to-face sessions to the online environment. In designing the online IL tutorials, the authors set out to explore if the same approach to teaching, i.e. videos interspersed with active learning exercises, is effective not only for different cohorts of students, but also for the different elements of IL. To achieve variety in the content, the study has adopted the Association of College and Research Libraries IL standards (ACRL 2010), which define IL skills for university students in the United States. The research questions (RQ) addressed by the study are as follows:

RQ 1: Can the same online, subject-specific IL instruction be beneficial to both first-year and final-year undergraduate business students?

RQ 2: Can the same design approach to online IL instruction be effective for the delivery of different IL skills?

The answers to these research questions have an impact on how librarians at Oakland University design and deliver IL instruction online to different groups of students. They inform the types of content librarians include in e-learning materials at various academic levels, as well as how they structure online tutorials to support and enable optimal e-learning experiences.

2. Literature review

2.1 Discipline-specific information literacy

The information science literature is rife with examples of successful collaborations among librarians and academic staff that result in well-integrated, class- and discipline-specific IL instruction (Jacobs and Jacobs 2009; Reed, Kinder and Cecile 2007; Malenfant and Demers 2004). The benefits of these partnerships are not difficult to discern, including improved relevance of the instruction to students' immediate work and a much more targeted approach to teaching than a generic session prepared solely by a librarian and not reinforced by the class projects. A study of final-year business students' perceptions and use of various types of resources (Lombardo and Miree 2003), for instance, found that the IL instruction with its detailed coverage of sources and its opportunities for practice broadened the students' understanding of the fragmented nature of the free web in regard to business-related data. After the instruction session, Lombardo and Miree report that business students realised that the web "requires more effort to search effectively" (2003, p. 14) and that some print publications are much easier to use than anticipated prior to instruction.

Another successful collaboration (Borg and Stretton 2009) resulted in the creation of an IL learning tool for business students rich in active learning elements at Sheffield Hallam University. The tutorial Borg and Stretton developed was delivered to 900 undergraduate business students and considered a success among both the students and the staff who were consulted in the process, as it actively engaged students in the session by having them analyse their own information seeking behaviours before delving into business-specific resources and search techniques. One staff member commented: "The session went very well - getting the students active and thinking - and feedback from them this week was that they were using the ideas already for assignment work." (Borg and Stretton 2009, p. 24)

Grafstein (2002) points out at that discipline-based approaches contextualise research by re-establishing the connection between research process and subject content. Grafstein argues that an understanding of one's academic discipline constitutes part of information literacy, even though it is an aspect that generally falls within the responsibilities of academic staff rather than librarians (2002, pp. 201-202). Librarians offer their unique expertise in information retrieval strategies and systems when collaborating with academic staff to achieve such a contextualised delivery of IL instruction; still, their focus is largely on the research process and the library systems that support it (Grafstein 2002, p. 197).

Arbaugh et al. (2009) acknowledge that librarians are faced with an increasing number of online classes, so their collaborations with academic staff need to accommodate the specifics of student practices in the online environment just as much as they do in face-to-face IL sessions. Kim (2011, pp. 13-14) has found that business students visit the library less frequently and rely more heavily on commercial websites for information. Such findings illustrate that an online IL tutorial for business students ought to highlight the value of library resources that are online and do not require a visit to the library building.

2.2 Online instruction

Most research on the use of online instruction for information literacy offers at least some reasons why it is beneficial to students. Joanne Oud summarises the variety of reasons as follows: "Online instruction can help support web-based courses, supplement face-to-face instruction sessions, reach more students, convince academic staff to use information literacy teaching even if they cannot give class time for face-to-face sessions, and help stretch limited staff resources" (2009, p. 164). A number of studies (Kraemer et al. 2007; McClure et al. 2011; Oud 2009) cite the increased need for instruction and the shortage of librarians to deliver it as one of the key impetuses for moving more IL instruction online, either to complement face-to-face instruction or to replace it.

Such a transition, studies have shown, can be achieved without sacrifice in the level of learning, because the strategies and tools used in both face-to-face and online teaching can lead to comparable learning outcomes. Students in first-year composition classes have been found (see Holman 2000; Nichols et al. 2003) to learn as much from computer-assisted instruction (i.e. online tutorials) as from a face-to-face session with a librarian when it comes to basic information literacy. In fact, Holman asserts that students find the pacing of the online instruction more satisfactory than the pacing of face-to-face instruction sessions, because of its flexibility and the chances to stop or go back to review challenging material (2000, p. 57). Further, McClure et al. found that their online tutorial met the learning objectives of the instruction leading to improved first-year student research: "they located more sources, evaluated their sources more effectively, and used them more often and more appropriately in their writing" (2011, p. 40). When computer-assisted instruction is embedded in the campus-wide virtual learning environment (VLE), it can be more engaging through the use of a combination of tutorials and quizzes. Kraemer et al. (2007, pp. 330-342) have compared the learning outcomes of such VLE-embedded online instruction with face-to-face instruction and with a hybrid approach that includes both face-to-face instruction and online instruction. They demonstrate that these three methods of instruction are about equally effective in the teaching of basic IL skills to first-year students; there were no significant differences in the performance of the three groups of students in the study.

Studies suggest that when students are presented with a choice between face-to-face instruction and online instruction, they overwhelmingly prefer online instruction (Ganster and Walsh 2008; Silver and Nickel 2007; Lindsay et al. 2006). After designing an online module customised for a specific class, for instance, Ganster and Walsh (2008) found that almost half of the interviewed students would prefer the online module because they could access it as needed, while emphasising that they would still like to have the opportunity for face-to-face contact with a librarian in case they have questions. Another study by Silver and Nickel (2007) found that 73% of their participants self-selected to complete the instruction online even though only about 63% of the overall sample (a total of about 300 students from an undergraduate psychology class) listed e-learning as their preferred instruction method. This suggests that 10% of the participants indicated that face-to-face instruction was their preferred method of learning, yet chose to complete the tutorial online due its perceived convenience and flexibility (Silver and Nickel 2007). Lindsay et al. (2006) suggest additional reasons why students prefer online instruction by focusing on students' expectations. According to the study students tend to expect that online instruction will save them time, and perceive that they have attained higher levels of research competency after online instruction regardless of the actual increase in their skills.

2.3 Active learning

In library research sessions rich in active learning, delivery of explanatory content and demonstrations of research tools are minimised to allow maximum opportunity for students to learn from their own experiences (such as through the actual use of tools to conduct research). Dewald et al. consider active learning exercises beneficial to students because they offer a “hands-on approach that provides experience in using the systems they will need for educational success” (Dewald et al. 2000, p. 37). In further discussing the benefits of active learning, they state that “real learning will only take place when students are asked to understand the material in their own terms and use it to accomplish a meaningful task” (2000, p. 38), because such learning encourages well-motivated students to engage with the material and retain more of it. One of the considerations in designing online modules, according to Dewald et al. (2000, p. 34), is that simple clicking is equivalent to page turning and does not in itself constitute interactivity. They advocate the use of creative and realistic exercises – with the creative approaches positioning the instructor as “the guide on the side’ who promotes active learning” and with exercises “that require the learner to use information literacy skills in a real world context”.

In the online environment, Armstrong and Georgas (2006) have evaluated the effectiveness of an interactive tutorial that uses activities and a game-like approach to find that its success depended on several key attributes: innovativeness; interactivity; game-like nature; fun; and ability to cater to different learning styles. Armstrong and Georgas found that students appreciated the chance to immediately apply the concepts in the tutorial within a game-like environment, while at the same time being able to control the pace of their learning experience. Further, Markey et al. (2011) have received student responses to practice-based study in a game-like environment, which indicate that students appreciated the exposure to library databases, the opportunity for hands-on practice, and the quality of the materials they found through the IL game. Students in this study also reported in focus groups that the game consequently “reduc[ed their] procrastination” on research assignments (Markey et al. 2011, p. 63). The above studies confirm the assertions of Dewald et al. (2000) that interactivity – the practical manifestation of active learning in an online module – is a contributing factor to student engagement just as it is in face-to-face instruction.

Studies have investigated the various characteristics of successful active learning in the online environment (Armstrong and Georgas 2006; Reece 2007; Smith 2007), as well as key considerations in designing online learning environments that facilitate active learning (Ladner et al. 2004; Tempelman-Kluit 2006; Tricarico et al. 2001). Armstrong and Georgas (2006) have found that factors contributing to the success of their online IL tutorials include a “high degree of interactivity; visually engaging (‘like a movie’); emphasizes active learning; and concept-based games”. Clarity and simplicity, as Smith (2007) observes, are also key characteristics of successful active learning (whether online or face-to-face) because they reinforce the presented content and aid in engagement. Smith (2007, p. 6) elaborates that the exercises can provide reinforcing practice and further clarification in the scripted feedback to answers but librarians must avoid exercises that are too time-consuming or too distracting. Tricarico et al. (2001, p. 222) point out that interspersing the active learning exercises throughout the content rather than including them at the end enriches the learning experience by allowing for self-evaluation and providing “immediate feedback without creating test anxiety”.

In another study of online IL instruction, Reece (2007) suggests that the activities and the feedback to answers can offer scaffolding in students’ learning through exposure to expert reasoning and thought processes. That is one way to engage the higher-order, critical thinking skills within IL and librarians cannot expect skill development to occur without allowing for practice along with scaffolding to facilitate learning. Another approach to engaging higher-order skills is exemplified in Ladner et al. (2004). They designed “weekly case studies” online that engaged students by requiring research, as well as online class guides whose content was synchronised with the class syllabus (Ladner et al. 2004, p. 332). Ladner et al. found that their approach supported pedagogies

such as the classroom flip, where lecture material is presented online, while active learning and discussion takes place in a classroom environment.

Tempelman-Kluit (2006, p. 368) discusses that the construction of knowledge can be all the more successful when it is learner-initiated; in fact, when advanced learners “experience a very controlled instructional environment that is geared toward less-experienced learners, they can be negatively impacted”. A tension, therefore, exists between providing sufficient structure and scaffolding for inexperienced learners, and integrating enough flexibility for a self-paced, exploratory experience for the more advanced learners. E-learning materials can try to achieve a balanced approach or gear their content and approach to a specific group of students.

Hrycaj (2005) has studied the use of active learning in online IL tutorials, focusing on those created by academic libraries. He documents the increase of active learning methods over a previous study by Dewald (1999), reporting that more than half of the tutorials contained some active learning elements. The most common of these were quizzes, integrated questions, and exercises (Hrycaj 2005, p. 215-216).

3. Method

3.1 Sample

The study sample consists of 130 first-year business students and 114 final-year business students. The first-year students included in the sample were drawn from a required year-long business class, which is part of the business school’s new professional and career development curriculum. To successfully complete this class, students must participate in a number of professional development activities, including a library online IL tutorial. The sample of fourth-year students was drawn from a final-year class which is required for all business students. All students consented to being involved in the study as required by our institution’s ethical research policy.

3.2 Research design and data collection

Research design. The research methodology consisted of three components: a pre-test, an online tutorial (in the form of short instructional sections alternating with active learning exercises) and a post-test. Each of the questions in the pre-test and post-test provided the students with specific scenarios and asked them to choose an appropriate answer or research strategy from a multiple-choice list. This design allowed for realistic, scenario-based testing of skills that assessed the correct application of the corresponding IL skill. Since each of the three components could theoretically be completed within an hour (and in one sitting), the questions in the pre- and post-test were intentionally worded differently, yet designed to assess the same IL skills across all three components. This approach was chosen to avoid any testing effect (i.e. receiving student responses on the post-test based on their remembering their own answers from the pre-test) (Carrier and Pashler 1992) while still ensuring the appropriate aspects of information literacy were addressed.

Testing the questions. All of the questions in the pre- and post-test were designed to correspond to Association of College and Research Libraries (ACRL) IL competencies (ACRL 2010). The questions were examined by five faculty librarians who teach IL on a regular basis. Each of the faculty librarians were asked to independently categorise all questions by ACRL performance indicator. All of them consistently categorised all seven of the pre-test questions with the appropriate performance indicator from the ACRL guidelines. Each of the seven post-test questions was similarly categorised into the appropriate standard with either 80% or 100% agreement among the faculty experts. This process provides internal validation that the questions on the pre- and post-test address the same IL performance indicators regardless of their different wording. Each of the skills and corresponding questions are described in the next section.

Once the tutorial was fully designed and the questions for the pre- and post-test were categorised by faculty librarians, the entire study was piloted with a small group of students to ensure clarity in the instructions and logical progression within the tutorial and to determine the approximate time it would take students to complete all three components. The study was administered through Moodle, with which students were already familiar.

Data collection. Students were allowed to complete the online library instruction at their leisure and in multiple browser sessions. The data was collected over a 4-week time period for the final-year students in the sample and at the end of the academic year for the first-year students (since the first-year online class lasted a full academic year).

3.3 Pre- and post-test questions and associated ACRL information literacy skills

This section describes the six questions that were used in the pre- and post-tests and the associated IL skill that each set of questions was designed to assess. The questions address competencies from within 3 of the 5 standards that ACRL (2010) has defined. The authors have chosen to include and test only those IL competencies that are commonly emphasised in IL teaching within our university and that can be tested in pre- and post-test manner (i.e. some standards require the analysis of student projects in order to glean, for instance, how well students incorporate information from sources within their work).

Upon beginning the online tutorial, students were asked to complete the pre-test. After they completed the pre-test questions they then followed the tutorial which taught business-related IL skills, as detailed in section 3.4 below. At the end of the tutorial, the students were asked to complete a post-test.

Skill 1: Identifying sources of information

Performance indicator 1.2: “The information literate student identifies a variety of types and formats of potential sources for information” (ACRL 2010).

Recognising various types of sources and selecting ones appropriate for the specific information need addresses not only a student's knowledge of various publication types, but also the student's expectations of their usefulness for a specific research project.

Table 1: Questions for Skill 1

Pre-Test	Post-Test
You are writing a business plan for a soft drinks company. You need to research the company that is your biggest competitor in the industry. Which of the sources below offer company-related information?	You are writing a business plan for a frozen desserts company. Nestle is going to be one of your competitors and you want to find out as much as possible about them. Which of the sources below offer company-related information?

Skill 2: Selecting methods and systems

Performance indicator 2.1: “The information literate student selects the most appropriate investigative methods or information retrieval systems for accessing the needed information” (ACRL 2010).

Choosing an appropriate investigative method happens at multiple points throughout the research process and can include activities ranging from consulting different information systems to changing one's approach to the research topic based on knowledge gained during the process. The decisions involved in selecting a method become most explicit when one is confronted with a crisis or dead-end of sorts that requires a change in methods or systems.

Table 2: Questions for Skill 2

Pre-Test	Post-Test
You want to use library databases to find financial data for a company. You need the information right away, but you live an hour from campus. What should you do?	Searching ABI/Inform, you have found just two relevant articles to use for a project. What will you do to continue your research and find more articles?

Skill 3: Constructing and implementing a keyword strategy

Performance indicator 2.2: “The information literate student constructs and implements effectively-designed search strategies” (ACRL 2010).

This skill encompasses both the construction of a search strategy based on a specific information need and the effective execution of such a strategy using the syntax appropriate for various retrieval systems.

Table 3: Questions for Skill 3

Pre-Test	Post-Test
For a class presentation, you’ve been assigned to read current business news and present on the main economic trends in Japan. Which keyword combination will give you the most relevant results?	You are writing a research paper on the effects of globalization on labor unions. Which keyword combination below will give you the most relevant results?

Skill 4: Retrieving full-text materials

Performance indicator 2.3: “The information literate student retrieves information online and in person using a variety of methods” (ACRL 2010).

The ability to successfully locate and retrieve the full-text of research materials in general, and articles more specifically, can range from a simple click on a PDF link in an online database to an elaborate process of identifying whether the library subscribes to a journal, whether the subscriptions are both in print and electronic format but for various time periods, and where in the library building the journal can be found.

Table 4: Questions for Skill 4

Pre-Test	Post-Test
<p>You’ve been assigned to read an article from the October 13, 1990 issue of <i>The Economist</i>. Searching the library catalog, you have found the record for <i>The Economist</i>. Based on the screenshot below, how many online sources will contain the issue you need?</p> <p>You know that the article shown below is not available online in this specific database, because there is no link to the full text. You really need to read this article, though. Which part of the record would you click on to find if the library owns the journal in print or electronically from elsewhere?</p>	<p>You have found an article you want to read in Business Source Premier, one of the library databases in business. Looking at the article record below, do you have electronic access to the full text of the article?</p> <p>You know that the article shown below is not available online in this specific database, because there is no link to the full text. You really need to read this article, though. Which part of the record would you click on to find if the library owns the journal in print or electronically from elsewhere?</p>

Skill 5: Extracting and managing information

Performance indicator 2.5: "The information literate student extracts, records, and manages the information and its sources" (ACRL 2010).

A student's familiarity with the interfaces of various information systems, as well as with publication types available within them, makes for reliable recognition of key bibliographic elements. Extracting these elements forms the foundation for both the easy management of references, and the evaluative decisions necessary regarding the reliability of each source. As a result the questions below focus on the extraction of bibliographic information.

Table 5: Questions for Skill 5

Pre-Test	Post-Test
You have found the article shown below in an online business database, called Business Source Premier. Which part of the article record indicates the name of the journal or magazine in which it appeared?	The article record shown below is from a database, called Wilson Business Abstracts. Which part of the record indicates the name of the journal or magazine in which the article appeared?

Skill 6: Evaluating sources of information

Performance indicator 3.2: "The information literate student articulates and applies initial criteria for evaluating both the information and its sources" (ACRL 2010).

Academic research encompasses the evaluation of all types of sources ranging from websites to dissertations. The distinction between popular, professional, and scholarly articles has a prominent role in academic assignments.

Table 6: Questions for Skill 6

Pre-Test	Post-Test
To determine if an article is from a scholarly journal, there are certain features to look for. In scholarly journals, for example, the author's qualifications are usually included in a brief biography that accompanies their article. Which of the following is another key feature of scholarly journals?	What type of information can you expect to find in a professional article?

3.4 Design of the online tutorial

The online IL tutorial consisted of six instructional videos (each including both an audio and visual component) and eleven active learning exercises with questions that reinforced the learning objectives of the videos. The video content in total represented a basic overview of:

- 1) accessing online databases;
- 2) constructing and refining keyword strategies;
- 3) recognising various types of publications, such as scholarly, popular, and professional articles;
- 4) primary data relevant to business research;
- 5) evaluating websites;
- 6) understanding proper citation practices.

After watching each video, students have an opportunity to move from comprehension to application by completing exercises. For example, the video on constructing and refining keyword strategies describes the whole process and demonstrates it in the interface of ABI/Inform, one of our most commonly used article databases in business. The video is represented alone on the

screen with a 'continue' button under it¹. When students continue to the next page, they encounter the first of three interconnected exercises; a sample research topic that they need to convert to keywords shown in Figure 1 below.

Figure 1: Forming a keyword strategy

For an assignment on global companies in emerging markets, you have chosen to research how McDonald's is approaching the Brazilian market. Which of the keyword combinations below will be understood by databases and will give you the most focused results?

- Brazil and "emerging markets"
- McDonald's Brazil
- Brazil and McDonald's

If students choose the best representation, they receive positive feedback explaining what makes it optimal. If students choose an answer that does not represent the topic well, they receive feedback that explains the shortcomings of their chosen answer and points out which keyword combination represented the topic best and why. The second activity, shown in Figure 2, prompts students to perform a search in ABI/Inform and to evaluate the subject terms that the database recommends for refining their search.

Figure 2: Refining a search in ABI/Inform

Now, you're ready to take the winning keyword combination *Brazil and McDonald's* and try it in ABI/Inform, a database of business articles. Follow the link below to open the database in a new window:

- [ABI/Inform](#) (link opens in a new window or tab; you'll be asked to login if you are off-campus)

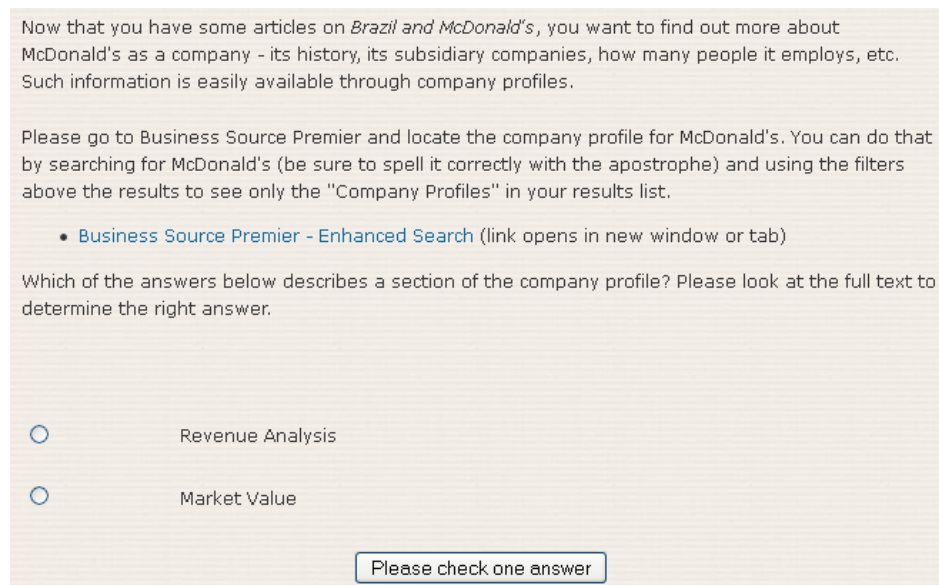
Please do the search and pay close attention to the results page. Above the results, you will see several topics suggested to make your search even more focused. Which of the topics actually improves on the results by giving you fewer and more relevant articles?

- McDonalds Corp (company/org) AND Fast food industry
- Brazil (location) AND McDonalds Corp (company/org)
- McDonalds Corp (company/org) AND Market strategy

¹ The video tutorial is available at: <http://library.oakland.edu/research/business/achieve/keywords/index.htm> [Accessed 12 May 2012].

Its feedback follows the same format and approach as the previous activity. The third activity, shown in Figure 3, asks students to continue their research using what they have learned in a new environment, the database Business Source Premier, which is not showcased in the video tutorial. The prompt gives explicit and detailed directions and tips, because its goal is to guide the students in their practice. The available answers are designed to indicate if the student successfully found the materials they were looking for and completed the exercise. The feedback follows the format of previous activities by explaining why their answer is correct or not. The same approach of showing a video and providing practice activities that allow for active learning to take place characterises the rest of the tutorial as well.²

Figure 3: Performing a Search in Business Source Premier



Now that you have some articles on *Brazil and McDonald's*, you want to find out more about McDonald's as a company - its history, its subsidiary companies, how many people it employs, etc. Such information is easily available through company profiles.

Please go to Business Source Premier and locate the company profile for McDonald's. You can do that by searching for McDonald's (be sure to spell it correctly with the apostrophe) and using the filters above the results to see only the "Company Profiles" in your results list.

- [Business Source Premier - Enhanced Search](#) (link opens in new window or tab)

Which of the answers below describes a section of the company profile? Please look at the full text to determine the right answer.

Revenue Analysis

Market Value

Please check one answer

The video tutorials and the active learning exercises follow in a sequential manner so that students engage in all of them. The goal of the practice activities was mainly to reinforce the video content through hands-on experience. To this end, the feedback prompt after each activity answer was designed to help improve students' understanding. If the student selected the correct answer, they would see a confirmation that they are correct with a brief explanation of why their answer is the correct one. If he or she selected an incorrect answer, a statement would appear explaining why the chosen answer was incorrect along with an explanation of which answer was the correct one and why. The overall sequence of videos and active learning exercises was designed to take up about 45 minutes if completed in one sitting without breaks.

4. Results and discussion

The data was analysed using paired t-tests. Tables 7 to 11 present results of the data analysis for the study.

4.1 Pre-test results

Table 7 contains the students' performance (by group) on the pre-test along with the length of time it took them to complete the pre-test.

² A full listing of the videos and the associated active learning exercises can be found at: <http://library.oakland.edu/research/business/achieve/> [Accessed 12 May 2012].

Table 7: Pre-test performance and time spent on task

Variables	First-year Students	Final-year students
Time spent on task	6:03 minutes	6:06 minutes
Pre-test score (% correct)	68.13%	70.80%
* p<.05 **p<.01 ***p<.001		

Based on our findings, there was not a statistically significant difference between the two groups in terms of the time that they spend completing the pre-test or their actual performance on the pre-test. In general, both groups took approximately 6 minutes to complete the test with an average score of 68% for the first-year student group and 71% for the final-year student group. Such comparable performance on the pre-test is surprising because one might assume that final-year students' years of academic research experience will lead to higher scores. It demonstrates that the academic staff's choice to incorporate the teaching of business-related IL in business classes should not rely on assumptions based on students' years in the university. Rather the results of the pre-test seem to indicate that all business students need to receive formal business-related IL teaching. While our university has begun to address this issue through the introduction of mandatory business-related IL teaching for first-year students, other universities might benefit from examining their own curriculum to ascertain whether all students receive subject-specific IL teaching.

4.2 Scores from exercises within the tutorial

Once the students completed the pre-test, they were then directed to the IL tutorial that provided them with business-related IL using the videos and exercises described earlier in this paper. Table 8 presents the results of the students' performance on the active learning exercises by group. The first-year students scored 72% whilst final-year students scored 75% in these exercises. The researchers *did not* find a statistically significant difference between the groups when their mean performance was compared using a t-test. While the final-year students did spend about 10 minutes longer than the first-year students on the tutorial, one cannot interpret the extra time as slower performance or difficulty with the material. The tutorial was unsupervised and students were free to explore library databases beyond the immediate tasks of the activities.

Table 8: Activities performance and time spent on task

Variables	First-year students	Final-year students
Time spent on task	36:00 minutes	46:35 minutes
Performance (% correct)	71.60%	75.02%
* p<.05 **p<.01 ***p<.001		

4.3 Post-test results

Once the students completed the tutorial, they were given a post-test to determine if it had any impact on their IL skills. Similar to the pre-test, data was collected on their overall performance on the post-test and the length of time it took them to complete the assessment. Table 9 contains the results of this aspect of the study.

Table 9: Post-test performance and time spent on task

Variables	First-year students	Final-year students
Time spent on task	5:24 minutes	4:53 minutes
Post-test score (% correct)	87.14%	90.23%
* p<.05 **p<.01 ***p<.001		

The researchers did not find a statistically significant difference between the two groups in terms of the time they spent completing the post-test or their actual performance on the post-test. In general, both groups took approximately 5 minutes to complete the test, with an average score of 87% for the first-year student group and 90% for the final-year student group.

4.4 Comparison between results and discussion

The study's final analyses consisted of a comparison of the students' performance by group on the pre-test versus the post-test and the students' performance on specific business-related IL skills by group. These results are presented in Tables 10 and 11. While the researchers did not find a statistically significant difference between the two groups on any aspect of the study, the study results indicate a statistically significant difference between the pre-test and post-test scores of all students (within group).

Table 10: Pre-test and post-test comparison and difference

Groups	Pre-test score	Post-test score	Difference in means
First-year students	68.13%	87.14%	19.01***
Final-year students	70.80%	90.23%	19.43***

* p<.05 **p<.01 ***p<.001

After completing the tutorial, the first-year student group improved their assessment scores by an average of 19 points and the final-year student group improved their post-test scores by an average of 19.4 points, thereby indicating that both student groups experienced a statistically significant increase in their scores after engaging with the instructional content and activities. This difference in each group's overall performance on the pre-test and post-test demonstrates that the online tutorial had a positive effect on the students' knowledge and skills. This result answers the first research question of this study. In other words, the data indicates that the same IL teaching appears beneficial to students at different levels of their academic career. This result is not surprising however, given that there were no discernible differences between the two groups (in terms of their research skills) as indicated by their performance on the pre-test. This is perhaps one of the most important findings of study; first-year students and final-year students were not different in terms of their IL skills at the beginning of the study. Based on this data, it should not be assumed that final year students have assimilated important IL skills by simply progressing through the business programme (and outside of systematic IL teaching whether on-line or face-to-face).

The results also help identify the types of IL content which would be most useful to deliver online. To explore the levels of improvement in knowledge between the pre-test and the post-test in a more nuanced manner, the researchers looked at students' performance on questions grouped by IL skills (corresponding to specific ACRL competencies). Table 11 shows what percentage of students successfully demonstrated each skill on the pre-test and the post-test. The analysis below does not differentiate between first-year and final-year students, because the analysis of their performance on both the pre-test and the post-test has established that they are not significantly different from each other on either test. The difference below represents the increase or decrease in students with correct answers between the pre- and post-test. The researchers realise that this data cannot be used as evaluation of students and their skills because it is based on a limited number of questions per skill. It is still informative, however, as a relative indicator of the effectiveness of the various skill areas of the tutorial.

Table 11: Pre-test and post-test comparison by skill area

(% of students with correct answers)

Skill	Pre-test	Post-test	Difference
Skill 1: Identifying sources of information	38.11%	97.13%	+59.02%
Skill 2: Selecting methods and systems	96.31%	88.52%	-7.79%
Skill 3: Constructing and implementing a keyword strategy	87.70%	97.13%	+9.43%
Skill 4: Retrieving full-text materials	45.49%	84.84%	+39.34%
Skill 5: Extracting and managing information	93.03%	95.08%	+2.05%
Skill 6: Evaluating sources of information	81.15%	72.95%	-8.20%

Identifying sources of information and retrieving full-text materials are the two skill areas that had the lowest performance on the pre-test, yet showed the highest improvement on the post-test with an increase of 59% and 39% respectively. The low pre-test performance confirms that students do not seem to be familiar with the breadth of publication types in business and how they can be relevant to their assignments, nor with the various ways to get the full-text of materials that they come across in library systems, such as databases or the library catalogue. The dramatic increase in performance on the post-test shows these skill areas are well taught through presenting content and allowing for practical application.

Constructing and implementing a keyword strategy is another skill area that resulted in an increase in correct answers after the online tutorial (in this case an increase of 9%). While students did well on these questions even on the pre-test, their improvement attests to the effectiveness of teaching keyword strategies. The availability of scenario-based activities puts the formulation of keywords in context by offering both a research topic and a database to carry out research in. Such activities offer meaningful and realistic practice to students, so they start building expectations not only about which keywords represent their topic best, but also about what keyword combinations might lead to focused results in various databases.

Surprisingly, two of the skill-based areas experienced a decrease in correct answers after the online learning activities. Eight percent fewer students gave correct answers on the post-test regarding the selection of methods and systems. The researchers suspect that this highlights what can be called "the Google effect". In other words, when Google is one of the choices students will use Google regardless of their exposure to, and practical use of, library systems during the learning activities. The piloting of the questions with students did not indicate any issues with the wording of the question and its answers. Consequently, it could be argued that our instructional content with its demo-and-practice approach was not successful in affecting student preferences for Google. The authors speculate that more in-depth teaching might be needed to communicate the intricacies and purpose of various information systems.

The evaluation of sources of information is the second skill-based area that experienced a decrease in correct responses (in this case 8%) between the pre- and post-test. Here, the findings indicate a higher familiarity with scholarly and popular articles, with little to no understanding of trade publications. The differences in performance might have been based on the types of sources referenced in the questions, attesting to a lack of critical assessment skills in general and to a poor match between these skills and the tutorial content. Further investigation might be needed to determine if the content in the tutorial was insufficient or if a demo-and-practice approach is not optimal for the communication of this type of content.

In answer to the second research question of this study, it appears that the same approach to teaching is not as effective for all IL skills. The areas that experienced the highest improvement in scores were identifying sources of information, constructing and implementing a keyword strategy, retrieving full-text materials, and extracting and managing information. Not surprisingly, the skills

that focus more on a critical approach to either the research process overall or to a specific source of information are more difficult to develop in such a one-hour session. Those skills might benefit from more detailed coverage in the tutorial accompanied by more extensive realistic exercises.

5. Conclusion

Contrary to business academic staff's perceptions about students' IL skills, as reported by Bury (2011), our findings suggest that the gap between the IL skills of first-year and final-year business students is not significant, as attested by their performance on the pre-test. This result calls into question common academic staff assumptions that students in their last year might have more extensive IL skills. Nevertheless, both groups achieve significant improvement in their performance after exposure to the same IL tutorial. In other words, both groups seem to benefit from the same IL content. Such findings indicate that online IL teaching can be effective across groups of students and that the same design and level of content is useful to both first-year and final-year business students where there has been no previous formal opportunities to learn these skills. This result may open up the opportunity for colleges and universities with personnel constraints – especially ones without systematic, mandatory, discipline-specific IL for first-year students – to effectively deliver online, subject-specific IL content to multiple student groups.

While both groups benefited from the tutorial, it is noteworthy that those benefits were focused in specific skill areas, rather than across all types of content. Building upon a growing body of research in online IL teaching, these findings highlight one main caution: an instructional design consisting of alternating videos and active learning exercises is helpful for teaching some IL skills, but not for all of them. More research is needed to investigate the effectiveness of various methods for teaching specific IL skills online.

Meanwhile, this study's findings will be of practical use and informative in the design of future online tutorials, specifically for business IL, but possibly for other discipline-specific areas. Some immediate changes to be contemplated by the authors include revised coverage of sources and systems, as well as a revised approach to the evaluation of materials.

Coverage of sources and systems: While many IL sessions, online and face-to-face, introduce students to academic articles, business research requires a wider awareness of other types of publications. An overall understanding of the world of business publications and data will need to be much more nuanced than a brief demo-and-practice approach can deliver. The authors believe that having more examples and comparisons will be better in illustrating to students what various sources have to offer and where they might fit in research assignments. Any other discipline that relies heavily on specialised resources will benefit from similar IL content. The design and evaluation of such an approach merits further investigation.

Evaluation of materials: It is not surprising that elements of information literacy involving higher level critical thinking and discerning judgement are hard to establish in brief instructional sessions no matter what the pedagogical approach. The authors believe that more extensive research scenarios that allow students to handle the same research topic over all phases of their research can enable them to evaluate sources better. Offering opportunities for detailed engagement with texts, i.e. time to read a few publications on the same topic, can help in modelling for students how to evaluate resources. The authors will also encourage academic staff to embed steps in their assignment guidelines for research papers that encourage active evaluation in the form of annotated bibliographies or other relevant reflections.

Both librarians and academic staff contribute to the discipline-specific IL skills of students. These contributions become evident when they collaborate to design IL learning materials to best capture not just the research process in general, but the peculiarities of each discipline. Efforts to deliver discipline-specific IL teaching at the programme level can clearly benefit from both perspectives and from an approach that takes the specifics of each skill into account. All students, regardless of how long they have been part of an academic programme, can find such teaching informative,

useful, and relevant to their studies. More research is needed to investigate what instructional design methods librarians can employ to optimally teach the different IL skills within the contexts of each academic discipline.

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