Four Pedagogical Approaches in Helping Students Learn Information Literacy Skills

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A B S T R A C T

In spring 2012, Rider University librarians heightened their collaboration with classroom faculty to teach students in core writing classes information literacy (IL) skills during IL instruction (ILI) sessions. This quasi-experimental study assessed four pedagogical approaches for single or multi-session ILI. The conventional approach, which involves lectures, demonstrations, and hands-on time, was used in both the control and the experimental groups. The three experimental groups involved: (a) assigning students to preview the class Research Guide and take a graded quiz (Preview group), (b) engaging interactively with students during the ILI session (Active Learning group), and (c) providing multiple instruction and follow-up sessions (Multi-session group). A different pretest and posttest based on the first two ACRL Information Competency Standards for Higher Education (2000) were developed for assessment. The results showed that student knowledge of concepts included in the training improved significantly in both the control and the experimental groups, but no differences were found among the teaching methods employed. The qualitative analysis revealed that the professor in the Preview group who integrated IL cohesively in her assignments experienced more satisfactory learning outcomes. The overall low scores suggest that more powerful instruction strategies besides diversified pedagogies are needed to significantly enhance long-term retention.

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INTRODUCTION

The Franklin F. Moore Library (Moore Library) at the Lawrenceville campus of Rider University in New Jersey provides an active information literacy instruction (ILI) program and offers course-integrated ILI to its 5500 undergraduate and graduate students at the request of faculty. The librarians at the Moore Library have been following the assessment movement in higher education in the U.S. for over a decade and have assessed student learning outcomes of information literacy (IL) since 2002. For the past few years, the Moore librarians used pre- and posttests to assess students’ basic IL skills on the first two IL objectives of the ACRL Information Literacy Competency Standards for Higher Education (2000):

1. The information literate student determines the nature and extent of the information needed. Students will identify a variety of types and formats of potential sources of information.

2. The information literate student accesses needed information effectively and efficiently. Students will recognize controlled vocabularies; illustrate search statements that incorporate appropriate keywords and synonyms, Boolean operators, nesting of terms, and truncation, refining the search statement when necessary; and determine the most appropriate resources for accessing needed information.

In recent years, the Library’s ILI program has targeted students in the required core Research Writing course and the Baccalaureate Honors Program’s (BHP) writing course. These courses are that allow the Moore librarians to reach most freshmen and sophomores to teach them basic IL skills. In the spring of 2012, all sections of these courses had an ILI, and many faculty members requested a follow-up session a few weeks after the initial ILI to give students additional instruction and hands-on time. All classes took a pretest prior to receiving instruction in the ILI. Those with follow-up sessions allowed librarians to administer a different posttest, with questions parallel to or on similar concepts as questions in the pretest, to assess retention from the previous ILI session. The 2010–2011 assessment revealed that students’ retention of basic IL skills and knowledge from the one-session ILI with the conventional instruction method was very limited (Dawson, Hsieh, & Carlin, 2012; Hsieh, Dawson, & Carlin, 2013).

In order to help students improve their basic IL skills, several Moore Librarians and class faculty worked closely to integrate IL into their...
courses in spring 2012. The present study assessed the effectiveness of four approaches to teaching IL skills. All approaches used the conventional methods of lecture, demonstration, and hands-on time. The three experimental approaches were designed collaboratively by the librarians and teaching faculty. The three methods were (a) assigning students to preview the IL content before the library session and giving a graded quiz for the preview before or right after the IL session; (b) engaging students interactively during the session; and (c) providing students with multiple ILI and follow-up sessions.

The authors hypothesized that the students’ posttest scores would be higher than their pretest scores for all groups; that the Preview group would perform better than the other groups; that the Active Learning group would perform better on searching with the Boolean connectors AND/OR and with truncation; and that the Multi-session group would outperform the control group that used only the conventional method with no extra reinforcement.

**LITERATURE REVIEW**

This review focuses on studies of pedagogies for IL training and examines the correlation between the instruction methods and student learning of IL in colleges. Many studies have reported on assessments of IL research instruction (RI) for general education courses or subject-specific courses. However, few studies provide evidence of student learning in relation to teaching methods (Mokhtar, Majid, & Foo, 2008). Hook (2012) reviewed the literature in College & Research Libraries from 2009 to 2011 and reported studies with a broadly defined positive impact of library instruction on student learning. Some studies in the review were examined for their pedagogical approaches, but most did not link learning to particular teaching methods. For example, Roselle (2009) reported interview results of 31 academic librarians regarding their teaching methods for under-prepared college students. These methods included simplicity, mini-sessions to break down IL elements, scaffolding teaching instruction with one IL objective at a time, and using engaging activities. No evidence of enhanced student learning from use of these methods was presented. Johnson, Anelli, Galbraith, and Green (2011) reported that honors students gained IL skills from scaffolding instruction, including hands-on activities, feedback, and the multiple assessment instruments embedded throughout the course. These honors students in science had the same problems using the library as the other students.

The authors found that one session is insufficient to teach IL skills thoroughly.

Burkhardt (2007) echoed the point that information literacy instruction must go beyond the one-session mode. Her three-credit IL course integrated lectures, active learning, hands-on exercises, a bibliography of a research project, and a journal discussing the process of collecting and evaluating each type of resource. Students improved significantly in the posttest, yet she was still disappointed at their improvement on Boolean connectors. Gross, Latham, and Armstrong (2012) developed a three-step process model (ASE—analysis, search, and evaluation) to improve information literacy skills for below-proficiency college freshmen. A variety of empirical methods, including tests, surveys, interviews, and focus groups were used to collect data. However, student learning outcomes were not discussed. Small, Zakaria, and El-Figuigui (2004) observed and interviewed librarians and students in seven community colleges on the motivational strategies used in ILI and investigated students’ on- and off-task behaviors during the classes. The ARCS (attention, relevance, confidence, and satisfaction) Motivational Model was used for data analysis. Among the findings, attention strategies (e.g., questioning) were used the most and satisfaction strategies (expectancy/value of the research results or skills learned) the least. Because the focus of this study was solely motivational factors, nothing was said about student learning. Maitaouthong, Tuamsuk, and Techamanee (2010) developed an instructional model that integrates IL into a general education course at the college level. The teaching methods included lecture, demonstration, problem-based learning, case studies, and students’ assessment of their own learning. The posttest indicated that the experimental group demonstrated higher learning than the control group.

Walton and Hepworth (2011) tested three interventions designed to develop the IL skills of first-year undergraduates. In their study, pedagogy took a blended approach and combined face-to-face and online social network learning (OSNL). The group incorporating OSNL proved most successful. It seems that conversation and feedback with peers promoted high-level cognitive processes that resulted in deeper learning and higher confidence. Kraemer, Lombardo, and Lepkowski (2007) compared face-to-face, hybrid, and online instruction of IL and found that students improved the most through hybrid learning. This suggests that online instruction should be part of a comprehensive information literacy program but that it should not completely replace librarian–student interaction. Librarians at the University of Arizona offered a one-credit IL online course to the required English Composition course and assessed student learning from four groups (Mery, Newby, & Peng, 2012). The group taking the 10-week online course improved significantly in almost all ACRL IL categories. The group receiving one-shot IL from librarians improved significantly in some categories, but the gains were not consistent and not as great as those who took the online course. No differences were found between the pre- and posttests in the control group, which received no IL teaching, and in the group receiving IL from class instructors. The authors concluded that well-designed IL online courses could be effective. Because IL skills are complex and cognitively challenging, students learn them best from a formal course rather than one-shot instruction.

Cook (2008) offers a useful overview on the main educational theories for college teaching and provides two teaching models: direct instruction (Objectiveism) and student-centered learning (Constructivism). The chapters in his co-edited book (Cook & Sittler, 2008) detail 17 instructional pedagogies that fit nicely into the framework of the teaching models and educational theories. The pedagogies (e.g., Cephalonia, games, clickers, metaphor, storytelling, problem-based learning, etc.) offer practical ideas on engaging students in the research process and likely add fun and relevancy for students in the sessions. Although the authors of the book reflect on lessons learned from their specific methods, little quantitative evidence is provided for student learning of IL skills from these methods. Unlike most studies that test IL methods in for-credit or semester-long courses, this book provides valuable pedagogies for one or multiple sessions of ILI, which can be adopted by the majority of instructional librarians in higher education who teach the one-session format. Cook asserted that different pedagogies fit different needs and that no single pedagogy can claim to be the most effective. Grassian and Kaplowitz (2009) and Mokhtar and Majid (2006) also discussed the benefits of using multiple methods and matching them to different situations. In addition, Grassian and Kaplowitz (2009) presented learning theories from psychology and explained how the theories are applied in the research instruction models. This is a valuable source for librarians to acquire theory-based practice because few studies report evidence of student learning from such practice (Hook, 2012).

Only a few studies assess the effect of pedagogy on student learning outcomes for one-session ILI. Kenney (2008) detailed an 80-minute IL session using problem-based teaching. However, no evidence for student learning outcomes was provided. Ilic, Tepper, and Misso (2012) used an answerable question as the method for delivering a single workshop to third-year medical undergraduate students. Those who took a workshop did not improve their medical literature searching skills but were more confident in constructing clinical questions and in identifying information gaps.

In sum, few single-session IL studies have investigated the connections between pedagogies and student learning outcomes. The current quasi-experimental study uses pre- and posttests to assess four nonrandom groups with different pedagogical approaches (conventional, preview, active learning, multi-session) for IL training. Despite the known limitations of quasi-experimental assessment, results still can
provide valuable information for guiding practice (Upcraft & Schu, 2002). The current study fills important conceptual and assessment gaps in the literature with regard to quantification of differential outcomes across IL teaching methods.

METHOD

PARTICIPANTS

Participants were students in the required CMP-125 Research Writing and the BHP-150 writing courses in spring 2012. All sections of these courses participated in ILI. Class sizes were capped at 25. The students were predominantly second-semester freshmen and were a cross-section of all disciplines. Of the 16 CMP-125 classes, nine (56%) returned for a follow-up session, which allowed for posttesting. Three hundred twenty-six students completed the pretest and 153 completed the posttest. Of these students, 107 completed both the pre- and posttests. Of those who completed both tests, 39 were in the Preview group (3 classes), 32 in the Active Learning group (2 classes), 14 in the Multi-session group (1 class), and 22 in the control group (2 classes).

TESTS

The pre- and posttests comprised ten multiple-choice questions (see Appendices A & B). The tests were installed on Google Docs for students to take in the library’s computer labs (Hsieh & Dawson, 2010). The wording of questions and response options were altered on the posttest to reduce effects of memory on performance. Each question had five response options. Two of the options were correct for each item (to reduce chance response rates) and the student had to select both to be considered correct. The first five questions pertained to the first IL objective (identifying a variety of sources). The questions addressed the online catalog, the library’s databases, encyclopedias, journals vs. magazines, and location of the library’s journals. Questions 6 to 10 were on the second IL objective (constructing search queries). The questions addressed searching by subject, Boolean connectors (AND/OR), truncation, and the purposes of books.

In addition to the questions regarding IL objectives, the tests included demographic questions such as class year (freshmen, sophomore, junior, senior, or other) and the last four digits of the student ID, which allowed for matching of pre- and posttest scores.

ILI METHODS

CONVENTIONAL METHOD (CONTROL GROUP)

The conventional session included lecture, search demonstrations by the librarian, and hands-on time for the students to practice searching while the instruction librarian monitored individual students and answered their questions. These methods were employed in all sessions, regardless of instruction condition. See Table 1 for a depiction of the instruction and assessment activities for each ILI method.

PREVIEW METHOD

Each class in the Preview group was required to review a Research Guide created by the instruction librarian. Sample Research Guides for the Composition classes are available on the Rider University website (guides.rider.edu). The guides were individualized for each class section. Students reviewed the guide and were quizzed on the material prior to arriving for the first ILI session and pretest (Professor 2), or immediately after the first ILI session and pretest (Professor 1). Two different professors and their classes participated in this group. Each professor used the Research Guide slightly differently, so qualitative analyses were performed to inform future ILI planning. These usage differences and the qualitative data are discussed in the Results.

Table 1
Instruction and assessment activities for each group.

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<td>Follow-up with ILI</td>
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<td>Posttest</td>
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ACTIVE LEARNING METHOD

After learning about the Boolean connectors (AND/OR), truncation, and phrase searching, students completed a worksheet to practice the search techniques. The worksheet provided students with search terms for consideration. They experimented with using these different search methods and were asked to discuss why they would use these techniques. The professor gave students very broad topics and wanted them to learn how to narrow their topics to more specific aspects of their subjects. Thus, the worksheet engaged students in actively conducting searches, employing connectors and truncation, and thinking critically about the results of the searches. The librarian helped students during the hands-on time with the worksheet and graded it using a rubric (see Appendix C). Students did not receive course credit for the worksheet assignment. A one-minute paper was given at the end of the follow-up session asking them what they learned and which areas were still troublesome for researching their topic.

MULTI-SESSION METHOD

Students in this condition were from a single class that returned for a follow-up session the day after the initial session. This follow-up session included additional instruction and opportunity for hands-on practice as two librarians monitored and coached individual students doing research. A second follow-up session occurred two weeks later in which librarians responded to individuals’ questions.

PROCEDURE

Faculty members were assigned to teach the classes according to their time schedule. A particular librarian was responsible for each teaching method, with the exception that two librarians taught the classes with the Multi-session method. Thus, classes were assigned to teaching methods based on schedule. As students in the Research Writing classes arrived in the library class labs, they were directed to take the voluntary online pretest. Five minutes into the scheduled class time, participants were asked to finish responding to the test quickly as the instruction was to begin. Students arriving after that time did not take the pretest. At the end of the library session, the librarians handed the answer sheet of the pretest to students.

Three or four weeks after this first ILI session, the classes returned to the library for their follow-up sessions for more instruction and hands-on time. The librarians administered the posttest to the classes as they arrived for this session, again using the first 5 minutes of class time prior to further instruction. Students in the Multi-session group had two follow-up sessions as mentioned earlier. The posttest was given in the second follow-up session; thus, this posttest measured the effect of two instruction sessions instead of one, as was the case for the other groups.

Instruction librarians tailored their instruction for each session to the class assignments and students’ research topics, which were different for each faculty member. Librarians developed their instruction content using LibGuides™ and based on the class assignments. The basic IL concepts assessed were addressed in the ILI sessions, but each concept was explained in varying depths, depending on the assignments. For example, for an assignment requiring students to use only journal articles, book sources would be merely mentioned and the librarians would
not demonstrate searching for books. Since not all concepts were addressed in depth in each session, the librarians provided the answer sheet with rationales for the pretest questions to students after the first ILI to enable students to learn about the IL concepts on their own. They also recorded the concepts addressed in each session so that student learning could be associated with what was taught.

**DESIGN AND ANALYSIS**

The independent variables were Group (control, preview, active learning, multi-session), ACRL Objective (1, 2), Test (pretest, posttest), and Question (1–10). All variables were manipulated within-subjects with the exception of group. The dependent variable was number of correct responses. Data were compiled in Excel and inferential statistics were performed using SPSS. Analyses comprised a series of factorial and one-way analyses of variance (ANOVAs) to compare means across multiple independent variables or single variables with more than two conditions. The REGW-q multiple comparison procedure was used. This procedure maximizes the statistical power while controlling the Type I error rate across the full set of tests conducted. The Type I error size measure was partial eta, a measure of nonlinear correlation. This measure varies from 0 to 1 with magnitudes greater than .15 typically considered significant.

**RESULTS**

**PRETEST**

Three hundred twenty-six students completed the pretest. Tests were conducted to determine whether differences existed across class years, courses (CMP-125, BHP-150), disciplines (humanities, business, education, science, social sciences, performing arts, undecided, other), or ACRL objectives (1, 2). One-way ANOVAs for overall number correct for the 10 questions showed that the BHP honors students scored significantly higher than the non-honors students, \( F(1,324) = 25.66, p < .001, \text{eta} = .13 \), and the freshmen scored higher than the sophomores, \( F(2,319) = 5.59, p = .004, \text{eta} = .18 \). There were no significant differences across disciplines, \( F(7,318) = .79, p = .59, \text{eta} = .13 \).

Across the full sample, scores on Objective 1 [\( \text{Mean} (M) = 1.89, \text{standard deviation (SD)} = 1.18 \)] were significantly higher than scores on Objective 2 [\( M = 1.42, SD = 1.19 \)], \( F(1,319) = 8.42, p = .004, \text{eta} = .16 \). This main effect of Objective did not interact with class, discipline, or course. Thus, all sub-samples performed better on Objective 1 than Objective 2 on the pretest.

An additional analysis was conducted to determine whether the CMP-125 students who had preview materials differed from the other CMP-125 students or the BHP students. A one-way ANOVA indicated that there was a significant effect of group, \( F(2,323) = 14.23, p < .001, \text{eta} = .28 \). Multiple comparisons indicated that the BHP group (\( M = 4.30, SD = 1.88 \)) performed better than both the Preview (\( M = 3.51, SD = 1.97 \)) and CMP-125 (\( M = 2.94, SD = 1.78 \)) groups, which did not differ.

**MATCHED PRETEST–POSTTEST**

The following analyses include only the 107 students who completed both the pretest and posttest. A 4 (Group: control, preview, active learning, multi-session) \( \times 2 \) (Objective: 1, 2) \( \times 2 \) (Test: pretest, posttest) mixed factorial ANOVA was conducted. This analysis yielded a significant main effect of objective, \( F(1,103) = 11.17, p = .001, \text{eta} = .31 \), with scores on Objective 2 higher than those on Objective 1. Objective also interacted with both group, \( F(3,318) = 2.79, p = .04, \text{eta} = .27 \), and test, \( F(1,103) = 49.77, p < .001, \text{eta} = .57 \). Fig. 1 demonstrates that the preview and active learning groups scored significantly higher on Objective 2 than on Objective 1, whereas the other two groups scored equivalently on both objectives. The Test \( \times \) Objective interaction, shown in Fig. 2, indicated that Objective 1 scores declined from pretest to posttest, whereas Objective 2 scores increased significantly from the pretest to the posttest. No other effects in this ANOVA were significant.

The session records revealed that all classes received instruction on six of the ten IL concepts represented in the questions: databases (Q2), the search tool (Journal Holdings) to locate library’s journals (Q5), search by subject in the catalog (Q6), Boolean connectors (Q7, Q9) and truncation (Q8). Seventy five percent of the classes received instruction on differentiating journals from magazines (Q4) and on the purposes of books (Q10). Sixty seven percent of classes received instruction on the online catalog, and only 25% on using encyclopedias for background information (Q3).

Because ILI sessions focused only on six of the ten questions mentioned above, the above analysis was repeated for just these six questions. The Group \( \times \) Test ANOVA indicated the presence of a main effect of Test only, \( F(1,103) = 11.00, p = .001, \text{eta} = .31 \). This shows that students’ scores did increase significantly from pretest to posttest for the questions matched to training content (Fig. 3). The group main...
effect and interaction effects were not significant. In other words, the analyses revealed that significant gains occurred from pretest to posttest which agreed with the hypothesis. These gains were consistent for all groups and no group differences exist as hypothesized.

A 4 (Group: control, preview, active learning, multi-session) × 10 (Question: 1–10) × 2 (Test: pretest, posttest) mixed factorial ANOVA also was conducted. Results showed a main effect of question, \( F(9,927) = 37.24, p < .001, \eta^2 = .51 \), and an interaction of Test and Question, \( F(9,927) = 15.73, p < .001, \eta^2 = .36 \). The interaction is shown in Fig. 4. Students showed different levels of comprehension of the IL concepts among the questions. Q1 (online catalog) and Q6 (search by subject in the catalog) had low accuracy rates. Q4 (journal vs. magazines), Q8 (truncation) and Q10 (purposes of using books) had higher accuracy rates. Some questions saw significant gains from pre- to posttests [i.e. Q7 (Boolean AND/OR), Q8 (truncation), Q9 (Boolean OR), and Q10 (purpose of using books)], whereas others had significant declines in accuracy from pre- to posttests [i.e., Q3 (use of encyclopedias), Q4 (journal vs. magazines) and Q5 (search tool for locating library’s journals)].

To assess the impact of instruction, students were classified as showing no learning (incorrect on both tests), learning (incorrect then correct), loss (correct then incorrect), or retention (correct on both tests) for each question. The initial analysis focused only on the four questions for which some students received instruction and others did not. Percentages of students falling into each outcome category are shown in Fig. 5. Chi-squared analyses were used because ANOVA is not appropriate for frequency (i.e., nominal scale) data. The effect size measure used was \( \phi \), a measure of correlation for nominal scale variables. The frequency of the two positive outcomes (learning and retention) was greater for those receiving instruction than for those not receiving instruction for those topics, \( \chi^2(1, N = 470) = 17.39, p < .001, \phi = .19 \). A similar analysis was performed by objective for those receiving instruction only (see Fig. 6). As can be seen, learning and retention rates were significantly higher for Objective 2 than for Objective 1, \( \chi^2(1, N = 850) = 40.52, p < .001, \phi = .22 \). Taken together, these analyses demonstrate moderate effects of instruction relative to no instruction and greater effects of instruction for Objective 2 than for Objective 1.
COURSE ASSIGNMENTS

PREVIEW GROUP

The two professors involved with these students had different assignment structures and research topics, but each had her students meet with the librarian twice during the semester, and each invested time reinforcing IL concepts in class.

The first professor’s students met with the librarian for two different instruction sessions, once as they worked on their first essay assignment and again as they worked on their third essay assignment. Prior to each library session, students were asked to read a relevant section of the Research Guide. After each library session, students had an assignment; after the first IL session, they were quizzed on the material that was covered and wrote a research proposal.

This quiz (see Appendix D), which introduced the library databases and resources, was designed to test basic information literacy skills. In a class of 17 students, the results of the quiz were as follows:

- 15 got Question 1 correct (88%)
- 12 got Question 2a correct (70%)
- 12 got Question 2b correct (70%)
- 5 got Question 2c correct (29%) (8 got 1/2 credit; 4 got no credit)
- 15 got Question 3 correct (88%)
- 15 got Question 4 correct (88%)

The results revealed that while students did well with basic research questions (items 1, 3 and 4), they were not as successful at answering questions directly related to the library website (items 2a, b, and c). Students did the most poorly on Question 2 (“On the Rider Library homepage, what will each of the following links help you find?”) item C (“Journal Holdings”) with only 29% of the students answering this question correctly. The results of this quiz indicated to the instructor that she needed to revisit the library website with the students in class for some additional training.

These students again reviewed the Research Guide prior to attending their second library session (or the follow-up session), which focused on utilizing library databases and locating articles specific to the students’ topics for their next project. The goals of this session were to prepare students for their two major assignments due following the session: an annotated bibliography and an exploratory essay. The annotated bibliography, which students needed to complete for the class immediately following the library session, asked students to locate and evaluate a variety of sources (print and non-print) in order to make a case for how these sources would help them form their opinion on their exploratory essay topic. The exploratory essay assignment, due several weeks after the library session, helped students begin to make in-depth connections between their research and their ideas. The goal was to examine a topic from a variety of perspectives, and arrive at, as opposed to begin with, a thesis. Points were awarded for critical analysis of research and discussion of how research informs thinking on a topic.

Though numerical grades were only slightly higher on the exploratory essay (M = 89.7%) than the earlier essay following the first library session (M = 87.2%), student comments indicated the formalized emphasis on library skills and their integration into the course was effective. Students were asked to consider how they had grown as a writer and researcher, and what specific assignments/activities/personal insights contributed to their growth. Here are comments from three students:

Student 1 Another improvement I can definitely say I have made a conscious effort in is to find credible and reliable sources. This is not something I was aware of before and I treated material from sources on the web as facts on which I based conclusions. I now understand that researching the sources is just as important as researching the topic. Using data that is inaccurate, skewed, or distorted to a particular perspective for biased reasons can lead to inappropriate conclusions. The annotated bibliography exercise in particular helped me to realize that a thorough analysis of the source actually leads to ideas that can be incorporated into the essay as substantiation of the thesis. Additionally, I have improved my skills at using the college database for sources rather than just relying on the internet.

Student 2 Moving on from my second paper, I was surprised in that the style of the third essay was different than the first two...This format made me develop as a researcher in that it made me analyze and break down the sources I was researching in a different perspective. Rather than incorporating bits and pieces of my source into my paper along with my own thoughts and opinions, this format had me write about the process of my research. As a result of this different style paper, I am now a better researcher because I learned to break down and analyze my sources as well as their credibility and importance.

My success in the proper structure of research was further improved by the library sessions. These taught me how to correctly utilize databases such as EBSCOHost, whereas previously, I would use Google Scholar to attempt to find peer reviewed articles. While my process of performing research changed over the semester, my writing technique definitely changed significantly after Essay 3, the hypothesis-driven essay. Beforehand, I approached essays with a formality, in which the writer was all knowing and always formal in language. It was very eye-opening to write an essay in which a topic was being presented to the reader in the formality that the writer had not yet performed the research, and was looking to learn more about the topic. I enjoyed this structure because it allows the reader to imagine the writer’s research process—it also provides a logical guide for the writer to look back on, and actually see their development throughout essay.

The second professor’s assignment structure was different in that there was only one research paper and all of the students were writing on the same topic (the artist Frida Kahlo). After the first library session, the students handed in a topic proposal and a working bibliography, consisting of ten items (four books, four articles, and two of any source evaluated by the student); this was worth 10% of their grade. When the students met with the librarian a second time, no further formal research instruction occurred on new topics or concepts—it was a hands-on only session, an opportunity for students to ask the librarian for assistance with their in-progress research. (Unfortunately none of the students availed themselves of either the librarian’s or the professor’s expertise here; a handful asked basic, procedural questions relating to the assignment.) The final draft of the paper was due a week later.

Professor 2 invested significant time on reviewing the Research Guide in class, beginning three weeks before the first research instruction session, assigning points to individual and group work for topics covered in the Research Guide preview (finding a book, finding an article, evaluating a website—for a total of 3% of their grade). Further, one week before the instruction session with the librarian, the professor gave an online quiz of 10 questions through the course management system that was designed to reinforce topics covered in the Research Guide and to dispel myths about research (see Appendix E). This quiz was worth 10% of the students’ grade. The quiz was authored by the professor with suggestions from the librarian.

Reviewing Professor 2’s class quiz, out of 38 students, 9 (24%) earned a perfect score of 10, 8 (21%) earned a score of 9, 7 (18%) earned a score of 8, 6 (16%) earned a score of 7, and 8 (21%) did not take the quiz. Of those who took the quiz, all achieved a passing grade.

ACTIVE LEARNING WORKSHEET

The Active Learning group used a worksheet to practice the use of Boolean connectors (AND/OR) and truncation in searches. The results of this group differed from the hypothesis because the analysis of the
relevant questions (Q7, Q8, Q9) found no differences between the Active Learning group and other groups on these questions in the posttest. Examination of the worksheet responses showed that both classes in this group (N = 32) scored higher for identifying the main keywords and found it more difficult to construct queries with Boolean connectors, phrase searching, and truncating words (see Table 2).

**ONE-MINUTE PAPER**

Two questions were posed in the one-minute paper: “What is the most important thing that you learned during the two research instruction sessions?” and “What questions do you still have about researching information for your paper?” Interestingly, most of the students wrote in their one-minute papers that they learned how to search more effectively. More than half (64% in group 1 and 58% in group 2) did not have additional questions.

**DISCUSSION**

Because ILI sessions were tailored to the specific assignments and goals of the faculty, not all concepts were covered in all sessions. Librarians recorded the content of each ILI session so more refined analyses could be performed. The records showed that four out of five concepts (Q6–Q9) in Objective 2 were addressed in all classes, whereas only 2 out of 5 concepts (Q2 and Q5) in Objective 1 were equally addressed. The librarians focused on Objective 2 because the IL assessment of students in the previous year revealed that students were weaker in IL Objective 2 even after an ILI (Hsieh et al., 2013). Analyses showed that the two positive learning outcomes (learning and retention) occurred more frequently for the concepts covered than for those not covered. Further, the instruction was more effective for Objective 2 than for Objective 1. Thus, focused analyses did support the efficacy of ILI in this typical one-shot format.

Results provided significant evidence for the positive impact of single-session ILI on students’ IL. For the six critical questions with the corresponding concepts being addressed in all sessions, students’ performance increased significantly from pretest to posttest. However, student learning did not seem to differ significantly across teaching methods.

It is worth noting, though, that locating the library’s journals (Q5) and searching by subject in the catalog (Q6) still were challenging for students despite the teaching of these concepts in all sessions. The difficulties were evidenced by the significant decline in the posttest scores and were also documented in the quiz results of Professor 1 of the Preview group.

Results for the pretest data only demonstrated that the honors program students did better than the non-honors students, as would be expected. No differences were identified across disciplines. Pretest scores were better for ACRL Objective 1 than for Objective 2, though scores were relatively low for both objectives. The main finding, however, was that student knowledge was fairly limited, with pretest scores being below 40% overall and for each objective. Thus, there is a great need for effective ILI and research to establish the most successful teaching methods.

The students’ exploratory essays in Professor 1’s class, which used the Preview method, provided qualitative assessment of their learning. Students cited the benefits of the exploratory essay and the preceding library sessions, and acknowledged their contributions to the students’ growth as writers and researchers. The first student in particular noted that “researching the sources is just as important as researching the topic” and that “[u]sing data that is inaccurate, skewed, or distorted to a particular perspective for biased reasons can lead to inappropriate conclusions.” The second student described the process of writing the exploratory essay—from the library session to the annotated bibliography to the essay itself—as useful in that it helped that student “break down and analyze my sources as well as their credibility and importance.” In addition, the third student noted that the library sessions demonstrated how to find credible articles without the help of Google Scholar, and that these sessions were beneficial in the crafting of the exploratory essay. The library Research Guide, coupled with the specific library instruction and scaffolded assignments that encouraged students to spend a lengthy time with their sources, seemed to have led to an overall greater understanding of the importance of information literacy.

Students in Professor 2’s class had a different experience. On the surface, it appeared the quiz was a relative success: 100% of the students who took the quiz passed. Yet Professor 2 deliberately made some answers of the quiz immediately obvious, because she felt that such questions would reaffirm good research habits. Also, the quiz provided the correct answer after each question, and the student could take the quiz a second time for a higher grade. However well-intentioned the motivation, the quiz results thus might not be a good measurement of actual student learning. Data on the scoring breakdown of multiple-choice versus yes/no questions were not supplied by Professor 2.

Moreover, it is unclear as to whether the IL skills learned by the student through the previewing activities, quiz reinforcement, and research session were retained or used. The professor noted that between the working bibliography and the final draft, students reverted to using un-evaluated websites, despite the articles and books found in and after the first research session. While the professor required a quota of source types for the working bibliography, there was no such requirement for the final paper, because she wanted the students to decide for themselves whether these sources were useful in supporting their thesis. Further, the students did not revise their drafts based on the professor’s feedback, and thus they neither used their second library session effectively, e.g., asking the librarian to help them find more or appropriate sources or revise their thesis, nor improved their papers accordingly. The librarian’s review of two of the best papers revealed not only improper citation formatting but a poor choice of and surprisingly few sources, as well as the inclusion in the bibliography of sources demonstrated during the library session but not relevant to or even cited in the paper itself. This suggests that students disregarded what they learned about choosing sources and searching databases, returning to their old research habits to fulfill the minimum required of the assignment.

Even though the Preview group’s posttest was not statistically different from the other groups and the results on a quiz or test do not necessarily correlate to student outcomes on a research product, the librarian did find that teaching the Preview group was a better experience because the students had some basic familiarity with the concepts.

Yet, the results between these two subgroups suggest that the design of the professor’s assignment affects desired student outcomes. Even though each professor invested considerable time and energy in reinforcing information literacy and the research process, Professor 1 was happier with the students’ products than Professor 2, and Professor 1’s students seemed to have genuinely learned IL skills. The first difference is that Professor 1’s group previewed the guide twice before two different research instruction sessions for two different assignments; Professor 2’s group only received one research instruction session, although the students came to the library twice, and the guide was only reviewed before the first ILI session. This could be the reason that Professor 1’s students averaged higher on the posttest, although the difference between the two classes’ posttests was not statistically significant (Fig. 7). Few of Professor 2’s students availed themselves of the librarian or the professor in the follow-up session and did not appear engaged with the assignment. Another difference between the professors’ assignments was that Professor 1’s topics were broader and allowed for students to choose a topic that interested them.

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Table 2

Percentages of students in the Active Learning group attaining each work quality rating on the worksheet.

<table>
<thead>
<tr>
<th>Quality rating</th>
<th>Identifying keywords</th>
<th>Construction of query</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exemplary</td>
<td>62%</td>
<td>23%</td>
</tr>
<tr>
<td>Competent</td>
<td>26%</td>
<td>40%</td>
</tr>
<tr>
<td>Needs work</td>
<td>12%</td>
<td>37%</td>
</tr>
</tbody>
</table>

---
Perhaps most significantly, Professor 1 built reflection and critical thinking into the assignments. While Professor 2 assigned a working bibliography, students were not required to explain why they chose their sources for the assignment; they only had to meet the source type requirements, perhaps without knowing or caring why. Without being forced to reflect, they were free to ignore the professor’s feedback and to revert to their old research habits, without any consequence but their final grade. This reflective assignment is an additional pedagogical approach, beyond the scope of the original study, which the librarian and the professor plan to explore and assess further.

Based on the results of the pre- and posttests, the worksheet activity, and the one-minute paper, the research skills centered on identifying main keywords and constructing effective queries need to be repeated and reinforced for the Active Learning group. It was discovered immediately after examining the worksheets from the first class that changes were needed to make the form more user-friendly and that directions needed to be clearer. This form was simplified in the 2012 fall semester. The results from the one-minute paper indicated that students might have understood structured search queries better but did not seem to be able to actually apply these processes. Based on this analysis, there seems to be a need for additional structured practice that can be reviewed by the librarian. Lastly, if grading or class participation points are awarded, these sessions may be viewed as more relevant by students.

MULTI-SESSION GROUP

Two librarians taught the Multi-session group with two ILI and additional follow-up sessions. The extra time allowed the librarians to provide more detailed instruction and attention to individual students in the classes. The librarians noticed that few students asked more questions after the first follow-up session. The class faculty reported that some students thought they were ready to explore on their own after the first library session and did not feel the need for extra training. The fact that the posttest scores of this group were not different from those of any other group studied suggests that students did not demonstrate better IL skills from receiving an additional instruction session and more individual attention from two librarians. The students might be satisfied with their search results without realizing their knowledge gap. The finding agrees with the result of an earlier study, indicating that there was no correlation between students’ reported frequency of prior IL and their IL levels (Hsieh et al., 2013). Without setting check points of students’ research process in the assignments in this group, it was hard to tell how well students integrated IL in their essays and what concepts to reinforce. This experiment defies the assumption that students’ IL skills increase with receiving more ILI sessions.

LEARNING OUTCOMES OF THE IL CONCEPTS

The two-correct answer tests revealed further that less than 30% of participants could identify the best search tools to find journal articles on a given topic (Q2, Fig. 4). Answers to Question 4 revealed that even though 78% of the participants could tell that journal articles include extensive references in the pretest (Q4, Fig. 4; Q4, Appendix A), only 49% knew that popular magazines were not peer-reviewed (Q4, Appendix B). This indicates that about half of the participants could not tell the differences between journals and magazines. This result is similar to Hufford’s (2010) findings from his credit IL course. Much time was invested on this concept in class, and he was disappointed that only 57% of participants could identify scholarly journals in the posttest.

Less than a third of participants (29%) knew how to use the Journal Holdings link to search for the library’s full-text articles by journals’ names in the pretest (Q5, Fig. 4). All librarians emphasized this concept in the sessions, yet even fewer students (14%) answered it correctly after the ILI session. This concept continues to be a challenge for users to learn and retain. Some Moore librarians wondered if a different label than “Journal Holdings” would work better. “Journal Locator” is the term used at Monmouth University Library where librarians also reported students’ difficulty in finding the library’s journals under that appellation (Hsieh & Holden, 2010). Cunningham (2006) noted the repeated inquiries about how to find the full text of an article from students despite instruction on this concept in each ILI session. He stated that this is a complicated multi-step process containing many if/then scenarios that lead to different choices. Imler and Eichelberger (2011) observed undergraduates’ behaviors in using citation-linking software to find full-text journal articles through a screen-capturing device. They recommended some changes in web design to help students on this task. The Moore librarians have since changed “Journal Holdings” to “Find Journals.” In addition, a horizontal navigation menu is created for the library homepage to help users find journals and other key resources of the University libraries more easily.

The participants’ scores in this study increased significantly on structuring search queries (Objective 2) in the posttest. The questions on truncation (Q8, Fig. 4) indicate that participants could recognize the truncation in application (Q8, Appendix B) much better than they could articulate what it can do for them (Q8, Appendix A). Is the significant increase in the posttest scores the result of learning or is it because the posttest question might be easier than that of the pretest? The discrepancies between the two corresponding questions in the tests are enough to cause one to question the validity of the result. However, use of identical pre- and posttests from 2009 to 2011 (Hsieh et al., 2013) revealed that students improved significantly in the posttest on this concept consistently during the period. Truncation was a concept few students understood initially, but most learned it quickly.

In the pretest, about a quarter of participants were correct about the combination use of Boolean connectors AND and OR (Q7, Fig. 4), while only 20% were correct on the use of OR (Q9, Fig. 4). The increases are significant in the posttests on the Boolean concepts; however, the majority still did not understand them (Q7 and Q9, Fig. 4). They would have difficulty applying the use of Boolean AND and OR effectively for finding targeted information. These results agree with the findings of the Active Learning group from the search query worksheet and students’ one-minute papers. The investigating librarian of that group concluded that even though students seemed to understand the purposes of the AND/OR connectors, they may not be able to apply these processes. Burkhardt (2007) also indicated disappointment in her finding of students’ improvement in the Boolean connectors of a three-credit course. Despite students’ significant improvement from 37% in the pretest to 54% in the posttest, Burkhardt considered the posttest scores still low. This is another concept that students would master only from repeated practice over time.

The concept of subject searching in the catalog was little known to, and not learned by, most students (Q6, Fig. 4). With little knowledge on how information is organized in the catalog record or in other metadata schema, few students could comprehend the concept of a subject search and use it effectively from the short ILI session they received. This is another challenging area for students to learn and apply when doing research.
In summary, the two correct answers/multiple-choice questions of the tests reduced the chance rate of guessing correctly and provided more information about Rider students’ understanding of the basic IL concepts because each question extended the dimension of the tested concept, as if asking two questions in one. The different posttest questions were intended to reduce the impact of short-term memory of the pretest because students received the correct answers to these questions after the pretest. Little evidence indicates that the correct answer sheet helped; otherwise, the posttest results would have been much different. Perhaps more could be done to work with faculty to reinforce these IL concepts in class, to integrate IL into the assignments, and to give grade incentives for students to learn the IL concepts, because grades are largely a critical motivation for today’s students.

LIMITATIONS

About 10% of the participants in the pretest and 13% in the posttest did not follow the instructions to select two correct answers, despite the “Two Correct” stated in each question. The five-minute window at the beginning of class time for each test was short, and some students might not have been able to complete it in time, which could skew the results. Also the 5 minutes yielded small samples for each group, especially when only the matching records of students taking both the pre- and posttests were used. This method can be refined in the future with fewer groups but with larger samples in each group.

Multiple-choice question tests are good at collecting factual data but are limited in measuring participants’ higher-order thinking skills (Oakleaf, 2008). Most of the Moore librarians were limited in accessing students’ essays and could not evaluate how students applied IL concepts in their writing. The additional assessment tools used in this study, including students’ reflection essays, bibliographies, grades of their essays, worksheets, and one-minute papers helped provide more qualitative aspects of student learning not captured by the multiple-choice test questions.

The different questions in the pre- and posttest are similar, but a few posttest questions address a concept from different angles than the pretest questions (e.g. Q4, journals vs. magazines and Q8, truncation). The differences could threaten the validity of the results. Future use of non-identical pretest/posttest questions should be parallel and avoid such discrepancies.

The Preview group’s two faculty members taught differently and with different assignments. These inconsistent variables could affect the results of this group. Nevertheless, the authors carefully documented pre- and posttest results between the subgroups and found no statistical differences. The qualitative assessment of the two classes, however, revealed the differences in teaching and student learning that can be of good value to other IL educators.

In this quasi-experimental study with non-randomized experimental groups and pretest–posttest design (Quasi-Experimental research designs, 2001), besides the controlled teaching methods, there are possibly other un accounted factors, such as different teaching faculty and librarians, each with different teaching styles, abilities and assignments in the sessions, that could have affected the outcomes.

In summary, assessment study is not the most rigorous form of social science research (Upcraft & Schu, 2002). Its purpose is not to test theories but to provide guidance for practice. With the above-stated limitations, the results of this study documented what lower-division college students knew and learned cognitively through one- and multi-session ILI via the various teaching methods. The limitations provide areas to consider in refining future instruction and assessment studies.

CONCLUSIONS

The results provided support for the efficacy of single-session ILI. Student knowledge of concepts included in the training did improve over time. These gains, however, did not generalize to related (untrained) concepts and skills. Further evidence of the effect in teaching is supported by the results that students scored stronger in Objective 1 in the pretest and significantly stronger in the posttest in Objective 2, as most of the IL concepts in Objective 2 were addressed in all the ILI sessions. This was not the case for Objective 1, and the posttest scores declined significantly in Objective 1. The data revealed further that students learned and retained better the concepts that were taught in all sessions than those that were not. Thus, tailoring ILI to specific needs of students, and perhaps limiting the number of concepts taught per session, seems to be a model supported by the present data. This also indicates the benefits of pretesting student knowledge prior to ILI and/or tailoring sessions to the specific goals of the instructor or discipline.

Despite evidence for the positive impact of ILI, the effect did not vary significantly according to teaching method employed. None of the groups performed significantly different from each other as hypothesized.

Additional qualitative assessment tools of the Preview group shed further light on student learning and revealed that the higher engagement from the professors and students in the preview activities and the quizzes seems to have enhanced student learning in this group. The instruction librarian reported better teaching experiences with the better prepared students. Students’ essays and bibliographies of this group indicated that even within the same Preview group, professors’ assignments and instruction approaches could have different impacts on learning outcomes. Professor 1 had cohesive assignments that allowed students to apply and reflect on the IL skills learned from the research process and experienced better success. This is a method worth further development and investigation in the future.

The data revealed that students’ IL level started low with the average of 25% correct and increased to 34% after receiving one or two sessions of ILI. This is still a low figure, albeit a significant increase. More intensified collaborations need to take place in the curricula for students to be IL proficient. For institutions that offer only the single-session ILI such as Rider University, teaching faculty ought to integrate IL into the assignments cohesively, as Professor 1 in the Preview group did in this study, and make students accountable for their learning of IL. Strategies such as online tutorials, embedded librarians, and flipped classrooms can be explored to extend the power of the single-session ILI. Librarians and teaching faculty can benefit from understanding a variety of learning theories and pedagogies and mix their approaches to engage students actively in the learning process (Cook, 2008; Grassian & Kaplowitz, 2009; Molkhat & Majid, 2006).

Perhaps critical factors other than instruction methods, such as the complex nature of IL and the limited time students have in the session(s), have also impacted student learning. Students learn IL by interacting with the materials they encounter (Newell, 2009) and by applying and reflecting what they learned through assignments (Maitaouthong et al., 2010). As shown in the literature review, semester-long IL-integrated courses with carefully designed assignments and assessment tools to monitor students’ learning progression throughout the semester tend to have significant impact on students’ IL skills. Information literacy skills and today’s library research environments are too complicated for students to learn in the one-session format (Badke, 2008; Burkhardt, 2007; Johnson et al., 2011; Mery et al., 2012). Challenging as this can be, however, if information literacy is intended to take root with students, a credit IL-integrated course can offer systematic and focused IL training, and thus is highly recommendable for inclusion in the strategic planning of the institution.

APPENDIX A. INFORMATION LITERACY PRETEST, SPRING 2012

Select TWO BEST answers for each question. The answers collected will not be associated with you personally and will not count toward...
your grades. Thank you for helping us see how much you already know about library resources and your searching skills.

1. Typically a library's online catalog allows you to: [Select two]
   1. Locate a book on the shelf.
   2. Find a complete text of the journal articles in the library.
   3. Discover information about the college's courses.
   4. Locate all of the library's journals by journal titles.
   5. Find videos or DVD films that the library owns.

2. Which of the following would be the best tools to use to obtain journal articles for your topic “autistic children”? [Select two]
   1. A library's online catalog.
   2. A library's databases/indexes.
   3. An encyclopedia.
   4. An Internet search engine such as Google.
   5. An interdisciplinary library database such as Academic Search Premier.

3. You have gotten an assignment on “watersheds” about which you know very little. What are the best ways to get a quick overview of this topic? [Select two]
   1. Search the library catalog on watersheds.
   2. Search journal articles on watersheds.
   3. Check if the University Libraries provide access to the full content of journal articles for your topic.
   4. To check the full text content of an article by the journal's title.
   5. Search the web on watersheds.

4. Which of the following are characteristics of scholarly journals? [Select two]
   1. Articles reviewed by subject experts.
   2. Mainly for the general public to read.
   3. Reports news events in a timely manner.
   4. Articles include detailed references.
   5. User friendly language free of professional terms.

5. What is the tool “Journal Holdings” on the Library homepage used for? [Select two]
   1. Find which libraries in the state have a certain journal.
   2. Check if the University Libraries provide access to the full content of this article “A tune-up for China's auto industry” by Paul Gao.
   3. Check if the University Libraries have a certain journal in house or in a library database.
   4. To check the full text content of an article by the article's title.
   5. To check the full text content of an article by the journal's title.

6. Your assignment is to use the library catalog to find biographies and criticisms about Ernest Hemingway's life and work. What are the most efficient ways to find the most relevant items in the catalog? [Select two]
   2. Search “Ernest Hemingway” by keyword.
   4. Search “Ernest Hemingway” by author.
   5. Search “Hemingway, Ernest” by “Subject begins with.”

7. Which of the following searches are the best when searching for the question “Should women be exempt from the death penalty?” [Select two]
   1. women or (female and death penalty)
   2. (women or female) and death penalty
   3. (women or female) and (death penalty or capital punishment)
   4. women and female and “death penalty” and “capital punishment”
   5. women female “death penalty” “capital punishment”

8. Truncation is a method of shortening a word by using symbols such as * or ? to search the word with different endings. An example would be child*. The search word child* would do the following in a search: [Select two]
   1. Limit the search to more specific fields such as in the subject field.
   2. Reduce the number of irrelevant results.

9. Which of the two searches will find the MOST articles on teenagers? [Select two]
   1. Teenagers and adolescents and youths and young adults
   2. Teenagers or adolescents or youths
   3. Teenagers and adolescents and youths
   4. Teenagers and (adolescents or youths)
   5. Teenagers or adolescents or youths or young adults

10. To find a reliable and thorough history of the American Revolution for a research paper, I can use books because: [Select two]
   1. They provide the most current and complete information on the topic.
   2. They may provide references on relevant sources on the topic.
   3. They cover the subject in good breadth and depth.
   4. They are concise and to the point.
   5. I can access the full content of books electronically.

APPENDIX B. INFORMATION LITERACY POSTTEST, SPRING 2012

This is a follow-up survey to see how much you have learned since the first research instruction session. Select TWO BEST answers for each question. The answers collected will not be associated with you personally and will not count toward your grades.

Post 1. Typically a library's online catalog can be used to find: [Select two]
   1. Information about the college's courses.
   2. Information about the college's courses.
   3. Information about books in non-print items in the library.
   4. Information about the college's courses.
   5. Complete list of journals for which the University Libraries subscribe.

Post 2. A classroom assignment requires you to find two recent journal articles on “identity theft.” Which of the following are the best places to start? [Select two]
   1. Google search engine.
   2. A subject specific database such as ABI-INFORM.
   3. The library's online catalog.
   4. A reference book such as an encyclopedia.
   5. An interdisciplinary library database such as Academic Search Premier.

Post 3. Your professor asked you to provide a brief overview on the Danish painter Jorn Asger, whom you know nothing about. What are the best ways to find what you need? [Select two]
   1. Search the library catalog.
   2. Search journal articles.
   3. Search Amazon for books.
   4. Search an encyclopedia (online or print).
   5. Search Google on the Internet.

Post 4. Popular magazines have the following characteristics: [Select two]
   1. Articles reviewed by subject experts.
   2. Mainly for the general public to read.
   3. Report news events in a timely manner.
   4. Articles include detailed references.
   5. Have specialized vocabulary words specific to the profession.

Post 5. My professor asked me to get the article: “Gao, Paul, A tune-up for China’s auto industry”, McKinsey Quarterly; 2002, Issue 1, p144–155.” What should I do to find out if the University Libraries have this article in full-text? [Select two]
   1. Check the Libraries' periodical shelves for the article.
APPENDIX D. PROFESSOR 1’S QUIZ

1. If you are looking for articles on women in femininity, why might you use the term “feminin*” as your search term?
   - a. Online Catalog
   - b. Databases and Indexes
   - c. Journal Holdings

2. On the Rider Library homepage, what will each of the following links help you find?
   - a. Online Catalog
   - b. Databases and Indexes
   - c. Journal Holdings

3. What is a working bibliography, and why is it important to use when writing a research essay?

4. If my topic is “definition of ‘man,”’ what might be an example of a research question I could use to explore my topic further?

APPENDIX E. PROFESSOR 2’S QUIZ—POOL OF 20 QUESTIONS

A pool of 20 questions was created on Blackboard. When a student took the quiz, she/he saw 10 questions, randomly selected, with the answers randomly ordered. The quiz was designed to emphasize the search strategies taught by the Guide, to be easy, and to dispel myths about research. When finished, a student could see the score, correct answers, and the instructor-written feedback. A student could retake the quiz once.

(Here, a. is always correct; however, the answers were randomized for the students.)

1. It is a good idea to bookmark the Rider Libraries Home Page. [yes/no]

2. What should I do if I want to search efficiently for all these words? feminist, feminism, feminine, feminize, feminists
   - a. Use truncation. Type femini* (most databases) or femini? (the online catalog at Rider)
   - b. Type each word into a separate search.
   - c. Use just one word and expect all the rest to come up in my result list.
   - d. I can AND all of these words together in a Boolean search.

3. I would NOT use a specialized reference source (such as a specialized encyclopedia or specialized dictionary), whether print or online, to:
   - a. get in-depth information on a topic I already know a lot about.
   - b. get a concise and expert overview on a topic I know little about.
   - c. help me narrow down a broad topic or get ideas for further research on a topic.
   - d. find a bibliography of books on a topic that might help me in my research.

Feedback for a correct answer: You know that you CAN use a specialized reference, such as a specialized encyclopedia on art, to get a concise and expert overview of an art topic, to help narrow down a topic, to find a bibliography of books on a topic that might help me in my research.

Feedback for an incorrect answer: Re-read the question, and notice the NOT.

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Appendix C

Rubric to see how well you did for narrowing your topic and creating search statements:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Exemplary</th>
<th>Competent</th>
<th>Needs work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will be able to narrow a broad topic by using appropriate keywords that represent a thesis statement</td>
<td>Identifies major keywords, concepts, synonyms or alternative words in question from Pro/Con section of article in CQ Researcher</td>
<td>Identifies keywords in question from Pro/Con section of article in CQ Researcher</td>
<td>Does not identify keywords from question in Pro/Con section of article in CQ Researcher</td>
</tr>
<tr>
<td>Students will be able to create search statement using Boolean connectors, truncation, and phrases</td>
<td>Constructs search query demonstrating the proper use of Boolean operators, truncation of words, and quotation marks to indicate phrases</td>
<td>Constructs a search term using one or two of the search techniques, but not all of them (Boolean operators, phrase searching, uses truncation properly)</td>
<td>Writes search terms in the form of a short sentence or fail to use Boolean operators, phrase searching, and truncation properly</td>
</tr>
</tbody>
</table>

---
4. How many days of the week is a Reference Librarian on duty at Moore Library?
   a. 7 days
   b. 5 days: M–F. No one is available SaSu.
   c. 3 days: MWF.
   d. 2 days: Tu Th

   **Feedback for correct or incorrect answers:** Yes, 7 days. Here are the hours: Monday–Thursday 9 am to 10 pm; Friday 9 am to 9 pm; Saturday 10 am to 5 pm; and Sunday 1 to 9 pm.

5. I have my general topic, Frida Kahlo. I have decided how I want to focus and limit my topic, and I have a rough draft of my thesis sentence. I am ready to brainstorm for some search terms. I should write down a list of my search terms. (true/false)

6. When brainstorming to create a list of search words, I can...
   [multiple answers—mark all that are correct]
   a. choose key words from my draft thesis
   b. think about the historical time period to generate search terms
   c. use synonyms and words related to words already on my search list
   d. use synonyms and words related to words found from a search in a database

   **Feedback for correct and incorrect answers:** All of these answers are correct.

7. OK, I have a list of search terms. Now what do I do? I do one search and stop with the first ten results I find. (yes/no)

8. I've gotten some good results from my first search; now I can use words from browsing that results list to expand my list of search terms. (true/false)

9. I've gotten some good results from my searches, but I'm beginning to change my mind about my thesis. So I might use what I've learned searching to revise my thesis. (true/false)

10. Which Boolean search strategy listed below would give me the most results for the topic “Frida Kahlo as a Mexican painter”?
    a. Frida Kahlo AND Mexico* AND paint*
    b. Mexican painting AND Frida
    c. (women or female*) AND (paint* or artist*) AND South America*
    d. Kahlo AND Mexican AND painter

   **Feedback for correct and incorrect answers:** Remember to use truncation when doing Boolean searching.
   [Note: This exactly replicates a sample Boolean search shown in class before the quiz, searching Academic Search Premier, with an in-class discussion of why the most results were produced by using truncation in “Frida Kahlo AND Mexico* AND paint*”]

11. Why do a Boolean search?
    a. I can narrow or expand my search for more relevant results.
    b. I will get results that are in full text.
    c. I will retrieve all forms of a word.
    d. I will always get more results (more is better).

   **Feedback for correct or incorrect answer:** Boolean searching allows me to narrow or to expand my search for relevant results. I can use AND to get fewer but more focused results. I can use OR to get more results that are still relevant. Once I have many results, I can browse the titles and subject headings to improve my list of searching words within my Boolean search.

12. In order to solve the problem of finding articles on a given topic even when authors use quite different words for the same concept—such as “Latina” or “Chicana” or “South American”—most library databases supply:
    a. controlled vocabulary or subject terms
    b. truncation
    c. abstracts
    d. citations

   No feedback other than the correct answer, which is controlled vocabulary or subject terms.

13. I know there is junk out there on the Internet, but I know there is good stuff on free websites, too. What are the five criteria I can use to evaluate a website? (multiple answers—mark all that are correct)
    a. Author: Who is the author? Is the author an expert on the subject? Can I verify the author’s credentials?
    b. Accuracy: Are there obvious errors in grammar or spelling? Are there references, or footnotes, provided for facts presented? Can I verify the facts presented by using other sources?
    c. Objectivity: Is the information biased? Does the information promote a specific political, religious, ideological viewpoint? Are both sides of a controversial issue presented? If I am actually looking for a biased source, can I use this one and still maintain my own credibility?
    d. Currency: Is there a date confirming when the information was published? When was the website last revised or updated? Do all the links work?
    e. Coverage: Is the material in depth or general? Is the purpose of the website to inform?
    f. Design: Is the website beautifully designed?

   **Feedback for correct or incorrect answers:** All but “design” are relevant for your research purposes. Design is not relevant for your research purposes. It may be delightful, but it is not relevant. Check all free websites for: author, accuracy, objectivity, currency, and coverage.

14. How can I find the books that my professor has put on reserve for this course?
    a. Go to the online catalog, basic search, and look at the 5th tab “Course Reserve.” I can check out any book, for a limited time, from the Circulation Desk.
    b. Go to the reference section of my Moore Library.
    c. Go to my professor’s office.
    d. Go to the shelf, using the Call Number, to find the book in the stacks.

   **Feedback for correct and incorrect answers:** Reserve books are at the Circulation Desk, and they are no longer in the stacks. Reference books are always found in the Reference section. The professor does not have those reserve books checked out.

15. I have already identified a very important book on my topic, but Rider’s library doesn’t own it. Using the Rider Library website, I can check out other library catalogs, including The College of New Jersey Library, where I can check out books. (true/false)

16. How can I decide whether to take the time to read a book that might be of use to me in my research? (multiple answers—mark all that are correct)
    a. I can look at the table of contents (at the beginning of the book; sometimes also in the online catalog). I might read just one relevant chapter of a book.
    b. I can read the online summary of the book, or, through Google books, I can read online reviews of the book.
    c. With the book in hand, I can turn to the back of the book and look up my keywords in the index.
    d. I can look at the bibliography, or list of references in the book.

   **Feedback for correct and incorrect answers:** All these answers are good ones: preview the book by looking at the table of contents, reviews, index, and bibliography.

17. I must use only in-print reference sources. (true/false)

18. Which of the following is a subject-specific database? My general topic is the Mexican artist Frida Kahlo, and I’m particularly interested in the subject of her art or her place in art history.
    a. JSTOR
    b. I have no clue.
    c. Gale Virtual Reference Online
    d. Ask my friend who is now taking an art history course.

   **Feedback for correct and incorrect answers:** Your friend just might give you an answer, but you’re certain to get an answer...
either by asking a reference librarian or by looking in JSTOR, which covers scholarly journals in art and art history. [In class, the instructor had demonstrated using JSTOR and limiting the search to the art and art history journals in JSTOR.]

19. I have a very good list of search terms, but my first several Boolean searches have not turned up enough results. What can I do now? (multiple answers—mark all that are correct)
   a. I can see a librarian, who can help me search more effectively in the most appropriate databases.
   b. I can try re-designing my Boolean search, by changing some of my ANDs to ORs. That should include more results, if I’m trying appropriate search terms.
   c. I can try a different library database.
   d. I am giving up and changing my topic.

Feedback for incorrect answers: Do not give up! See a librarian, re-design your search in the same database, and/or try a different database.

20. Which is a characteristic of scholarly journals?
   a. Scholarly journals are written for and by experts in the particular field; articles are evaluated by experts in that field before being published.
   b. Scholarly journals provide industry-specific news and advertising targeted at those who work in a particular profession or trade.
   c. Scholarly journals report on time-sensitive news, current events and popular topics.
   d. Scholarly journals cover basic facts, definition, history, and concepts on a subject.

Feedback for incorrect answers: Re-read the section of the Guide defining scholarly journals.

REFERENCES


Maitanouthing, T., Tsuusnik, K., & Techamaneey, Y. (2010). Development of the instructional model by integrating information literacy in the class learning and teaching processes. Education for Information, 28(2–4), 137–150.


