

Part I

Business

SECTION INTRODUCTION

In this first part of the book we introduce two chapters that explore information literacy assessment in business and finance at the undergraduate and graduate levels. The author teams in this section provide assessment models from universities in the United States and New Zealand. They discuss several quantitative and qualitative tools for assessing information literacy including a marking rubric, an online research log, reflective tasks, pre- and posttests, and citation analysis. Both chapters reinforce the value of assessment to better understand student learning and to influence the perception of information literacy instruction within colleges and universities.

We start this first section with “Using Citation Analysis to Evaluate and Improve Information Literacy Instruction” by Casey M. Long and Milind M. Shrikhande from Georgia State University. This case study examines the use of citation analysis to better understand teaching and learning in several sections of undergraduate and graduate courses about international finance. This assessment was also designed to overcome the many challenges of integrating information literacy into the curriculum and to inform the development of an entire program with a focus on information skills at the same institution. This author team presents a comprehensive literature review about citation analysis that offers a convincing rationale for the use of this technique in assessment initiatives. They also describe an initial pre- and postassessment strategy using multiple-choice questions that did not meet their original expectations. Their critical appraisal of this first attempt led to their decision to adopt a citation analysis approach. According to the findings of this faculty-librarian team, citation analysis provided strong statistical evidence that the information literacy instruction in the undergraduate and graduate finance courses made a difference in student learning. The success of this initiative led to a greater level of support

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for information literacy instruction at Georgia State University. This chapter demonstrates the potential impact of assessment efforts on teaching and learning in discipline-specific courses and the importance of these findings within the wider institutional context. It may be especially valuable to faculty and librarians interested in using quantitative assessment data to garner support for nascent initiatives at institutions in transition or to expand upon the success of existing programs in any academic environment.

In the second chapter, Douglas G. Carrie and Lynne M. Mitchell from The University of Auckland Business School, New Zealand, present “A Holistic Approach to Embedding Information Literacy in the Design, Delivery, and Assessment of an Undergraduate Business Program.” This is the first of three chapters in the book that provides an international perspective on information literacy instruction and assessment. The author team describes an information literacy program in business that prepares students with a comprehensive set of information skills for success in the real world. This chapter examines an embedded approach to information literacy based on standards defined by the Australian and New Zealand Institute for Information Literacy (ANZIIL). In their literature review, the authors identify important links between information literacy and the workplace. This perspective reinforces an integrated approach to information literacy in the business curriculum and supports a highly visible role for librarians in teaching and assessing courses in class and online. Writing and critical thinking are both key aspects of information literacy instruction in this program. Some of the innovative assignments discussed in this case study include an analytical report about a New Zealand industry, digital media projects, and collaborative virtual businesses. This chapter reveals a complex scaffolding of information literacy assessment that unfolds over time in multiple classes, from introductory to capstone experiences. The authors describe some of the challenges in assessing a holistic information literacy program, while demonstrating the success of their innovative eight-year partnership between faculty and librarians. This reflective chapter illustrates the value of an assessment model that fully integrates a dedicated librarian in the instructional design and assessment process.

The emphasis of this section on business and finance defines important links between higher education and the real world. It also shows how key competencies such as information seeking, evaluating and synthesizing information, writing, and critical thinking are relevant concerns in different academic settings and the workplace. To apply some of these assessment techniques in your course or program, take into account the following:

- Develop an assessment strategy that scaffolds with the teaching and learning and encompasses multiple courses over time.

- Extend undergraduate information literacy programs and assessment to the graduate level, when appropriate.
- Draw upon the differing expertise and background of librarians and faculty members when considering assessment methods.
- Review the data being collected from assessment efforts, and revise or replace methods that do not provide the type of information being sought.
- Use multiple channels to report upon information literacy successes, as proved by assessment, in order to enhance the need for information literacy instruction in other programs at the institution.
- For some disciplines, highlighting the link between specific information literacy skills and the world beyond academia will provide persuasive evidence of the need for information literacy programs and the assessment of student learning.

As with all the chapters in this book, the assessment strategies and rationales are not confined to the disciplines in whose context they are described. The scaffolding approach, the extension to graduate courses, and the connections between knowledge gained from courses and the wider world, to take just three themes from these two chapters, are all pertinent to many other disciplines as well. Additional elements found in this section are sure to resonate as well.

Chapter 1

Using Citation Analysis to Evaluate and Improve Information Literacy Instruction

Casey M. Long and Milind M. Shrikhande

INTRODUCTION

Information literacy is a complex skill set that is often overly simplified. As many academic librarians know, it cannot be acquired in one in-class session. Students must gradually be introduced and encouraged to apply the concepts through multiple class sessions and assignments. The route to effective information literacy instruction is to understand the student experience, identify the skills needed, and strategically integrate information literacy into core courses. Each information literacy session should build upon another and challenge students to further their skills.

The citation analysis assessment method offers one of the best ways to understand how students locate information, the types of sources they use, and if previous information literacy sessions have effectively altered student research strategies. With this type of data in hand instructors and librarians are able to demonstrate the impact of information literacy instruction, make necessary changes to the original instruction method, and build a foundation for a broader information literacy program. In this chapter we provide a case study on how citation analysis was utilized at Georgia State University to evaluate, revise, and develop a teaching approach that best meets the needs of students in an elective finance class. In addition, we discuss how the evidence gathered through citation analysis is creating

opportunities to promote the need for a strategically designed information literacy program.

BRIEF HISTORY OF CITATION ANALYSIS

Citation analysis is essentially a subfield of bibliometrics and is utilized in libraries in several distinctly different ways. There are a number of excellent literature reviews that provide a history of citation analysis (Smith, 1981; Osareh, 1996; Fescemyer, 2000). Although most citation analysis histories and literature reviews date the emergence of citation analysis to the 1960s when citation indices began to appear, they all agree that citation analysis probably originated much earlier. Farideh Osareh indicates there is evidence of bibliometric studies as far back as 1890 (Osareh, 1996: 149). Linda C. Smith describes research published in 1929 by Gross and Gross that utilized citation analysis as a collection development tool (Smith, 1981: 97).

There are many branches of citation analysis. Some evaluate the impact a work has on future publications. Others assess the citations in student and faculty work to measure the quality of the library's collection and identify resources that should be added. The branches of citation analysis that are most pertinent to the development and assessment of information literacy are the ones that focus on understanding students' information-seeking skills and measure the impact or quality of information literacy instruction.

An early attempt at using citation analysis to evaluate information literacy instruction appears in a seminal instruction-focused report published in 1966 called the Monteith College Library Experiment. The project actually began in 1960 at Wayne State University as a way to strengthen the connection between the library and college teaching. Through a series of ten library assignments over the course of the degree program, librarians aimed to teach students how to find their way in the library. To assess student's library competency at the end of this program the researchers felt the "products of the assignments themselves could be one source of evidence on student learning" (Knapp, 1966: 108). Unfortunately, several events prevented the researchers from gathering the information necessary to complete the analysis. One obstacle Knapp notes is the librarians' dependence on instructors for the implementation of the assignments (Knapp, 1966: 138), illustrating the need for collaborative instruction and assessment.

Another early adopter of this methodology is Thomas Kirk. In an article published in *College & Research Libraries* in 1971 he used this method to compare two library instruction methods. It is possible that Kirk was the first to successfully execute instruction assessment based on citation analysis. The authors of this chapter were unable to locate earlier studies and the only relevant reference in Kirk's bibliography is to the Monteith College Library Experiment conducted

by Knapp. Nonetheless, this work together with other contributions (e.g., Kirk, 1973) on the evaluation of library instruction established Kirk as one of the forefathers of this assessment technique.

A few significant studies on the use of citation analysis emerged in the 1980s and 1990s. Some of these articles showed how citation analysis was used to obtain quantitative data on the effectiveness of an instructional technique (Kohl and Wilson, 1986; Dykeman and King, 1983). Others provided a critique of citation analysis as a library instruction evaluation tool and recommended some standards for conducting such assessments (Gratch, 1985; Young and Ackerson, 1995). All of these studies pioneered the use of citation analysis and variations of these recommended methods continue to be used.

Starting in the late 1990s, the use of citation analysis began to surge and the focus of research published based on this evaluation method changed dramatically in just a few years. A large part of this increase was due to the rapidly expanding role of electronic sources and the Internet in student research. Initially, these studies focused on determining if students took advantage of the electronic and Internet sources available. In their 1997 article published in *Research Strategies*, Malone and Videon state that they wanted, "to discover the extent to which undergraduate students are finding electronic resources for their course-related research" (Malone and Videon, 1997: 152). Their concern was whether students knew how to access electronic resources through the library and the Internet. Interestingly, no less than 84 percent of the 291 bibliographies they examined utilized no electronic resources. Although many studies including the study by Malone and Videon do not use citation analysis to evaluate instruction, these studies provide valuable insights into the information-seeking behavior of students, helping librarians and course instructors to design future instruction sessions.

Shortly after the turn of the millennium, citation analysis studies moved away from determining *if* students were using the Internet to understanding *how* students were using the Internet for research. A major conclusion reached was that librarians would need to provide better guidance to students on citing electronic sources and on evaluating the quality of websites that they chose for their research (Fescemyer, 2000; Davis and Cohen, 2001; Davis, 2002).

It was not long before the Internet became a popular research tool. As a result, the citation analysis studies began looking at the extent to which students used the library and the quality of the research sources being selected. These works compared the ratio of electronic sources to print sources and Internet sources to library sources (Hovde, 2000; Kraus, 2002). An emphasis on evaluating the impact of the instruction on student information-seeking skills was also revived (Emmons and Martin, 2002; Davis, 2003; Ursin, Lindsay, and Johnson, 2004; Robinson and Schlegl, 2004).

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Citation analysis is now firmly rooted in the cannon of instruction assessment techniques. Works produced by Kirk, Gratch, Ackerson and Young, and Davis provide the foundation for all citation analysis studies and new research produced each year identifies new uses and techniques for this assessment method. The unique ability of citation analysis assessment to identify student information-seeking behavior ensures it will play an important role in the crafting of information literacy instruction as technologies and tools evolve.

INFORMATION LITERACY AT GEORGIA STATE UNIVERSITY

Like many academic institutions, Georgia State University faces difficulties in promoting information literacy across campus. The first and greatest obstacle is the lack of a formal information literacy program that is supported by the institution and integrated into the core curriculum. Though information literacy is listed as a strategic goal in the University Action Plan (Georgia State University, 2008: 1), information literacy is neither a required component within the core curriculum nor is it integrated formally into any degree program curricula offered at Georgia State University. Information literacy sessions are conducted by librarians at the request of individual instructors.

As it is up to individual professors to integrate information literacy into a course, students' information literacy skills vary depending on the courses they select. Some students sit through two or three information literacy sessions in one semester. Others only receive information literacy instruction in an introductory writing course. An extreme example of poor information literacy coordination involves a group of 25 students in a single cohort participating in the Freshman Learning Community, taking a series of five classes together. In three of the five cohort classes they received information literacy instruction from three different librarians. Neither the librarians, nor the course-instructors were aware that the students were receiving a basic introduction to library resources and research techniques in other classes. This is not an infrequent occurrence, as business librarians at Georgia State University often encounter the same MBA students in multiple information literacy sessions taught throughout the semester. One can argue that the repetitive nature of these sessions helps reinforce the concepts taught by the librarian, but there is an equal probability that the students simply tune out the additional instruction sessions and develop the impression that they are fully skilled in the art of research. Inability to understand students' information literacy needs and lack of coordination between course instructors results in a missed opportunity to expose students to advanced skills.

Another issue Georgia State University faces in promoting information literacy is the diversity of needs among its students. Georgia State University is

widely noted for its ethnic and racial diversity, but is also very diverse in the types of students it attracts. For years Georgia State was known as a commuter school. Originally founded as a business night school, Georgia State University continued to serve the needs of professionals pursuing a part-time education as it grew and expanded its degree offerings. The introduction of student housing in 1996, however, initiated a gradual transformation of Georgia State from a commuter school into a traditional college campus. Now the student body at Georgia State consists of students who started their college career at Georgia State, transfer students from local two-year colleges, older students restarting their education, full-time students, and part-time students.

The ability of librarians to plan appropriately for an information literacy session is challenged by the differences in the educational trajectory of students within a class. For instance, librarians can neither assume a third-year student received a basic orientation to the services and tools available through the university library, nor can they assume that the orientation had occurred within the past three years. As an experiment, a professor who teaches two sections of a junior-level business communications course asked her students to raise their hands if they had been at Georgia State since their first year of college. The differences between the two sections of the same course were dramatic. In the first course section only 15 percent of the students raised their hands and in the second course section 75 percent of the students raised their hands. This anecdotal evidence suggests that information literacy sessions must be tailored to these diverse audiences if they are to succeed.

To conduct an effective information literacy session librarians need to develop a course module that identifies and fulfills the learning needs of the students in the classroom. The size of the institution also presents a challenge. Currently there are more than 27,000 students pursuing degrees in more than 250 areas of studies. Though the library has librarians who focus on meeting the needs of first- and second-year students and another group of librarians who address the discipline-specific needs of students, many students graduate without any information literacy skill instruction. Students attending an information literacy session in their final semester at Georgia State University frequently wish they had received this type of instruction earlier in their degree program. To ensure students build strong information literacy skills, librarians must be able to work collaboratively with departments and designers of the core curriculum to maximize effectiveness of the offered information literacy instruction.

In summary, librarians at Georgia State University face several challenges. Building stronger relationships with faculty, improving coordination of information literacy efforts, and understanding the student experience are some examples. Citation analysis assessment has the potential to address these challenges. Our initial collaborative efforts in this direction have led to improved

organization of information literacy instruction in the College of Business at Georgia State University. This case study demonstrates how citation analysis assessment improves the efficacy of information literacy instruction and contributes to the development of an institutionalized information literacy program.

A PARTNERSHIP TO IMPROVE STUDENT INFORMATION-SEEKING SKILLS

Teaching innovations are often triggered by observations and through strongly felt needs for improvement by classroom instructors. After several years of assigning term projects in an international finance class, one of our professors began to explore ways to improve this course assignment. Satisfied that students were learning core course concepts from this independent team assignment, he felt there was need to strengthen the students' research skills so they could complete this assignment at a higher level. During the national Financial Education Association Meetings (2003), he attended a presentation on information literacy and was inspired to begin building such skills among students working on the independent team assignments. Coincidentally, upon his return from the conference, the finance professor received an e-mail message from a business librarian offering information literacy instructional services and a partnership to develop an information literacy instruction method began. The focus of this collaboration was to encourage appropriate information-seeking behavior among graduate and undergraduate students.

The business librarian prepared an hour-long research session that highlighted key resources, introduced search techniques, explained how to use the library, and discussed plagiarism. This was the basic approach the business librarian took with each of her classes. Confident in this approach, the business librarian believed the assessment result would demonstrate how the information literacy session improved students' skills. She did not expect the assessment would prompt her to question her approach to teaching.

To measure the results of this instructional effort, the business librarian developed a pretest/posttest assessment tool that utilized a series of multiple choice questions. This tool began with basic questions designed to gather demographic information and develop an understanding of students' prior information literacy experience. Then the tool delved into some questions aimed at understanding students' familiarity with business resources. The results of the pretest, however, proved unreliable and did not gather the type of data needed to understand students' knowledge levels. It was difficult to tell from the results whether students were actually able to correctly identify which databases provided access to specific types of business information. This

was partially the result of poor design. On questions in which the test designers intended students to select the best database for a particular type of information, student responses indicated dissonance. Students selected tools that did contain the type of data requested by the question but not necessarily the best database for the purpose. In addition, the multiple choice nature of the test enabled some students to successfully guess the correct answer. It became clear that even if the pretest assessment tool was properly designed, this method would not provide the data needed to understand how students were applying the concepts taught in class. This method only measured whether the students remembered the names of databases and basic procedures for accessing these resources. It did not provide insight into whether students utilized these tools and how effective they were at finding the information they needed for assignments.

After carefully researching other methods for assessing the information literacy instruction the team selected citation analysis as their assessment tool and developed an instrument to measure their effectiveness vis-à-vis the intended goals of the instruction session. This tool was then utilized throughout three semesters in undergraduate and graduate international finance classes in which students worked on an independent team assignment. The tool prompted changes over the course of three semesters, including the following:

- shifting the instruction session from the regular classroom into a computer lab to facilitate greater hands-on research instruction;
- creating a research template to streamline students' thinking regarding issues faced by their chosen organization and help students avoid information overload;
- designing a Web-based research guide to provide further assistance; and
- altering the instruction session to help students build a greater understanding of the research process.

In addition to these instructional components, the data gathered from the citation analysis assessment combined with observations from interactions with students seeking assistance led to the realization that the in-class library research sessions needed to be complemented by consultations for the students, individually or in teams. Thus, both the faculty member as well as the business librarian began setting up regular consultations with the students to answer their questions, to provide guidance and perspective, and to consolidate their information literacy skills.

These research instruction sessions provided students, especially the uninitiated ones, with a framework for analysis and the generation of ideas that would grow into fully thought-out term papers. Consequently, the librarian-faculty team started observing a marked improvement in the submitted projects

along the dimensions of variety and quality of resources being used. After using the citation analysis assessment method for three semesters the assessment data indicated the combination of instruction techniques was effective in improving students' information-seeking skills. The team discontinued assessing the information literacy sessions each semester. They still plan to use this assessment to ensure the instruction approach continued to be effective, but they felt that the development of an information literacy instruction package was complete.

Although most librarians are familiar with many of the techniques used by this team to teach information literacy, it is the combination of the different techniques that fulfilled the specific needs of students in this course. The citation analysis assessment method guided the redesign; however, a key component for the success of this endeavor is the faculty-librarian collaboration. Without a joint commitment to information literacy, the time required to tailor the instruction to this course may not have been available. To develop lifelong information literacy skills among students it is essential that sustained faculty-librarian collaboration combines different methods and inputs that can be refined over time. Working in coordination with each other, the faculty member and librarian have to complement each other's role by providing opportunities for multiple interactions with student teams during the course of the semester.

DESIGNING OUR CITATION ANALYSIS ASSESSMENT TOOL

We selected citation analysis as the method to assess our information literacy efforts because it enabled us to see how students were finding, evaluating, utilizing, and citing information sources. Using this method required that we create a citation analysis tool to measure students' abilities. In this section we describe the steps we took to develop our citation analysis assessment instrument.

Developing Clear Objectives

Thomas Kirk advocates that all instructional design should begin with the setting of instruction goals and objectives. He states that "the objectives are going to be there whether or not we consciously decide what they are going to be" (Kirk, 1973: 5). When we conducted our first assessment using the pre/posttest method we found Kirk's statement to be true. We knew in general what we wanted to accomplish, but did not develop an outline of these goals. As a result we were uncertain how to measure the effectiveness of the session and in retrospect the instruction approach lacked focus. We quickly realized we needed to articulate what we actually aimed to achieve. Our goals were simple and based broadly on the information literacy standards established by

the Association of College and Research Libraries (ACRL, 2000). Through our sessions we aimed to:

- introduce students to key sources respected and used by financial professionals;
- encourage students to use a variety of sources that express different viewpoints;
- teach students to cite their sources; and
- ensure that students understand how to paraphrase and synthesize information properly.

Identifying Criteria for Assessment

Once the instructional goals were set we established criteria to measure students' success within that goal. The criteria we identified included an assessment of:

- *Quality of Sources:* Are the sources appropriate for the topic and scope of the paper? Are the sources well-respected sources in the discipline?
- *Variety of Sources:* Are there enough sources to sufficiently develop a well-rounded argument/perspective? Do the sources provide diverse perspectives?
- *Citation Format:* Is a consistent citation format utilized? Is enough information provided in the citation to enable the reader to locate the source referenced?
- *Information Use:* Is there evidence of plagiarism? Are information sources properly paraphrased or quoted?

Establishing a System to Grade Information Literacy Achievement

After establishing our criteria for assessment, our next step involved creating a scoring system. We refer to our system as an information literacy grading scale. To create this scale, we used a zero to five-point scale for each item with one being the lowest score and five being the highest. If a student team did not integrate one of the lessons learned during the information literacy instruction into their paper, the team was assigned a one for that criterion. If the team consistently applied all the lessons learned into their paper, the team was assigned a five. Zeros were occasionally assigned when no evidence was available upon which to evaluate the paper. For instance, when a paper was discovered to be plagiarized it received a zero. If no sources were used or listed the team was assigned a zero for that category.

Learning goals are not always created equal. In the goals we set for ourselves we felt that some of the learning objectives were more important than others. As

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a result we weighted each of the categories according to the overall importance for information literacy achievement. Our primary goals were to ensure use of a variety of appropriate sources, to reduce plagiarism, to introduce students to key sources in the discipline, and to ensure students learned to utilize them appropriately. For us, citation format was considered less important than all of the other criteria. To adjust for these differences, we assigned the following weights to each characteristic:

- Quality of Sources = 40 percent
- Variety of Sources = 20 percent
- Citation Format = 10 percent
- Information Use = 30 percent

The weighted scores were then added together to create what we termed “an information literacy score” for the team project. This score measured how well students demonstrated these information literacy skills. All the scores for each semester were then averaged together to provide an overall information literacy score for that semester. These scores were separately ascertained for undergraduate students and graduate students as we wanted to measure each of these groups independently.

Outlining Grading Guidelines to Ensure Rating Consistency

Because our project spanned multiple semesters it was important to develop a set of standards that could be used every semester to measure achievement in each category. This helped our grading to be consistent from semester to semester. Creating guidelines also helps in limiting the subjectivity of the evaluation process, especially if multiple individuals are scoring the papers. Appendix 1.1 provides a detailed overview of the guidelines we established.

Analyzing the Citations in Context

Citation analysis, as the name implies, places a heavy emphasis on evaluating the resources listed in the bibliography of a paper, but to obtain a full understanding of how students use and cite information we found it necessary to review the content of each paper. Our evaluation of information use within the paper included assessing:

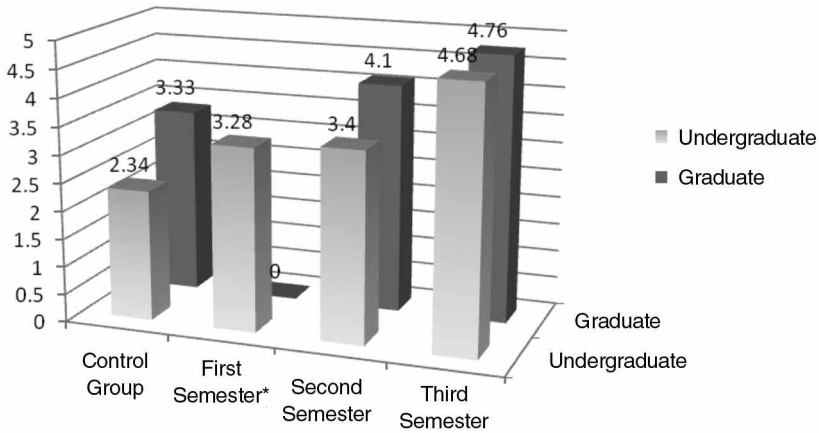
- the appropriateness of the information for the topic and scope of the paper;
- the extent to which the sources cited in the bibliography were actually used within the paper; and
- whether the student teams synthesized the information into their own arguments.

Through this additional level of assessment we found several instances of plagiarism that may have previously gone unnoticed. Minor examples involved students citing sources in their bibliography that were not actually used as sources within the paper. One blatant instance involved a bibliography in which all of the sources cited were published years prior to the data that was actually reported in the paper. Further analysis of this paper led to the surprising revelation that the bibliography itself was actually taken from a completely different report published by a professor in Denver. Several other extreme examples of plagiarism were found, but most instances of plagiarism appeared to be examples of unintentional plagiarism. This level of analysis provided great insight into how and why students may plagiarize. As a result we were able to alter our instruction session to address plagiarism more extensively. We discussed the university guidelines on academic honesty and the finance professor made a point of referencing these guidelines throughout the course. This analysis also gave us examples of plagiarism that we could convey to the students so they had a better understanding of what was expected.

WHAT WE LEARNED THROUGH THE ASSESSMENT TOOL

The tangible results provided by the citation analysis assessment were encouraging. The tool provided us with data that indicated both undergraduate and graduate students benefited from the information literacy instruction at statistically significant levels. As shown in Figure 1.1, each of the three semesters in which an information literacy instruction session was integrated into the course, the information literacy scores of both undergraduate and graduate students consistently improved. By the end of the third semester, graduate student skills improved from 66.6 percent to a very high 95.2 percent of the maximum score attainable of 5.0, and undergraduate student skills improved from 46.8 percent to a significantly higher level of 96.3 percent of the maximum score attainable of 5.0. The undergraduate students benefited more compared to the graduate students. This difference was attributed to the higher maturity and awareness levels of graduate students due to earlier exposure to information literacy at the workplace and in their prior academic training. Graduate students started at a high threshold; therefore the marginal improvements were not as striking as those for undergraduate students. However, in absolute terms, both groups seemed to have gained significantly in their learning and skills for life-long information literacy applications.

The qualitative outcomes of the citation analysis assessment are difficult to demonstrate. In scoring the papers using the citation analysis instrument, we were able to note specific trends in the ways in which students completed their papers. For instance, after reviewing papers in the control group and in

Figure 1.1. Changes in Information Literacy Scores across Semesters

*No graduate papers evaluated in first semester

the first two semesters of instruction, it was clear from the content analysis that students were simply regurgitating information from the sources they selected. The information was properly summarized or quoted. However, the papers consistently lacked an element of critical thinking by students that is essential for supporting mere opinions. To remedy this problem, an in-class activity was designed that helped students understand better what we expected to see in their assignments. Students were given a packet of documents that were found in the library databases on a specific company. They were asked to work in teams for 15 minutes to identify a paper topic on that company and outline their strategy. At the end of the 15 minutes, the student teams presented their outlines and described the types of information sources they would need. After each student team completed their summary, we jointly evaluated their approach and provided constructive feedback. This approach clarified expectations for the students. As a result, not only did the information literacy scores improve dramatically, fewer student teams sought additional assistance from the librarian. If we had not reviewed the contents of the paper to determine how students were utilizing these sources, we may not have identified this issue.

ACHIEVING OUR GOALS

As noted in the previous section, our quantitative results showed a dramatic improvement in student information literacy skills. Because the information

literacy scores were high we felt we achieved our goals and created an instructional approach that could be used for future classes. We discontinued conducting a citation analysis after each semester and decided to utilize this technique periodically to ensure the information literacy session continues to be successful.

After the final semester of using this tool, however, we conducted a small survey of students who had completed their studies at Georgia State University to see if the information was retained and useful to the students after graduation. We received only 17 responses, but these responses were pretty well balanced in terms of representation for the different semesters. In the survey:

- 82 percent indicated that they developed more effective information searching skills;
- 76 percent indicated that they learned about relevant information sources; and
- 59 percent of the respondents indicated that they used the skills gained in the library research workshop in other settings such as the workplace, in other classes, or in another degree program.

In the free text comments of the survey, at least seven respondents clearly stated that they had not known about these resources previously and wish they had been introduced earlier. One student wrote:

i [sic] was never aware of the tremendous amount of resources available to us until this class which happened to be one of my last semesters. i use some of those resources at work now. i think every student should be given a course by Ms. Long as one of the first courses.

USING CITATION ANALYSIS TO INSTITUTIONALIZE INFORMATION LITERACY

The data gathered in the single elective finance course proved to be a launchpad for greater efforts. Pleased with our results, we applied for two awards to share our experience with others. We received both awards. One was given by the College of Business for innovative instruction. The other was given by the University Center for Teaching and Learning for instructional effectiveness. The key reason noted for our achievement of these honors was our ability to provide quantitative evidence of improvement in student learning.

These awards quickly raised the profile of information literacy within the College of Business. The faculty members were more receptive to the integration of information literacy instruction into their courses. The librarian took advantage of this new interest in information literacy to begin establishing a

comprehensive, well-coordinated undergraduate information literacy program in the College of Business. At this point in the process, she is close to full integration into two business courses that all undergraduates are required to take and is working on identifying a third. By working with a set of three required courses, the business librarian is able to introduce students to basic information literacy skills in one course and address additional information literacy concepts in subsequent courses. She is hopeful this will ensure all students are not only introduced to information literacy skills, but are able to achieve more advanced skills that are normally not addressed in information literacy sessions due to the lack of time available.

Outside of a collaborative effort, librarians and information literacy do not usually receive this level of attention. Simply the fact that the integration of information literacy instruction into a single course was highlighted as innovative instruction illustrates the lack of visibility librarians and information literacy can have in an organization. By collaborating with a faculty member and providing clear evidence of impact, information literacy finally received the level of attention it deserved within this organization.

ENSURING RESULTS ARE VALID MEASURES OF INFORMATION LITERACY

In the previous section we indicated the achievement of our intended goals and how we succeeded in improving visibility of information literacy instruction at the College of Business. The achievement of intended goals needs to be confirmed by ensuring that the results of our case study provide valid measures of information literacy. These quantitative robustness checks for reliability and validity of our results are discussed in this section.

Use of a Control Group as a Benchmark

An important principle of field study research is to compare the assessment of the sample of students in the experiment with a control group that has not benefited from information literacy instruction. We used a control group from a semester prior to the multisemester field study on information literacy instruction. Students' information literacy skills by the end of the third semester were benchmarked against the control group.

Use of Multiple Evaluators

Researchers using this assessment technique emphasize the need to use more than one person in evaluating student papers, especially while discussing the development of appropriate citation analysis tools. Some advise that those rating the citations should be individuals without a strong connection to the

subject matter or course (Gratch, 1985; Hovde, 2000; Scharf et al., 2007). Others argue that only librarians should rate the bibliographies.

Because we evaluated all the student papers and not just a sample from the course, we decided it was too much work to enlist the assistance of outside graders. Instead, the librarian conducted an initial review of all the papers. Then without revealing the librarian's assessments, 20 percent of the papers were randomly selected for the professor to cross-validate the librarian's assessments. The scores were then compared with the scores assigned by the librarian. The correlations between the scores of the two graders compared well on each attribute, ranging between 0.81 and 0.95. The overall correlation between the two graders' scores was about 0.91. The dual grading approach also helps validate the rubric detailed in Appendix 1.1 for citation analysis and information literacy assessment.

Test the Reliability of Results

To establish that the student teams sampled across the different semesters were from the same population as far as the means and variances of their academic proficiency were concerned, we used two statistical tests, a t-test for equality of means, and Levene's test for equality of variances (using SPSS [Statistical Package for the Social Sciences]). Academic proficiency was measured by using average GPA (grade point average) within student teams and comparing such average GPA scores across different semesters. These tests were conducted for undergraduate and graduate student teams separately to compare proficiency across a pair of semesters at a time.

We also conducted a statistical analysis of the performance by student teams across semesters. Although the scores indicated continuous improvement in the quality of resources used, variety of resources used, citations, and proper use of information, it is again imperative that such findings be validated statistically. A multivariate analysis of variance (MANOVA) test was conducted to indicate statistically significant improvement in student team performance across different stages of the field study across the different semesters. This test was implemented on a large enough sample of student teams to ensure that the number of student teams exceeded the number of dependent variables, as required for MANOVA.

CONCLUSION

Using citation analysis for instruction assessment is not appropriate for all instructional efforts. Time and human resource demands are potential limitations of this approach compared to the time normally spent on such instruction in the classroom. The evaluators need a sufficient time to review the student

work. This requires the course instructor to allow enough time for evaluation between the submission of the student papers and the return of these works to the students. In addition, students must be taught how to cite sources in such a manner that will enable the instructor to determine the source and the quality of the information. If, however, adequate time and resources are available, citation analysis provides a powerful tool to improve information literacy skills among students.

In this chapter, we presented a case study on how citation analysis was utilized at Georgia State University to evaluate, revise, and develop a teaching approach to best meet the needs of students in an elective finance class. Sustained efforts and a committed partnership between the finance professor teaching this international finance course and the business librarian resulted in outstanding information literacy skills developed by undergraduate and graduate business majors. The citation analysis assessment provided unexpected insight into the research methods students employed. It also highlighted weaknesses in the approach students used. In addition, citation analysis allowed us to evaluate our own teaching methods. Being able to recognize areas in which students failed to achieve the desired results enabled us to identify areas for potential change in our instruction methods. Once the change was implemented, we were able to use citation analysis to evaluate the effectiveness of the new teaching approach.

Overall, citation analysis assessment enabled us to perfect our instructional approach. In addition, the quantitative data measuring the success of our effort allowed us to demonstrate to the other instructors at the College of Business the need for greater opportunities to develop students' information literacy skills. These are just a few of the benefits we discovered in using citation analysis. Appendix 1.2 provides additional ways in which citation analysis may be used to improve information literacy instruction. We hope others will be inspired to utilize this assessment technique in one of its many diverse applications.

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Appendix 1.1. Guidelines Used in Evaluating Citations within the Paper**Quality of Sources**

Using a five-point scale, the use of recommended sources or those available through the library should rank higher than those that were not included in the instruction session. This indicates that the students retained knowledge of the tools discussed in the information literacy session or utilized the learning aids that were distributed in class. The information literacy session does, however, emphasize the evaluation of Web-based resources. If a resource was not recommended or available through the library Web site, such a resource should be examined to determine level of authority and appropriateness for the paper. If that resource proves to be reliable and appropriate to the content of the paper it should be ranked at the same level as any recommended resource and other tools available through the library.

Variety of Sources

A sufficient number of sources for the length of the paper should be listed in order to receive a five. Broadly, the number of sources listed should exceed five unless there is evidence that the paper topic required few sources to make a strong case for the thesis of the paper. These sources should present different perspectives. To illustrate, the company's annual report should be complemented with information from independent analyst reports, market research reports, substantial news articles that are not based on press releases, or other sources not published by the company itself. Within the paper, evidence should indicate that each of these sources was used. If one source dominates the bulk of the paper, the paper should receive a lower score.

Citation Format

A consistent use of a citation style (either an established style or a homegrown style) throughout the paper will result in a score of five. Homegrown styles should provide enough information for the reader to evaluate the quality of that resource and enable the readers to easily locate the resource. Papers with minor inconsistencies should receive a three or four depending on the severity of the inconsistencies. Limited attempts to document sources should result in a one or a two. No citations should receive a zero.

Utilization of Information

If it is evident the entire paper is plagiarized, the score is listed as zero as the student has not presented any work that can be evaluated. Clear and blatant forms of plagiarism used consistently throughout the paper result in a one. Smaller and potentially accidental forms of plagiarism are given scores of two, three, or four depending on the frequency. These may include poor paraphrasing in which the student simply reversed the order of a sentence. For example, if instead of "the bear went over the mountain" the student wrote, "over the mountain the bear went" the evaluators would note this as a minor plagiaristic incident. No evidence of plagiarism will result in a score of five.

Appendix 1.2. Citation Analysis Assessment

- **Evaluate Instructional Tools:** Ursin, Lindsay, and Johnson used citation analysis to determine how frequently freshmen used the resource guides provided by librarians. This team reviewed papers from 21 sections of a freshman class and identified citations to resources recommended by the research guides. From this research the team learned that the resources listed in the guides were not being used even when the guides provided students with easy access to the resources (Ursin, Lindsay, and Johnson, 2004). The ability to confirm anecdotal evidence based on observations with quantifiable data enabled the research team to recognize a need to try new approaches and build new partnerships on campus.
- **Evaluate the Effectiveness of an Instruction Method:** In institutions that have extensive information literacy programs, Hovde asserts that it is possible to use citation analysis to observe what students are not doing and from there make assumptions regarding the quality of information literacy training collectively (2000: 5). This can create a control group that may serve as a baseline for future evaluative efforts. It can also alert the instruction team to weaknesses in the current model of instruction.
- **Compare Instruction Methods:** The studies conducted by Kirk (1971) and by Kohl and Wilson (1986) both used citation analysis to compare two instruction methods. Kirk compared a lecture-demonstration method to a guided exercise approach. Kohl and Wilson compared tool-focused versus cognitive strategy approaches to instruction. By teaching the same material in different ways to at least two groups of students, these researchers were able to determine which instructional method was more effective. In Kirk's study a significant difference in the impact of the instruction was not discovered. Kohl and Wilson, however, did find a difference. These types of conclusions, especially when conducted over time and with different sets of students, help provide guidance not only to librarians and course instructors at one institution, but to all instructors of information literacy.
- **Measure Impact of Changes to an Instruction Package:** Young and Ackerson measured (1995) the impact of adding three hours of instruction and access to a computer laboratory staffed by a librarian to the traditional 50-minute lecture style instruction at University of Alabama. The case study described in this chapter uses citation analysis to build a teaching package that best met the learning styles and needs of students completing a specific assignment.
- **Assess Library Collection and Services:** A study by Holly Heller-Ross (2002) used citation analysis to identify differences in the types of resources used by on-campus and distance learners. This enabled the library to measure the quality of the services and tools available to each group.
- **Understand Student Information-Seeking Behavior:** Several studies use citation analysis to understand how students are gathering information. These types of studies create awareness of student behavior and help librarians and teaching faculty alter instruction to influence this behavior in a more favorable direction.