

An Assessment of the Impact of Library Instructional Strategies on
Engineering Students' Information Literacy

Jeffrey McAdams, MLS (Co-Principal Investigator)
Assistant Professor and Engineering Librarian, J. Murrey Atkins Library

Rebecca Croxton, MLIS, PhD (Co-Principal Investigator)
Associate Professor and Head of Assessment, J. Murrey Atkins Library

October 16, 2017

Abstract

In support of UNCC's goals for student success and retention, this mixed methods project seeks to assess the impact of the current information literacy instructional program offered by J. Murrey Atkins Library on engineering students' abilities to critically evaluate and select credible and meaningful resources in their research and writing. Current trends in the literature suggest today's undergraduate learners are opting for quick, easy, and convenient alternatives to meet their information needs that do not include the library. This elicits cause for concern, as significant, positive correlational evidence suggests library utilization is closely associated with students' academic performance and university retention. This study will include multiple data sources that will be used to examine students' information literacy skills, comparing findings between those who have engaged with the library's information literacy instruction program and those who have not. The findings from this study will help the research and instructional staff at Atkins Library make improvements to their information literacy curricula and will be used to develop a replicable model for information literacy instruction that will promote student success and retention through graduation. Findings from this study will be disseminated locally, nationally, and internationally via professional presentations and a peer-reviewed published manuscript.

930000	Supplies	
942000	Computing Equipment	1380.00
944000	Educational Equipment	
951000	Other Current Services	
GRAND TOTAL		\$ 8030.00

Attachments:

1. Attach/provide a narrative that explains how the funds requested will be used.
2. Has funding for the project been requested from other sources? ___ Yes ___X No. If yes, list sources.

Budget Narrative

Four line items are being requested to support this SoTL project.

1. Graduate Student Salaries - \$2250

A graduate student will be hired in either late Spring or early Summer 2018 at a rate of \$15/hour for 10 hours per week over 15 weeks to help the research investigators collect, organize, and analyze data both quantitatively and qualitatively. The graduate student will also help the study investigators prepare a final written report, professional presentations, and will be involved in the preparation of a manuscript about the project.

2. Participant Stipends - \$400

This study will include a total of four student focus groups (2 per phase) comprised of 10 students each. As a participation incentive, the research team would like to provide each participant with a \$10 gift card to either Starbucks or Barnes & Noble.

3. Domestic Travel - \$4000

As part of the plan for dissemination of knowledge, the researchers are requesting funds to travel to and present at the Annual Conference of the American Society for Engineering Education in Salt Lake City, Utah from June 24-27, 2018.

Projected costs include:

Item	Cost per Person	Total Cost
Registration	\$850	\$1700
Airfare	\$450	\$900
Hotel	\$600	\$1200
Miscellaneous	\$100	\$200
Total	\$2000	\$4000

4. Computing Equipment (Software) - \$1380

As part of this study, the research team is requesting funds to purchase two educational user licenses for the qualitative analysis software, NVIVO Pro 11, at a cost of \$690/license.



October 13, 2017

Scholarship of Teaching and Learning Grants Committee
Center for Teaching and Learning
UNC Charlotte
9201 University City Boulevard
Charlotte, NC 28223

Dear SoTL Grants Committee:

I am pleased to offer my support for the SoTL grant proposal submitted by Jeffrey McAdams and Rebecca Croxton entitled, "An Assessment of the Impact of Library Instructional Strategies on Engineering Students' Information Literacy." The findings from this study will help to advance UNC Charlotte's goals for student success and retention by helping students learn to critically evaluate, select, and use credible and meaningful resources in their research and writing. This project is particularly robust by virtue of its placement within one of the university's Prospect for Success courses, designed to introduce students to foundational topics in a major discipline while equipping them for the personal and professional challenges they may face at the university.

While assessment of the library's information literacy curriculum is important in its own right, it is particularly timely as academic libraries across the country are working diligently to find the most effective ways to reach and support students in the rapidly evolving information landscape. I am confident that the findings from this study will be used to develop a replicable model for both information literacy instruction and its assessment that can be adopted at other colleges and universities across the globe.

I have great confidence in Jeffrey's and Rebecca's ability to manage this project. J. Murrey Atkins Library is fully committed to providing them with any support they may need to make it a success. Jeffrey is the library's Engineering Librarian and is a seasoned and innovative research and instruction librarian. Rebecca is the Head of Assessment for the library with significant experience in both library science and educational research methodologies. Together, this team

of researchers has the potential to make a powerful impact not only for information literacy teaching and learning, but for the overall success of our students at UNCC.

I enthusiastically endorse this project for SoTL funding and look forward to seeing what we learn.

Sincerely,

A handwritten signature in cursive script that reads "Anne Cooper Moore".

Anne Cooper Moore, PhD
Dean, J. Murrey Atkins Library

Project Narrative

A. Specific Aims

Overall purpose. In support of UNCC's goals for student success and retention, the purpose of this project is to assess the impact of the current information literacy instructional program offered by J. Murrey Atkins Library on engineering students' abilities to critically evaluate and select credible and meaningful resources in their research and writing. Current findings in the library and information science (LIS) literature suggest today's undergraduate learners are opting for quick, easy, and convenient alternatives to meet their information needs that do not include the library (Colón-Aguirre & Fleming-May, 2012; Denison & Montgomery, 2012). This elicits cause for concern, as significant, positive correlational evidence suggests library utilization is closely associated with students' academic performance (Goodall & Pattern, 2011; Wong & Webb, 2011) and university retention (Haddow, 2013; Mezick, 2015; Soria, Fransen & Nackerud, 2013, 2014). The broader project goal is to develop a replicable model for information literacy instruction. The American Library Association (2000) defines information literacy as a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information."

Specific objectives. This study has three primary objectives:

1. To assess the effectiveness of the information literacy instructional program that is offered to entry-level engineering students. Findings will help to identify where improvements in the curriculum may be warranted.
2. To use the findings to develop a transferable model for information literacy instruction and assessment.
3. To articulate the impact library information literacy engagement has on students' research and writing skills.

Research questions. Research questions include the following:

1. How effective are the engineering librarian's information literacy instructional strategies and tools in teaching students how to critically evaluate and select credible and meaningful resources in their research and writing?
2. Is there a difference in the types and quality of resources used by students between those who participated in elective information literacy workshops or activities and those who did not?

Project rationale. In today's information landscape, students have a "role and responsibility in creating new knowledge, in understanding the contours and the changing dynamics of the world of information, and in using information, data, and scholarship ethically" (ACRL, 2016). Librarians play a key role in helping students become competent in these skills by "creating a new cohesive curriculum for information literacy" (ACRL, 2016). As such, the engineering librarian at Atkins Library has implemented an information literacy curriculum specifically tailored for UNCC engineering students. This curriculum was developed in accordance with principles outlined in the social cognitive theory, which asserts that knowledge is constructed when individuals engage in activities, receive feedback, and participate in other forms of interaction in social contexts (Bandura, 2001). Thus, learning activities included in the engineering information literacy curriculum are designed to promote students' active engagement in and construction of their own learning, practices found to be conducive to learning (Anderson & Dron, 2011; Rovai, 2004).

The primary goal of this project is to assess the impact the engineering information literacy instructional program has on ENGR 1201 students' information literacy skills. ENGR 1201: Introduction to Engineering Practices and Principles I is a required, entry-level course for

engineering majors. The course is designated as a UNCC Prospect for Success course, designed to introduce students to foundational topics related to a major discipline, while helping to equip them for personal and professional challenges they may face at the university.

Impact on teaching and learning.

A key element of the mission of Atkins Library is to serve as “...center of intellectual life at UNC Charlotte, ... advancing the scholarly and creative endeavors of the University ... by providing exceptional collections, spaces, services, and technologies...” (J. Murrey Atkins Library, 2016). The library’s Research and Instructional Services (RIS) team plays a critical role in advancing this mission by helping students learn to search, read, think, and contribute in an engaged and iterative research process (J. Murrey Atkins Library, 2017). RIS librarians have developed a variety of instructional curricula for students and faculty, though their effectiveness lies in question. While findings in the literature suggest that students who engage with information literacy instruction offered by the library are more likely to engage with the library’s resources and be academically successful (Croxton, 2016; Haddow, 2013; Mezick, 2015; Soria et al., 2013, 2014), one must evaluate the effectiveness of his or her own teaching practice and refine accordingly. The findings of this study will not only help to improve the information literacy instructional curriculum offered by Atkins Library, but will also serve as an important contribution to the LIS and higher education teaching and learning literature.

B. Literature Review

In universities throughout the United States, student retention is a critical issue. The U.S. Department of Education, National Center for Education Statistics (2015) recently reported that 59% of first-time full-time students who began seeking a bachelor’s degree at a 4-year institution in fall 2007 completed the degree at that institution by 2013. The academic library is equipped to

play a critical role in engaging students in the university systems, thus having the potential to positively affect student retention. However, current trends suggest undergraduate students are turning away from their academic libraries in favor of more attractive alternatives for their information seeking (Colón-Aguirre & Fleming-May, 2012; Denison & Montgomery, 2012). While academic libraries have long been heralded as the heart of the university (Leupp, 1924), today's undergraduate learners are opting for quick, easy, and more convenient alternatives to meet their information needs that do not include the library (Colón-Aguirre & Fleming-May, 2012; Denison & Montgomery, 2012; Mizrachi, 2010).

This turning away from the academic library elicits cause for concern as significant, positive correlational evidence suggests library utilization is closely related to students' academic performance (Goodall & Pattern, 2011; Wong & Webb, 2011) and university retention (Haddow, 2013; Mezick, 2015; Soria et al., 2013, 2014). Despite efforts to improve information literacy and increase students' willingness to use the library, the efficacy of this work lies in question (Coulter, Clark, & Scamman, 2007; Detlor, Booker, Serenko, & Julien, 2012). Rempel and Cossarini (2013) noted that many students rely on Google for finding materials to support their research, despite the fact that these students have received library instruction that highlighted the value of using library resources. In a separate study, Colón-Aguirre & Fleming-May (2012) found that undergraduates do not find library instruction sessions relevant to their practical information needs and many students do not come away from library information sessions feeling fully prepared or willing to move beyond Google and into the library for conducting their information searches. In response to these trends, the RIS librarians at Atkins Library have developed an information literacy curricula that they believe will effectively teach students to become informationally literate, willing and able to competently and critically

evaluate, select, and ethically utilize the most appropriate sources available for their research and writing. It is the goal of this study to assess the effectiveness of these efforts, specifically for engineering students.

C. Methods

To address the study's research questions, a mixed methods design will be implemented at Atkins Library in cooperation with instructional faculty and students of the William States Lee College of Engineering. Mixed research and analysis is proposed for this study, as quantitative and qualitative data, when used alone, are insufficient to answer the study's research questions (Creswell & Plano Clark, 2011). A mixed design is further justified as it will seek triangulation of findings across multiple data sources (Green, Caracelli, & Graham, 1989).

Participants. Study participants will be students enrolled in ENGR 1201 during the Fall 2017 and Spring 2018 semesters. The engineering librarian currently teaches voluntary information literacy workshops and has also created a supplemental information literacy module in Canvas, both designed specifically for ENGR 1201 students. Participation lists from the information literacy activities and ENGR 1201 enrollment rosters will be used to create four comparison groups (Table 1).

Table 1: Research Study Groups

Group	Attended Information Literacy Workshop	Completed Online Information Literacy Module
1	Yes	Yes
2	Yes	No
3	No	Yes
4	No	No

Study Design. The study will be conducted in two major phases. During Phase I, data will be collected from students enrolled in ENGR 1201 during Fall 2017 and analyzed using assessment instruments that will be designed specifically for this study. During Phase II, data collected from students enrolled in Spring 2018 sections of ENGR 1201 will be analyzed using the assessment instruments that were refined at the end of Phase I.

Data Collection and Instrumentation. Data collected for this study will be primarily qualitative, while some qualitative data will be transformed into quantitative data to allow for statistical analyses. Data collection will occur towards the end of the academic semester (F17 and S18), after ENGR 1201 students submit their “Whole Life Concept Project” papers to their instructors for grading. The Whole Life Concept Project is the major research and writing assignment for the course. Data collection will occur via the following:

- **Source Evaluation Activity** - After submission of their Whole Life Concept Projects, students will be emailed a Google Form and asked to evaluate one source they included in their projects.
- **Whole Life Concept Project Paper - Citation Analysis** - The ENGR 1201 professors will share electronic copies of students' Whole Life Concept Project papers with the researchers for citation analysis.
- **Follow-up Focus Groups** - Individuals who meet specific parameters (e.g., attended/completed at least one information literacy activity OR did not participate in any information literacy activities) will be randomly selected and invited to participate in a focus group to discuss their research techniques and challenges.

Anticipated limitations. Success of this project is dependent upon the cooperation of the ENGR 1201 teaching faculty. While some engineering faculty have historically been inclined to

engage with library's instructional program, others have been less willing to do so. During Fall 2017, there is buy-in to participate in this project by select faculty members. It is expected that the success of and findings from Phase I will be shared with the ENGR 1201 teaching faculty, thereby positively influencing individuals who chose not to participate in Phase I to engage during Phase II. Students who elect to participate in the Phase I focus groups will be asked to provide suggestions for improving student participation rates during Phase II.

D. Evaluation Methods

Responses to the Source Evaluation activity and the Whole Life Concept Project papers will be collated and organized into groups as outlined in Table 1. The researchers will analyze both the responses to the Source Evaluations activity and the citation/works cited pages of the Whole Life Concept Project papers, looking for students' use of and understanding of the following, (1) selection of quality resources for research, (2) use of required citation style (e.g., Chicago Manual of Style), and (3) students' justification/rationale for selection(s) of sources for research purposes. Research findings will be compared across the four study groups using assessment instruments that will be developed as part of this study. Data analysis for this study will be primarily qualitative with some data transformed into quantitative data for statistical analyses, as outlined below.

1. Open-ended responses to the online Source Evaluation activity will be assessed in two ways: (1) citation format will be reviewed to ascertain students' use of and understanding of prescribed citation style (e.g., Chicago Manual) and (2) students' justifications for source selection will undergo thematic, categorical analysis.

2. The works cited pages of student papers will undergo qualitative thematic analysis plus secondary quantitative analyses in which qualitative items are categorized and frequencies calculated per given categories. Data analysis will include:
 - Reviewing works cited pages via a rubric developed for the study, assessing quality, quantity, and types of resources selected.
 - Thematic/categorical analyses of works cited pages.
 - Frequency counts based upon thematic/categorical analyses to allow for group comparisons.
3. Focus groups will be audio recorded and verbatim transcripts prepared. The transcripts will undergo categorical analysis until key themes emerge from the data.
4. Findings from each data analysis activity (source evaluation, citation analysis, and focus group) will be mixed for deeper analysis and summarization of findings.
5. Data from the Fall 2017 and Spring 2018 semesters will be merged and final analysis conducted using the newly combined dataset.

With the study findings, the researchers will be able to answer the two primary research questions of the study: (1) How effective are the engineering librarian's information literacy instructional strategies and tools in teaching students how to critically evaluate and select credible and meaningful resources in their research and writing? (2) Is there a difference in the types and quality of resources used by students in their research and writing between individuals who participated in elective information literacy workshops or engaged with supplemental information literacy online tools and those who did not? By answering these questions, the researchers will be able to determine whether adjustments to the current information literacy

curriculum offered to engineering students are warranted. This informational literacy curricula will then be packaged as a transferable model to be used at other libraries.

E. Knowledge Dissemination

Knowledge dissemination will occur locally, nationally, and internationally.

- Local:
 - Present a poster at the UNCC Center for Teaching and Learning showcase event for SoTL awardees.
 - Provide a formal presentation at Atkins Library, inviting library and engineering faculty and staff to attend.
- National:
 - Present findings at the 2018 Annual Conference for the American Society for Engineering Education and publish in the conference proceedings.
- International:
 - Publish a manuscript in a peer-reviewed journal that addresses information literacy in higher education. Target journals:
 - Journal of Information Literacy
 - Communications in Information Literacy
 - Journal for Academic Librarianship

F. Human Subjects

To ensure protection of human subjects, UNC Charlotte Institutional Review Board (IRB) approval will be obtained prior to study implementation. The IRB application was submitted to the IRB on October 12, 2017.

G. Extramural Funding

We are not seeking extramural funding for this project.

H. Timeline

Month/Year	Task
October 2017	Submit SoTL Grant Proposal
Phase I	
September & October 2017	Provide Information Literacy Workshops & Online Module to Fall 2017 ENGR 1201 students
November 2017	Collect data from Source Evaluation activity.
December 2017	Collect Whole Life Concept Project papers
January 2018	Organize data
February 2018	Develop evaluation tools
March & April 2018	Evaluate data using established tools
May 2018	Prepare summary report of Phase I findings
May 2018	Refine evaluation instruments as necessary.
Phase II	
January & February 2018	Provide Information Literacy Workshops & Online Module to Spring 2018 students
April 2018	Collect data from Source Evaluation activity.
May 2018	Collect Whole Life Concept Project papers
May 2018	Organize data
June & July 2018	Evaluate data using instruments refined at end of Phase I.
June 2018	Present at 2018 ASEE Conference
July 2018	Compare Phase I & Phase II findings.
August 2018	Prepare final project report

September 2018	Prepare poster presentation for SoTL Showcase.
October & November 2018	Prepare/submit manuscript to target journal.

References

- American Library Association. (2000). *Information literacy competency standards for higher education*. Retrieved from <http://www.ala.org>
- Anderson, T., & Dron. J. (2011). Three generations of distance education pedagogy. *International Review of Research in Open and Distance Learning*, 12(3), 80-97.
- Association of College & Research Libraries. (2016). *Framework for information literacy for higher education*. Retrieved from <http://www.ala.org/acrl/standards/ilframework>
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52, 1-26.
- Colón-Aguirre, M., & Fleming-May, R. A. (2012). “You just type in what you are looking for”: Undergraduates' use of library resources vs. Wikipedia. *Journal of Academic Librarianship*, 38, 391-399.
- Coulter, P., Clarke, S., & Scamman, C. (2007). Course grade as a measure of effectiveness of one-shot information literacy instruction. *Public Services Quarterly*, 3, 147–163.
- Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage.
- Croxton, R. A. (2016). *Undergraduate students and academic library utilization: A quantitative dominant mixed methods study of information seeking needs, preferences, and motivation* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (1858781586).
- Denison, D. R., & Montgomery, D. (2012). Annoyance or delight? College students' perspectives on looking for information. *Journal of Academic Librarianship*, 38, 380–390. <http://dx.doi.org/10.1016/j.acalib.2012.08.007>

- Detlor, B., Booker, L., Serenko, A. & Julien, H. (2012). Student perceptions of information literacy instruction: The importance of active learning. *Education for Information, 29*, 147-161.
- Goodall, D., & Pattern, D. (2011). Academic library non/low use and undergraduate student achievement: A preliminary report of research in progress. *Library Management, 32*, 159-170.
- Green, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 11*, 255-274.
- Haddow, G. (2013). Academic library use and student retention: A quantitative analysis. *Library & Information Science Research, 35*, 127-136.
- J. Murrey Atkins Library. (2016). *J. Murrey Atkins Library 2015-2020 strategic plan*. Retrieved from <https://library.uncc.edu/atkins/annualreports>
- J. Murrey Atkins Library (2017). *Library instruction*. Retrieved from <http://library.uncc.edu/atkins/foryou/libraryinstruction>
- Leupp, H. L. (1924). The library: The heart of the university. *Bulletin of the American Library Association, Papers and Proceedings of the Forty-Sixth Annual Meeting of the American Library Association, 18*, 193-197.
- Mezick, E. M. (2015). Relationship of library assessment to student retention. *Journal of Academic Librarianship, 41*, 31-36.
- Mizrachi, D. (2010). Undergraduates' academic information and library behaviors: Preliminary results. *Reference Services Review, 38*, 571-580. doi:10.1108/00907321011090737

- Rempel, D., & Cossarini, D. M. (2013). Communicating the relevance of the library in the age of Google: Improving undergraduate research skills and information literacy through new models of library instruction. *Nordic Journal of Information Literacy in Higher Education, 5*, 49-53.
- Rovai, A. P. (2004). A constructivist approach to online college learning. *Internet and Higher Education, 7*, 79-93.
- Soria, K. M., Fransen, J., & Nackerud, S. (2013). Library use and undergraduate student outcomes: New evidence for students' retention and academic success. *Portal: Libraries & The Academy, 13*, 147-164.
- Soria, K. M., Fransen, J., & Nackerud, S. (2014). Stacks, serials, search engines, and students' success: First-year undergraduate students' library use, academic achievement, and retention. *Journal of Academic Librarianship, 40*, 84-91.
- U.S. Department of Education, National Center for Education Statistics. (2015). *The condition of education 2015* (NCES 2015-144). Retrieved from [https://nces.ed.gov/ programs/coe/indicator_cva.asp](https://nces.ed.gov/programs/coe/indicator_cva.asp)
- Wong, S. R., & Webb, T. D. (2011). Uncovering meaningful correlation between student academic performance and library material usage. *College & Research Libraries, 72*, 361-370.