

Writing a research paper: students explain their process

Writing a
research paper

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Abstract

Purpose – This study aims to explore how students conceptualize the research process, describing in their own words the strategies they used, as well as the successes and challenges they encountered. Areas of review include: thesis definition; search strategies; quality, variety and depth of resources; and source evaluation and citation.

Design/methodology/approach – The study analyzes 76 essays written by undergraduate and graduate students, describing their research process. Quotations from the students' essays have been incorporated into the study results to provide a unique perspective from the researchers' own reflections on the processes and techniques they used to complete their research papers.

Findings – Many students encountered difficulties when writing a rigorous research paper, even though they had previously completed research assignments for other classes. There was a clear indication that instruction and support from librarians continues to be valuable, even for experienced students.

Practical implications – The students' reflections provide a better perspective on how students conduct their research for upper-level research papers and new insights on optimal timing for support services. The findings will be shared with faculty, along with strategies that librarians and faculty can utilize to improve students' research papers.

Originality/value – The essays reviewed in this study provide a unique personal perspective as students reflect on their own behaviors during the research process. This research offers an alternative approach to faculty and librarian assessments of student papers and research skills.

Keywords Research, Academic libraries, Students, Learning process, Information searches, Assignments

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This study examines the process that students undertake in developing research papers, described from the student's perspective. Students often experience difficulty in writing long research papers, particularly in identifying relevant materials for inclusion, such as books, popular or scholarly articles, government statistics and documents and information gathered from Web sites. Faculty often complain that students focus too heavily on using search engines such as Google and fail to use scholarly materials to support their research. This study examines essays written by students describing their research methodology and the challenges they encountered in writing their research papers. Areas of review include: search strategies; quality, variety, and depth of resources; source evaluation and citation; and growth in the research process. An analysis of these criteria will inform librarians and faculty on the areas where students need additional support to efficiently write papers citing credible sources.



Background

In 2008, the Monmouth University Library introduced Library Research Awards for undergraduate and graduate students. The Library Research Awards program recognizes students who demonstrate skill and creativity in the application of library and information resources to research papers completed in fulfillment of a course requirement. Each year, two award recipients are selected, and each is presented with a certificate and checks for \$250 at the University authors' reception and are cited in the University commencement booklet. In addition to rewarding successful information literacy achievements by students, these awards were created to highlight and promote the Library's resources and services to the university community.

Individuals enrolled as undergraduate or graduate students at Monmouth University are eligible to apply for the Research Awards. The Library publicizes the awards on its website and social media, as well as sending email announcements each semester to faculty and students. Students must have completed research papers of at least ten pages in length during the Spring, Summer or Fall semesters as part of their class assignments. The papers must contain some element of library research, with the use of primary and/or secondary literature to support a research thesis. In addition to submitting a copy of their research paper, each applicant for the research awards is required to write a 500- to 750-word essay describing their research process. In the award application package, students are instructed to incorporate elements of the evaluation rubric ([Appendix 1](#)) when describing their research process, including: topic development; search strategies; use of library services; selection, evaluation, synthesis and citation of sources; and evidence of growth and development of research skills. The essay describing the research techniques utilized by the student is measured against the rubric's 40-point scale by a three-person award review panel, and serves as the primary criteria in the selection of award recipients.

The impetus for this study came from the wealth of insights gained regarding the students' research process that were gleaned from reading the student essays. This perspective of evaluating researchers' needs from the viewpoint of the student conducting the research is valuable to librarians and faculty in developing support services that can help students successfully complete research assignments.

Literature review

A number of recent studies have used ethnographic methods to capture in-depth details of students' study and research habits, and use of library resources. By utilizing ethnographic techniques such as interviews, discussion, observations and journals, researchers are able to shed new light on students' research habits as described in their own words. These ethnographic studies provide an alternative perspective on the process used by students in conducting their research, as compared to data gathered in faculty assessments of student research papers.

Two anthropological/ethnographic studies conducted at the University of Rochester, looked at students' research practices, as well as faculty expectations of research assignments. The first study took place in 2004-2005, and a second study was conducted in 2011-2013 to see if student research practices had changed. [Dimmock \(2013\)](#) discovered that, in gauging faculty expectations of good papers, overall, faculty were satisfied with sources used by students for their research, but enumerated other areas

which were problematic: poor writing skills; inability to make a good argument; summarizing, rather than synthesizing sources; and a lack of critical thinking skills.

In a study of upper-division humanities and social science majors, [Head \(2008\)](#) explained that students reported using a hybrid approach to their research to compensate for their struggles to narrow down topics and being overwhelmed by the amount of information available. Over two-thirds of the students agreed that campus librarians were helpful when they needed to write papers. Subsequent national Project Information Literacy (PIL) studies interviewed sophomores, juniors and seniors attending multiple colleges and universities regarding their research habits and finding information. [Head and Eisenberg \(2009, p. 2\)](#) confirmed that even with the convenience of information available on the internet, students were still frustrated when conducting research. “Research seems to be far more difficult to conduct in the digital age than it did in previous time.” In a PIL study, [Head and Eisenberg \(2010\)](#) found that the most difficult step of research for students was getting started. Furthermore, defining a topic, narrowing it down and filtering through irrelevant results were also problematic for students.

[McGuinness and Brien \(2006\)](#) used reflective journals to learn how students coped with researching and writing academic papers. Initial anxieties were followed by numerous challenges that needed to be overcome, but culminated in a sense of achievement when students completed their papers. After watching students conduct searches for information, [Anderson and Sexstone \(2013\)](#) concluded that students utilize a “whatever works” approach, using multiple strategies and the Web in different ways to find materials. Research is often an iterative process of trial and error, as students build their knowledge on a topic with each step taken along the way. [George and Foster \(2013\)](#) found that there was no single model that could describe the undergraduate student research and writing process, rather that there was great variability in their approaches. They conclude that to write a good research paper, the student needs to be engaged and interested in the topic. This in turn leads to identifying better resources and obtaining assistance in finding answers and writing, and students are more likely to utilize the library and start their research earlier, resulting in better papers. Similarly, [Foster \(2013\)](#) found that students who are motivated and interested in their academic work can quickly build a knowledge base, identifying key authorities on their topics.

The ERIAL (Ethnographic Research in Illinois Academic Libraries) Project investigated how students completed research assignments. Utilizing several different qualitative techniques, the study used first-hand accounts and observations on how students conduct their research. “In general, students appeared to lack the methodological understanding required to conduct an effective search” ([Asher and Duke, 2012, p. 73](#)). Students seemed to lack even basic information literacy skills, such as choosing an appropriate database and then finding satisfactory search results, sometimes finding no results and other times being overwhelmed with the quantity of results. When encountering problems with their projects, the ERIAL study indicated that students did not seek assistance from librarians. [Miller and Murillo \(2012\)](#) observed similar results, where students rarely sought assistance from librarians during the research process, possibly because of their general success in using internet search engines to acquire information. They also found that students were more likely to seek assistance from professors with whom they had an established relationship and who were viewed as experts in their disciplines, than by asking librarians for help.

The literature also indicates that there are significant differences in research conducted by freshmen as opposed to upper-classmen. [Picard and Logan \(2013\)](#) initially explored the research process of freshman first-generation college students (2012) and then followed up with a second comparative study of college seniors. They found that seniors had developed a much more complex understanding of research. Seniors viewed research as an iterative process and were much more adept than freshmen at refining search strategies, utilizing bibliographies to identify additional sources and thoroughly evaluating resources during a more exhaustive search for materials. Seniors were more self-sufficient in their research, but were also more likely to seek assistance from librarians when encountering problems, particularly in using databases and refining search terms. [Strong et al. \(2013\)](#) found that students' growing maturity (academic, social, emotional and physical) and developing closer relationships with faculty, librarians and their peers led to greater success as they made the transition from freshmen to college seniors.

In addition to the aforementioned ethnographic studies, quantitative work has been conducted by PIL and OCLC to measure college students' perceptions of the value of library resources and assistance provided by librarians. An [OCLC \(2010\)](#) report found that the majority of college students begin their information searches using search engines. While search engines offer speed, convenience, reliability and ease of use, 43 per cent of college students believe that library sources are more trustworthy than search engines. However, students seem to trust their own judgment when determining the credibility of sources they found on the internet, as 93 per cent utilize search engines to find information online, 88 per cent use Wikipedia and only 57 per cent use the library Web site. Students did acknowledge the value of libraries, with 56 per cent using library materials and 24 per cent querying a librarian to cross-reference information sources. Students asking librarians for assistance were overwhelmingly (90 per cent) satisfied with their experience and 80 per cent agreed that the librarians added value to their search process. Similarly, findings of a PIL study (2010) also revealed that students had a strong dependence on search engines for research, but found that a significant number (88 per cent) also used scholarly research databases for course-related research to access credible, in-depth information, as well as to meet instructors' expectations. The PIL study found that one-third of students sought assistance from librarians.

Methodology

This study was conducted at Monmouth University (MU), a private, mid-sized residential institution located in West Long Branch, New Jersey. The University has an enrollment of 4,600 undergraduate and 1,700 graduate students, offering 32 undergraduate and 23 graduate degree programs and a doctoral program in Nursing Practice. A research project application for gathering survey data from human subjects was submitted and approved by the MU Institutional Review Board (IRB).

A total of 76 essays submitted for the MU Library Research Awards during 2008-2015 were reviewed for this study. A content analysis of the essays was used to cluster similar research terminology used by the students to address the components of the award's evaluation rubric, such as: keywords, search strategies and evaluation. In addition, references cited in the research paper bibliographies were analyzed by source type (books, articles, Web, media, etc.) to determine the breadth of materials reflected in the students' research.

Quotations from the essays have been incorporated into the study results to provide insights from the students' self-reported reflections on the processes and techniques they used to complete their research papers.

Respondents

A profile of the 76 students who applied for MU Library Research Awards, shows that 57 per cent of the students wrote research papers for history/anthropology (35 per cent) or English (22 per cent) classes. The remaining papers were distributed across courses offered by 11 other departments, including: art, business, communication, criminal justice, education, health, nursing, political science, psychological counseling, psychology and social work. The breadth of this data sample is unique in its multi-disciplinary perspective on students' research.

The majority (68 per cent) of the award submissions were prepared by undergraduate students, of whom 39 (75 per cent) were seniors. Because the Library Research Awards require that research papers are a minimum of ten pages in length, most papers were written for upper-level or graduate courses. Many of the submitted papers were written as thesis papers, or fulfilled requirements for senior seminars. Only four, first- or second-year students submitted applications. A total of 24 graduate student papers were reviewed in this study. As a result, essays reviewed for this project were written by students who were more experienced researchers and approached their research in an academic manner, as compared to first- or second-year undergraduates who might take a novice approach to research papers.

Study results

Students began their research projects with varying degrees of comfort. Time spent on research papers varied dramatically from a few weeks, to seven months to develop a proposal and complete a graduate thesis project. Simply beginning a long research paper or thesis project was a challenge for many undergraduate students. A senior English major commented, "The idea of an eight to ten page paper is always intimidating; no matter how many times I've had to write one before". Students conveyed their anxiety in writing a research paper as: "a daunting task", "overwhelming", "arduous process" and "incredibly intimidating". Students experienced emotions such as: "immense trepidation" and being "frightened".

Several students mentioned building on research skills learned during previous classes, as well as the benefits of library instruction sessions that were embedded in courses. "Makes sense to use all previous knowledge learned during your college years to lead up to a senior research paper". However, many students still encountered problems when writing longer, more rigorous research papers, even though they are upperclassmen with previous research assignments completed for other classes. Fortunately, students used a number of avenues to get assistance from professors and librarians during their research. In addition to seeking assistance at the reference desk when they encountered problems, students noted the benefits of attending library instructional sessions. One student declared, "An instruction session was fundamental to my academic career". Research guides created by librarians were also mentioned as a good starting point for their research with links to credible sources and relevant subscription library databases.

A number of students mentioned that scaffolded research assignments allowed them to progressively improve their research skills throughout the semester and receive

intermediate feedback from professors. For example, one individual explained how an English professor broke down the research process into multiple steps, each building on prior work:

- review the literature and develop a research proposal;
- create an annotated bibliography;
- deliver an oral presentation; and
- submit a final paper.

The student commented that, although they initially did not like the additional step of creating a bibliography, it proved to be extremely useful in critically evaluating resources for inclusion in the paper. Several other students mirrored this sentiment of using the annotated bibliography as a tool for categorizing sources and assessing their relevance to their research topic. Furthermore, feedback received from instructors helped students to modify their topics or search strategies if necessary.

Topic selection

When choosing a topic for their research papers, students initiated the research process by brainstorming possible paper topics, drawing on their textbooks, syllabi and previous classes. Many students mentioned exploring an idea that is “interesting” and they are “passionate” about. One student explained:

Since this topic was obscure, I had to use a variety of search terms to find anything of use. This likely made me a more thorough researcher because now I will use these techniques for future papers. In the past, I might have just switched topics if I could not easily find what I wanted, but this topic seemed so interesting to me that I refused to switch.

The first step many students took in formulating a thesis for their paper was to identify a broad topic and then to dissect it into several theme areas. Collecting general background research helped to develop a focus for the paper. Several students mentioned identification of experts in the field and reviewing their work to provide perspective for the research. Other students looked for “holes”, “gaps” or “unsolved issues” in the literature or “questioning the analysis of an expert” as a criteria for identifying potential research topics. A psychology student with a quantitative research component to his research noted, “First come up with reasons why the study is justifiable, has not already been done, and is worth studying to begin with”.

After reviewing information on their topic, most students mentioned developing a “working thesis” statement that contains the focus of their research and explains the approach the author takes in analyzing the topic. An overall consensus among students was that thesis statements must be flexible and need to be adjusted as the researcher writes their paper and new material is uncovered. One student commented that, “I believe it [thesis] changed weekly throughout my research”. As a result, students realized that research is an iterative process, not a longitudinal one and adjustments should be expected along the way.

Searching

The modification of thesis statements led to numerous revisions of search strategies, “Being that this is a large project with an endless amount of approaches, I frequently changed my search strategies as my project description changed”. The majority of students found it

necessary to modify their search strategies multiple times when looking for relevant articles in the library's subscription databases. None of the students mentioned collecting adequate results in their initial searches, but many noted that varying the arrangement and wording of search terms could make a significant difference in producing the desired results. While the majority of students mentioned using library databases, most undergraduate students referred to vendors such as EBSCO and ProQuest, indicating that the searches may have been in general, multi-disciplinary databases or students did not differentiate between the various databases they explored. A relatively small number of students mentioned specific databases, such as JSTOR, PsycARTICLES and Business Source Premier, to find articles specific to their discipline. Oftentimes, these databases were selected because they had been used in previous research projects or were included in a librarian's research guide on their topic.

Students found that expertise with search terms developed as more sources were reviewed and they became more conversant with their topics. In discussing her approach to searching, one student explained:

Once I found an article related to my topic, I was provided with more terms that would be adequate for my search. First articles were more broadly linked to my topic, they helped me find terms that brought me to more specific articles.

Students also realized that the more specific their search terms, the better the results. Similarly, increasing specificity by combining search terms yielded more useful results, "The Boolean search is a thing of wonder; it takes only patience to hit literary gold". Many students mentioned that the references from scholarly articles, particularly those written by experts in their fields, yielded a wealth of additional citations which they reviewed for inclusion in their papers. At times, students discovered completely new search terminology, "The most useful search term was one which I had never heard of prior to writing this paper".

The challenges of developing effective search strategies were further exacerbated when working on interdisciplinary topics, when students were unfamiliar with terminology and needed to identify sources from several fields. Students observed that search terms vary by discipline and need to be adjusted depending on the database being utilized. "Thinking outside the box" was a successful approach to identifying search terms when initial queries did not result in appropriate materials. Some students turned to librarians and instructors for assistance with selecting keywords when they encountered problems with their research results, while others mentioned using a database thesaurus to identify better terms, "One of my favorite, most useful tools is the thesaurus". Another student mentioned the benefit of having the databases generate useful search suggestions, even if the query contained misspelled words or typographical errors.

The use of limiters during the database search process was mentioned by many students as a way to further refine search results. Several students noted that they only learned about limiter tools when asking for assistance from library staff. The most commonly mentioned limiters were "full text" and "peer reviewed". Moreover, limiting results by date of publication was frequently used to select the most recent materials published on a topic.

While the majority of students discussed searching for source material in subscription library databases, several students also discussed the use of books. One student offered tips on searching the library catalog for books, "I discovered small, but

important tricks when searching the library catalog to get desired search results. E.g. eliminate the word 'the', check by title and check with keywords". There were also comments on optimizing material gleaned from books, "Never let a book's title fool you, look through the contents".

The fact that a significant proportion of student research is done online also led to some trepidation when looking for books in the library and asking for assistance:

At first, I was apprehensive to use a printed book, especially since I was not comfortable with how to find appropriate books and how to locate them in the library. As I mentioned, multi-subject databases were my search engines of choice, so it was really out of my comfort zone to have to find a printed book.

Until this point, I simply bought printed sources that I needed for research, partially because I assumed using the library catalog was complicated, and partially because I didn't want to ask for help doing something I learned in the fifth grade.

I was mortified at having to ask for help over such a seemingly simple task, and also quite relieved to see how easy the process [using the catalog] was.

Another challenge students mentioned was information available in unfamiliar formats, such as microfilm and microfiche, resulting in the students' feeling intimidated. However, if the source was important, students turned to reference assistance for help in using the equipment to view these materials.

While many students experienced challenges during their research, several students conveyed their knowledge of utilizing the library and were astonished that their peers felt uncomfortable, "I was baffled to hear many of my classmates had not either been to the school library, or were unsure how to utilize the plethora of available resources offered". A feeling of satisfaction was expressed by one student when they were able to assist their peers in finding materials in the library. Several students expressed familiarity with the Library, but mentioned the Library's online research guides as their most helpful resource, highlighting the best databases and websites for a discipline or a specific course.

Outside resources

Virtually all research conducted by students was done either physically in the University Library or electronically in the Library's subscription databases or on the internet. Only two students mentioned traveling to archives collections to access very specialized information on their topics, by visiting the National Park Archives in Hyde Park, New York and the Baseball Hall of Fame in Cooperstown, New York. Fortunately, many educational institutions and organizations are digitizing special collections, making them easily accessible to the public electronically. Several students discovered such digital collections which provided uncommon details for their research topics, including transcripts, maps and a digital photo gallery.

Students' satisfaction with interlibrary loan (ILL) services was very high, affording access to worldwide resources. ILL services were used frequently by students to order articles unavailable in full text, as well as relevant books identified via WorldCat searches.

Quality, variety and depth of sources

A total of 1,275 sources were cited in the 76 research papers, or an average of 17 references per paper. As illustrated in [Figure 1](#), scholarly journals (53 per cent) represented the most heavily used type of source material, followed by books (28 per

cent). Web sites cited in the students' bibliographies represented a variety of materials, including: images, music, broadcasts, videos and interview transcripts. Upon examination, the type of sources cited appeared to vary by discipline. History and English papers predominantly used scholarly articles and books. On the other hand, Communication and Business used more current, popular articles, as well as Web sites. In general, government documents seemed to be an underutilized category of resources, with only a few students citing government-produced data and reports. The rich collection of statistics produced by government agencies could have been incorporated more frequently into research papers to support topics.

Many students initially selected articles based on abstracts when reviewing results from library database searches, and downloaded full-text documents for subsequent retrieval and closer perusal. Some students were instructed by their instructors to utilize only scholarly, peer-reviewed articles. One student noted, "It was crucial to find sources that were peer-reviewed and scholarly". Other students indicated that it was valuable to pair scholarly material with a popular article to present a broader point of view. Selection of materials for review was primarily based on whether the article or book supported the research thesis, credibility of the content and its relevance and significance:

I found scholarly articles challenging to read, but force the reader to think critically about the research topic, and find a way to relate to one's own ideas.

The process of evaluating them for relevance and validity was the most challenging, yet also extremely rewarding. Every time I discovered something new it was like opening a whole new door.

In several cases, students noted difficulty in determining the reliability of sources, particularly on topics outside their discipline. Some of the other considerations mentioned included, "noting bias in some sources", "brought a new perspective to my own", "selected articles from respected journals in the field" and determining the "reputation of the anthropologist or journalist writing the piece".

Students also discussed the benefits of incorporating both primary and secondary sources into their research to present multiple perspectives on a topic, "while primary sources present first-hand knowledge or an inside view of a particular event, secondary sources serve as interpretations of primary sources". Several students noted the rich materials they uncovered through historical newspapers, oftentimes revealing events not mentioned in secondary sources and providing valuable evidence and insights from eyewitness accounts that were in sharp

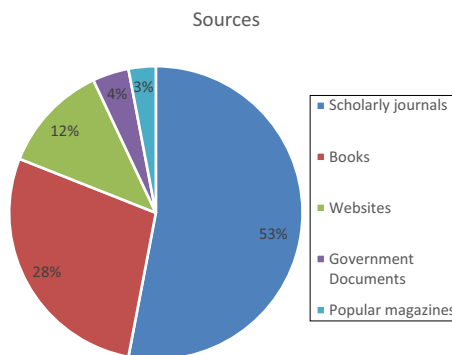


Figure 1.
Sources

contrast to historical accounts of events. Primary sources also provided a unique perspective “through the eyes of a person from that time period” and “insight into the emotional state of Americans”. In addition, several students were particularly excited about finding transcripts of interviews and letters of correspondence that revealed personal opinions and enriched research papers by adding a human perspective.

Lessons learned by students

A final component to the essay rubric asked for students’ reflections on what they had learned about the research process and how this could be applied to other projects. Although many students were intimidated at the start of their research, most reflected on the process in a positive light and spoke of the confidence they gained in mastering the assignment. One student offered, “I learned that with proper research, no argument is impossible”. Students experienced a robust growth in their skills and newly acquired confidence in their ability to conduct research, compared to the trepidation they felt at the beginning of their projects:

I feel that since gaining these skills, I can unearth information that is much more valuable and scholarly that makes my work stand out from others who simply used an Internet search engine with a few key terms.

A majority of the students indicated that they learned that research is an iterative process, with adaptations necessary along the way to cultivate a successful paper. “My research for this particular paper is comparable to a puzzle; I had to find bits of information to make sense of in a larger picture”. There was also a realization that “research is an ever-evolving process that allows for continual learning”.

Several students revealed that the research process encouraged them to find their own perspective on the topic and add to the knowledge which may have been studied previously by others. “All I had to do was find my own strong, clear voice, and get writing”, and “As a graduate student, I found that I am required to become the scholastic voice on a topic, not just reiterate what has already been written”.

For many students, these long papers were the culmination of academic studies and the skills learned could be applied to their future careers. For other students, the skills sharpened by practicing during the research process would influence their work in other classes and potentially lead to submission of the papers for publication in their discipline. Students clearly increased their repertoire of skills during their research. One student aptly summarized the process of creating a research paper:

Research is meant to encourage students to utilize critical thinking and analytical skills and if in the end of conducting research students are able to dissect and evaluate the most critical aspect of the topic they researched, they have done a successful job in researching a topic.

Discussion

The findings of this study are closely aligned with several earlier studies of college seniors (Anderson and Sexstone, 2013; Picard and Logan, 2013; Strong *et al.*, 2013). Students rely on previous research experiences to add to their knowledge base, as well as utilizing the relationships that they have developed with faculty and librarians in seeking assistance when they face challenges in their research.

Although virtually all of the essays analyzed in this project were written by experienced researchers, several differences should be noted between undergraduate and graduate students. Graduate students were clearly more confident in writing research papers, particularly in their quicker selection of topics and utilization of advanced search strategies. This higher degree of confidence might be attributed, in part, to more self-reported mentions of collaboration with faculty during the research process. In fact, graduate students usually work with faculty over a period of two semesters on their thesis projects and receive ongoing feedback. As graduate students, they had a stronger knowledge base about their disciplines and were also more cognizant of the key authors and relevant research databases necessary for retrieving source material on their topics. By comparison, the journey for undergraduate students differed, as they more commonly reported lack of confidence and initial anxiety when they began the process of writing their research papers. For many students, this was their first long research paper, and, as exemplified by one student, they were not sure they could even write ten full pages on one topic. Undergraduate essays frequently included explanations of how students selected their topics after reviewing previous coursework and conducting extensive background research prior to narrowing down their focus. Graduate students seemed to select their topics quickly, based on disciplinary interests they had developed over time. However, the growth both groups experienced and the sense of achievement upon completion, closely echo the findings of [McGuinness and Brien \(2006\)](#) who also used the students' own reflections to gain insights on the research process and evidenced ultimate pride in their work.

The results of this study found that identification of keywords and developing search strategies were the most challenging aspects of research, particularly for undergraduate students. Similar to the findings of previous studies ([Head, 2008](#); [George and Foster, 2013](#); [Picard and Logan, 2013](#); [Anderson and Sexstone, 2013](#)), most students realized that research is an iterative process and may require multiple approaches to identify the best keywords in order to unveil appropriate sources. Students were prepared to conduct exhaustive searches to identify comprehensive information, particularly if there was a personal connection with the topic. This included adjusting search terms until satisfactory results were achieved, utilizing advanced search techniques, searching multiple databases and submitting ILL requests when materials were not available at the MU Library. Overall, graduate students described more refinements in their search strategies, defining specific terms they used and identifying discipline-specific research databases. On the other hand, undergraduates were more likely to use a trial and error approach to searching and cited database vendors, rather than specific databases they used. It follows, that these research challenges present an opportunity for librarians to provide further training to students on discrete tasks in the research process, such as developing effective search queries, using advanced search tools and critically evaluating sources.

While students frequently mentioned library instruction in their essays, [Head and Eisenberg \(2009\)](#) found that the value of instruction was perceived the highest when the lessons learned could be practiced immediately, on a "just-in-time" basis. Applying search techniques months after an instructional session were not easily recalled. Several undergraduate MU students noted the benefits gained from instructional sessions and were aware of, and actively used librarian-created research guides during their research. On the other hand, none of the graduate students mentioned instructional sessions, but mentioned asking for help from librarians more often than undergraduates when they were unsure where materials were located in the library. Therefore, library instruction

sessions timed to occur just after students have narrowed down topic ideas would be optimal, particularly in combination with one-on-one consultation between the librarian and students on their individual topics. To provide support to students who do not attend instruction sessions with their classes, subject librarians should extend outreach to invite students to participate in research workshops or schedule one-on-one meetings for personalized advice on topic selection, searching and evaluation.

Although project assignments were not reviewed as part of his study, a number of students noted that professors limited sources to peer-reviewed, scholarly materials. In some cases, students would have benefited from Internet sources, especially digitized collections. Rather than limiting sources to scholarly articles, emphasis should be placed on helping students evaluate sources more meticulously to take advantage of a wider variety of materials.

There are several limitations that should be noted regarding this project. The study sample was relatively small and conducted at one institution, predominantly with upper-level and graduate students. A more diverse sample is needed to generalize these findings. According to previous research conducted by the author (Dubicki, 2013), 77 per cent of four-year college faculty require that students write short research papers (1-5 pages) requiring research, while a smaller group (64 per cent) assign research projects requiring more than six pages. This study analyzed papers which were at least ten pages in length, predominantly completed for upper-level courses. Expanding the project with a comparative study of shorter research papers would test whether the same challenges are encountered, and provide insights on the experiences of less-experienced, freshmen students in conducting research.

Conclusions

This project sought to explore how students conceptualized the research process, describing in their own words the strategies they used, as well as the successes and challenges they encountered. The students' reflections have provided librarians at MU with a better perspective on how students conduct their research for upper-level research papers and new insights on optimal timing for support services. While we anticipated that students would need to build their skills over the course of conducting their research, we were surprised at the extent to which experienced researchers still felt trepidation at the beginning of the process and struggled with some basic research skills.

One immediate goal is to disseminate the findings of this study to MU faculty, building an awareness among faculty regarding the students' reflections on research and the challenges they encounter. The findings will be supplemented with a list of strategies that faculty can utilize to improve students' research papers, such as:

- collaborating with librarians on assignments;
- scaffolding assignments for early intervention of any problems that may arise;
- bringing classes to the library for instruction; and
- encouraging students to meet with librarians for one-on-one coaching.

A number of ideas have also been identified by this study which can be incorporated into library instruction and outreach activities, particularly to graduate students. A review of MU instruction delivered over the previous academic year revealed that 75 per cent of sessions were presented to first- and second-year students when students are conducting research on

general topics. Only 10 per cent of instruction was provided to graduate students. Keeping in mind the benefits of “just-in-time” instruction, where students can immediately apply techniques learned, more emphasis should be placed on introducing upper-level and graduate students to discipline-specific resources, and offering one-on-one consultations to provide topic-specific coaching on search strategies. During instruction, a review of the research process and emphasis on the iterative nature of research may prove beneficial in managing expectations of the students and reducing the anxiety experienced by many students. Tips on selecting topics and narrowing the scope of the paper would prove especially useful in setting students on the right track. Navigation of the physical library was clearly warranted based on the number of students experiencing difficulty with finding books. Teaching advanced search strategies using Boolean operators and limiters to refine search results was also an area where many students were challenged. Discussing evaluation criteria for both articles and Internet sources would also provide students with more certainty on what should be considered credible information, going beyond whether the source just addresses the topic of the research paper. Because this is an extensive list of material to cover during a single instruction session, the use of flipped classroom techniques with students reviewing tutorials or completing exercises prior to attending library instruction may prove effective. Furthermore, the development of online research guides tailored to support course assignments, as well as a research toolkit available to all faculty and students, supporting instructional sessions and independent researchers may be particularly useful.

In addition to providing support for research assignments and the tangible items such as computers, printers and books, many students described the Library as a “sanctuary” during their research. The Library offers an environment with a calming atmosphere, and a physical location where students could read and write without distraction. Even with the ubiquity of online access to many materials, the library as a place to conduct research remains vital to students in performing their academic work.

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Further reading

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Appendix 1

Evaluation criteria for MU library research award essays

The **essay** describing research techniques used will be given the most weight in the judging process. The essay should demonstrate the applicant's: identification of sources consulted, description of searching process and evidence of learning. Submissions will be judged by a three-person panel on a 40-point scale. Up to ten points will be awarded for each of four categories. Successful projects will:

- Make extensive, creative use of library services, resources and collections in any format.
- Exhibit the ability to select, evaluate, and synthesize library resources and to successfully use them in the creation of the research paper.
- Show evidence of significant personal learning and development of research skills (Table AI).

Evaluation category	Developing (1-3 points)	Competent (4-6 points)	Exemplary (7-10 points)	Total points
Search strategies	<p>No focused research topic or thesis statement is stated</p> <p>Does not identify appropriate keywords</p> <p>Only one search tool is used to locate all resources</p> <p>Search strategies omitted or very general</p> <p>Limits search to general tools (e.g. Academic Search Complete or Google searches)</p> <p>Does not identify appropriate finding aids and tools for given context</p>	<p>Research topic or thesis is present, but not focused</p> <p>Identifies appropriate keywords</p> <p>At least four different types of search tools are used to locate resources</p> <p>Basic and some advanced search techniques used</p> <p>Identifies basic or general finding aids and library services such as librarians and reference sources, but omits other appropriate aids and services (e.g. Special collections, interlibrary loan or research guides)</p>	<p>Research topic or thesis is focused and clearly stated</p> <p>Identifies appropriate keywords</p> <p>Variety of search tools are used such as library catalogs, electronic databases, subject directories, and web search engines</p> <p>Search strategies explicitly described, including challenges, information gaps, and responses to failure</p> <p>Advanced search techniques are demonstrated</p> <p>Displays dynamic knowledge of finding aids and library services</p>	
Quality, variety and depth of resources	<p>Inadequate number of sources</p> <p>Does not use library resources</p> <p>Coverage of the subject matter in sources is insufficient</p> <p>Sources are not considered scholarly</p> <p>Does not use subject-specific resources (e.g. specialized encyclopedias, subject-specific databases, etc.)</p> <p>Few sources are appropriate for college-level research</p>	<p>Uses an adequate number of sources</p> <p>At least one library resource is used</p> <p>Some sources present in-depth coverage of the subject matter</p> <p>Some scholarly articles are used</p> <p>Only one subject specific resource is used (e.g., specialized encyclopedias, subject specific databases, etc.)</p> <p>Most sources are appropriate for college-level research</p>	<p>Uses a diverse and prodigious number of sources (print, online, books, magazines, newspapers, websites, primary sources, popular, scholarly)</p> <p>Multiple library resources are used</p> <p>Sources present in-depth coverage of subject matter</p> <p>Two or more subject specific resources are used (e.g. specialized encyclopedias, subject specific databases, etc.)</p> <p>All sources are scholarly</p> <p>All sources are appropriate for college-level research</p>	

(continued)

Table AI.
Evaluation rubric

Table AI.

Evaluation category	Developing (1-3 points)	Competent (4-6 points)	Exemplary (7-10 points)	Total points
Source evaluation and citation	<p>Sources do not present information that supports the thesis</p> <p>Does not identify criteria for evaluating sources</p> <p>Utilizes only sources that are consistent with original thesis, no discussion of conflicting information</p> <p>Sources are not adequately given attribution</p> <p>Sources not cited in standard and consistent way</p> <p>Student's research process shows no growth</p>	<p>Most sources present information that supports the thesis</p> <p>Criteria for evaluation of sources is incomplete or unclear</p> <p>Discusses differing positions on topic</p> <p>Sources are used ethically</p> <p>Sources cited in standard format but contain errors or some missing elements</p>	<p>All sources present information that directly supports the thesis</p> <p>Explanation of evaluation techniques is given</p> <p>Describes efforts to incorporate differing positions</p> <p>Sources are ethically and effectively used to support thesis</p> <p>Consistently provides accurate, complete citations to sources in format/style appropriate to the discipline</p>	
Growth in the research process	<p>Sources not cited in standard and consistent way</p> <p>Student's research process shows no growth</p>	<p>Solid understanding of library research and student's research process shows some growth</p> <p>Reflections on learning are mentioned</p>	<p>Student's research process shows a solid understanding of library research and indicates significant growth</p> <p>Reflections on personal learning are defined and effect on future research is noted</p>	