"In the Greater Context of the Field": What Undergraduate Reflections on the Research Process Tell us about Information Literacy

Madelaine Vanderwerff
Sara Sharun
Christopher Thomas

Abstract

This study examines research practices of undergraduate students, as described in reflective essays submitted in applications to a Library research award. Thematic analysis of 24 student award essays identified three strong themes in student reflections on their research experiences: Students experienced research as a social process, made meaning closely tied to disciplinary ways of knowing and practicing, and underwent transformation through the research process. Through a discussion of these themes, the authors highlight implications for information literacy instruction and suggest this instruction be connected more strongly to disciplinary practices in order to develop information literacy in undergraduate students.

Introduction

The discourse of Information Literacy (IL) instruction in higher education often describes the purpose of teaching IL and critical thinking as developing students' metacognitive abilities and lifelong learning skills.[1] However, meaningfully assessing and evaluating the evidence of that learning and development is an ongoing challenge. Much of what librarians have as evidence of student learning comes from snapshots of skills, attitudes, and knowledge from in-class assessments which often assess the impact of IL instruction sessions more effectively than actual student learning.[2] IL assessment is commonly quantitative in nature, which can measure what students can do and how well they can do it, but provides

This article first appeared in *portal: Libraries and the Academy*, 24:2, 2024, 405-426. Reprinted with permission by Johns Hopkins University Press. https://doi.org/10.1353/pla.2024.a923712

limited information to help librarians understand students' information behaviors and experiences of research, or the larger context in which they perform that research.

Much rarer are qualitative librarian assessments of deeper learning that might be evidenced in student essays and other finished research products that are separate from a one-shot IL session or course. Librarians seldom have access to these finished projects for assessment or analysis, which can potentially provide deeper evidence of student learning.[3] Research assignments alone often do not allow instructors to access and assess learners' feelings and attitudes, changes in which are important learning outcomes and a common goal of IL instruction. Indeed, some of the *Association of College and Research Libraries* (ACRL) Framework's threshold concepts, such as "searching as strategic exploration" and "research as inquiry" are difficult or impossible to assess from research products without a reflective component.[4] However, research logs, journals and other artifacts of student reflections on the research process are valuable information sources for librarians and other instructors who teach research.[5] This type of evidence of learning is especially beneficial for librarians whose information literacy instruction is primarily in the form of one-time workshops or individual research consultations. Assessing students on their process instead of their product through reflective activities can be more instructive by uncovering the student experience -- not only the cognitive tasks but also the emotions, attitudes, behaviors, and practices that go along with those tasks. Reflective essays, diaries, logs or journals can show us where and how and why students struggle or succeed in research, which can provide evidence to inform library instruction, services, and resource provision.

Having served on adjudication committees for their institution's *Library Awards for Research Excellence*, the researchers recognized the potential insights into student learning that could be gleaned from the qualitative data provided in these award submissions. Through reading the reflective essays that were part of these submissions, the authors discovered that students who are given an opportunity to reflect on their academic research journey and provide rich, detailed descriptions of their experiences can tell us not only

what and how they learned but also about what fostered, encouraged, inhibited or challenged that learning. Of particular interest was the fact that although the award was sponsored by the library, these reflections did not require applicants to mention specific library services or resources, and thus would provide authentic, unmediated descriptions of student research experiences that could inform library instruction and service provision.

This study asks: how do students describe their learning experiences during a specific research project? What do their reflections tell us about the context and conditions of their learning that can inform approaches to information literacy instruction and library services?

Literature Review

Student Reflections about the Research Process

Outside of an information literacy context, many scholars have utilized student reflections through surveys, interviews, or written reflections to examine how students perceive the research process, how they develop as researchers and how that data can inform pedagogical response. [6] Courtney Faber et al.'s study addressed students' perceptions of the research process and connections between those perceptions and how they see themselves as researchers. They found that individuals' identities as researchers are intertwined with previous experience and knowledge of research and researchers.[7] The research practices and social interactions that students experience during research help them to develop epistemic ways of knowing about how research works, who a researcher is, and what researchers do. Anesa Hosein and Namrata Rao, through the analysis of reflective essays, found that student-centered pedagogies afforded opportunities for students to understand the research process as well as their own research identity and socialization into the research processes of their discipline. [8] Likewise, Rachel Wishkowski et al. collected data from undergraduate students through a longitudinal survey, and found that students went from seeing researchers as people who could only be "highly educated professionals", to seeing research

as an individually satisfying and socially meaningful process, and began to see themselves more as active participants within their disciplinary discourse. [9]

Reflections as Pedagogy in Information Literacy Contexts

Much has been written about the intentions behind, and outcomes of, reflective exercises for students learning about research. In their review of the evidence for using research journals in IL instruction Louise R. Fluk identified a number of ways researchers have described the impact of these reflective activities on student learning and metacognitive development: they help students make sense of, illuminate, map, shape, make visible, engage with and structure the research process.[10] Fluk's review concluded that evidence shows reflective and descriptive research journal assignments can promote students' affective as well as cognitive development, and contribute to the development of IL among post-secondary students.

Pamela McKinney and Barbara A. Sen also reviewed the research on the use of reflection in IL instruction contexts, and effectively summarized a body of literature that has found positive associations between the practice of reflection and the development of "advanced" and "higher order" IL competencies in post-secondary students, aspects of which include problem solving, deep learning, advanced search strategies, and an increased understanding of the value of IL. [11] A common conclusion about the value of reflective journals, research logs, and other such activities for students -- and one that is most significant from a pedagogical perspective -- is that authentic, reflective practice allows students to see research as a process rather than a product. Reflection also allows students to grapple with threshold concepts in information literacy. Developing this understanding in students and helping them push through these thresholds is difficult in the skill- and process-based activities often presented in standalone

sessions and workshops.[12] Moreover, the potential benefit of facilitating reflective activities as part of IL instruction exists not only for students, but for teaching librarians as well.

Analyzing student reflections

Analysis of student reflections can provide insight into the "behaviors and meanings ascribed to those behaviors by the students themselves", allowing one to identify the variety and nature of resources students draw upon and the barriers they face during the research process.[13] Reflective essays can provide a lens to view the ways that students internalize and apply the skills, knowledge, practices and attributes that define information literacy and can inform approaches to information literacy instruction. Previous research has demonstrated the benefit that analyzing student research narratives has on designing and delivering library instruction, services and resources. Similar studies of student narratives provide insight into teaching methods, curriculum development, instructional technology design, and pedagogy.[14] Additional studies of undergraduate students' reflections on the research process have been conducted in first year writing courses, Liberal Education courses, honors students, and Education students.[15] These researchers have mapped ACRL concepts to the student experience in order to see how students utilize resources, how students conceptualize the process, and how confident they feel about their research abilities. In general, their studies have contributed to developing a rich description of the student experience of research, including thoughts and feelings about the "meandering process of library and archival research" and the value of scholarly networks, for example.[16]

The present study builds on a smaller body of research that has examined library research award applications. Jennifer Bonnet et al. describe how their library's award prompted students to "describe the ways in which sources and research shaped each other." [17] They analyzed student essays in conjunction with their bibliographies, and were specifically interested in how students described the sources they used

and their engagement with those sources. The authors described their award applicants as advanced undergraduates with a "more sophisticated disciplinary background" and saw these highly engaged and motivated undergraduate students as the library's "core constituency" and the ones for whom services, programs and instruction should be planned. More specifically, they drew lessons from this group for approaches to teaching emphasizing particular ACRL frames.

Sophie Bury et al. looked at undergraduate research award submissions to examine how "IL skills and conceptions" of "high achieving undergraduates" are reflected in their research accomplishments. These accomplishments were closely tied to library-centered concepts: identifying search tools, applying search strategies, evaluating info, and using library resources, tools and services.[18] They found that students rely on a small number of familiar tools and used simple searches, but also that they were strongly interested in their topics and engaged in the research process. From their findings, they recommend shifting library instruction away from "the mechanics of searching and retrieval" and building higher order IL competencies.[19] Like Bonnet et al., Bury et. al also advocate for engaging students at multiple levels, to provide for the novices, apprentices, and advanced undergraduates. Both studies concluded that students should be taught that research is a non-linear and iterative process, and that higher order IL skills like understanding scholarly communication networks and strategic searching should be incorporated into IL instruction.[20]

The current study builds on these findings by using a broader lens on the student experience of research than previous studies, and diving deeply into themes relating to multiple ways that research is experienced by the students, rather than exclusively focusing on what students did and how they felt about it. The authors argue that additional questions can be asked and more can be discovered from student narratives of the research process. Through an openness to seeing and understanding research as an experience rather than a process, this experience can be described through three main themes emerging from analysis of student reflections -- becoming, identifying, connecting -- that can offer ways of seeing academic

research to help us understand our students' needs and inform the supports, resources, and services that academic libraries provide.

The Research Study

Setting, Participants and Sampling

This study took place at an undergraduate university in Alberta, Canada (Treaty 7 Territory) with an enrollment of just over 10 000 full time learners. The university's commitment to supporting and promoting undergraduate research is a central mission and value as reflected in academic, research and institutional strategic plans. The *Library Awards for Research Excellence* is one of many opportunities offered to support and celebrate undergraduate researchers on campus.

The *Library Awards for Research Excellence* was initially established at Mount Royal University in 2012. Award categories and requirements have evolved over the years, and currently awards are given to celebrate research excellence in both individual and group projects. The projects are adjudicated in the Spring semester by two committees, each composed of two faculty members from the Library, and three external members representing disciplines from the faculties of Business, Arts, Health and Sciences. Students are required to include a copy of a project that has been completed through credit coursework or a university sponsored research program (this could be a paper, poster, audio/visual project or any other format that demonstrates evidence of a research component), a bibliography, an instructor support form and a reflective essay. Human Research Ethics approval was granted to collect and analyze the reflective essays from students who agreed to participate in the study.

Since the focus of qualitative research is the "in-depth exploration of a central phenomenon" and not about generalizing to a broader population, the researchers used purposeful sampling to select the necessary participants.[21] Purposeful sampling is the intentional selection of participants to understand the phenomenon under study. The type of purposeful sampling used in this study is theoretical or concept sampling, where the concepts or theories are generated from the "constant interrelation with data collection and data analysis".[22] The researchers identified applicants to this award as a group of individuals who had recent experience undertaking the phenomenological question at hand (the research project or the task of doing research) and who could be willing to participate in our study.[23] Once institutional Human Research Ethics approval was granted, recruitment materials were included in the award application information and applicants providing consent became participants in this study.

Data Collection

Data was collected over the course of three years in three rounds of award competitions from May 2019 to May 2021. Over this three-year period, 24 of 78 total award applicants (30.7%) provided consent to participate in the study. Descriptive statistics were not collected, but the discipline of the originating assignment that prompted the submission was indicated in all award submissions. Table 1 (below) shows the disciplines represented.

Table 1 - Submitted Essays by Discipline

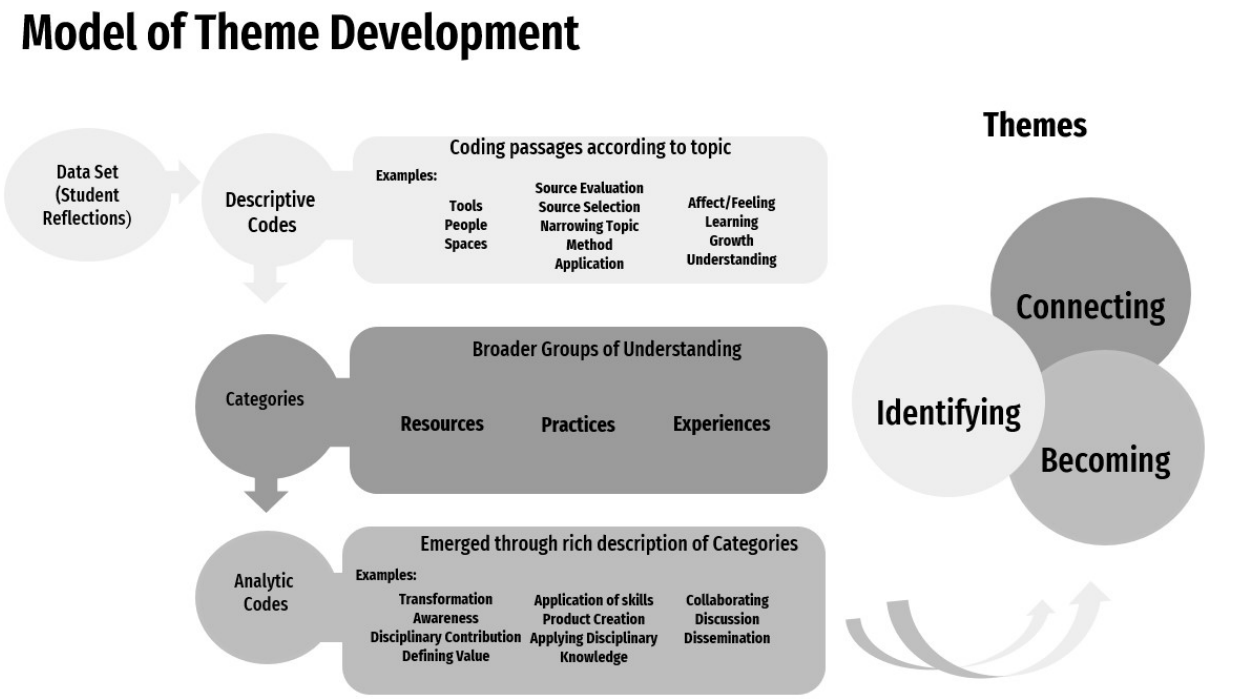
Discipline	**# of submissions**
History	6
Biology	4
Psychology	3
Anthropology	3
Criminal Justice	2
Business	1
Computer Science	1
Nursing	1
Policy Studies	1
Sociology	1
Unclear	1
Total	24

Data Analysis Approach

After adjudication processes for the awards were complete, consent forms and reflective essays were released to the researchers and were then anonymized and randomized. A thematic data analysis approach was applied to this data set in order to organize the reflections into meaningful and manageable codes, categories and themes. Coding began with randomly selecting six papers to develop initial categories. Initially identifying codes from the data through descriptive/ in vivo coding, three categories were developed (practices, experiences and resources), and several subcategories began to emerge from the reflections (evaluation, strategies, synthesis, cognitive, effective and use of tools/resources). Through multiple subsequent rounds of iterative, comparative coding, the researchers developed additional sub-categories that included both the concepts they defined and those described by the students. Following a four-step thematic analysis process outlined by Saldana as well as Gibb, the researchers established codes,

created higher level categories, developed analytic codes, and reviewed and synthesized the codes to develop overarching themes.[24] Three themes emerged through this iterative process of describing, comparing, and identifying relationships among these categories (see Figure 1).

Figure 1



Note: The above figure illustrates the process of data analysis for this study; first descriptive codes were applied to each student reflection, forming three broader groups of understanding (resources, practices and experiences). Also emerging from the data were rich descriptions of categories which contributed to the development of 3 themes; identifying, connecting and becoming.

Findings

In their reflective essays, students wrote not just about what they did, but how they perceived their actions and the outcomes of their actions. Their experiences of research were expressed both as inward-looking,

individual realizations related to their cognitive development, and as outward-facing observations about learning rooted in interactions with people and resources in their environment. As students described their research experiences in terms of their intellectual and emotional journeys, they made clear that they also experienced and were affected by external forces that impacted the direction of their projects. Analysis of these reflective essays reveals information literacy as an experience strongly dependent on the disciplinary context of students' learning in which they concurrently: connect with particular ideas, sources, and audiences; identify with disciplinary ways of selecting, evaluating, and using information sources; and become researchers through transformative research experiences. These three distinct aspects of learning -- connecting, identifying, and becoming -- emerged as dominant themes in these reflections.

Connecting: Students experienced research as a social practice, one that was impacted by people around them, the tools and resources available to them, and the connections they made to both previous experiences and anticipated future activities. These connections were evident in writing about their choice of research topic, research dissemination venues and formats, and audiences with whom they planned to share their research.

Identifying: Students identified with and engaged with the tools, practices and processes of research in their disciplines. They recounted their experiences of finding and utilizing the right tools and types of evidence appropriate in their disciplines, and uncovering scholarly conversations and disciplinary knowledge about their topic.

Becoming: Through the application of the tools, processes and practices of research they described, students became aware of themselves as researchers and members of a discipline. They related emotional, transformative research journeys and awareness of their own contributions as researchers to their disciplines

Connecting

LIS researchers have demonstrated that research is a social act that requires interaction not only with text, data or sources, but engagement with experiences and people who shape those interactions. Specifically,

studies of students as apprentice researchers have shown how students connect to scholarly communities of practice guided by local campus community experts like librarians and instructors.[25] Similarly, students in this study experienced research as a social practice that required them to connect and collaborate with others.

Connecting to experts

Students described the connections to scholarship they discovered through their coursework and assignments. Most students mentioned specific coursework or course themes that piqued their interest in a broader topic and described a process of building their research project based on those interests. Several described connecting with course instructors in various ways: forming ideas inspired by or building upon existing research programs of their professors, developing relationships with honors project supervisors, experiencing research opportunities as a research assistant, joining professional associations, attending conferences, and completing research ethics applications. Students also made connections with librarians and archivists, both from their own and other institutions. Several students described their liaison librarian brokering external relationships with librarians with specializations specific to their needs (data, GIS) or with specialized collections (court house, government and external academic librarians) within the community. Lastly, students described a variety of physical spaces as helpful to their projects including academic writing centers, research centers and institutes, and accessibility offices.

Connecting to experiences

Students consistently reflected on how their personal experiences influenced their choice of research project and how they engaged with their project. For example, one student wrote that their sibling's long-term illness inspired them to focus their project on mobility devices. Other students applied their experiences as volunteers, research assistants, and field school students to choose research topics.

Engagement in the research process also shaped how students connected to their topics, whether through experiences presenting their work to peers or seeing fellow students participate in university-wide and faculty-specific undergraduate research events. Students also made connections to their future anticipated experiences, leveraging their projects for careers and graduate study pursuits.

Connecting to an audience

Students from all disciplines were aware of their audiences and were intent on sharing their research in meaningful ways with those audiences. Several students described the purpose of their research product, and articulated how the purpose impacted what sources they searched for, selected, and applied. Knowledge translation projects (such as conference poster presentations, podcasts, community-partnered projects, and journal articles) seemed to encourage students to reflect on how knowledge is disseminated and the real-world applications of their research. One group of students reflected that “as broadcasting majors, it was then our main focus to translate this into something we found interesting, engaging, and entertaining. Not only for individuals well-versed in the world of anthropology and science, but for people new to the topic as well. It was important to us that our final project be universally accessible." Another student wrote, "I do not think my thesis would have been as relatable if it only revolved around statistics and graphs. Having an individual explain their experience can provide a deeper influence for readers who might be skeptical about restorative justice practices." Students had audiences in mind as they shared their thoughts about the potential impact and purpose of their work. Many of them articulated a sense of purpose that connected the research process to the results and the presentation of those results. One student commented, "learning all of these tools and resources [...] enhanced the research experience, [and my] ability to present research findings to various audiences in different formats."

However, the initial connection was described, it is apparent that students relied heavily on establishing social connections to disciplinary norms, tools and communities in order to complete their projects and

connected their research practices and products to an awareness of audience, impact, and potential uses for their research.

Identifying

Students identified with the tools, practices and customs, describing how they applied appropriate research tools to find information. They practiced disciplinary approaches to critically appraising information, recognizing types of evidence used in their field, and understanding the scholarly conversation around their topic.

Identifying tools and resources

The award application (see Appendix A) instructions prompted students to explicitly describe their search strategy, and their essays illuminate a variety of strategies and processes to find, acquire, assess and apply information sources in their research projects. Previous research has discussed the nature of student researchers' strategies and their use of resources.[26] Like the participants in those studies, these students used familiar tools and proven strategies and identified reliable or valuable sources,[27] and they did so with a disciplinary lens. For example, history students used online digital archives while criminology students navigated case law and primary legal sources. Seeing source identification in the context of students' identification with disciplinary practices shines some light on the cultural context of their search strategies. Their frequent reference to "root sources," -- key texts and seminal works often introduced to them by instructors or other scholars -- shows how these key sources that directed or defined their research process also shaped the connections they made to other scholars' work, the conclusions they drew about their topic, and their understanding of the research process.[28]

Many students recounted their experiences seeking and acquiring the "right" discipline-specific tools and information sources. As Rempel et al. have observed, students unfamiliar with disciplinary tools often

struggle and fall back on generic tools that have given them some success in the past; in this study, students who used generic tools like Google or the library search field described different material and emotional outcomes from those who used discipline-specific resources.[29] For example, a Criminology student who relied on Google was surprised at how difficult it was to find the specific type of information they were looking for, while another student in the same program who made use of discipline-specific tools "obtained far too much information and eventually deleted several pages worth of non-pertinent data to keep the project as brief and relevant as possible." Strong connections between positive emotions and student's ability to connect to discipline specific tools and research methods were seen in most of the essays, such as a burgeoning historian recalling the feeling of a "breakthrough" when discovering the right primary source to support their project, and an anthropology student describing their pride in locating a root article that was essential to their topic.

Identifying value - source evaluation

Their discipline-specific perspectives on research tasks were also reflected in the distinct and concrete ways they evaluated sources. They not only validated what they found with corroborating literature, but also established the relevance of sources in terms of their knowledge of how research evidence was used in their field. For example, a group podcast project led the students to reflect on the need "to research around the story" which

> led to a very broad range of articles and papers to investigate. The researchers needed to pinpoint [information] that would fit within our story, while not losing the scientific conclusions behind them. It was additionally difficult […] to find sources that included both important evolutionary information and information that would be easy to write into an audio script. …it was so important to us that our sources were scientifically significant but also easy to translate into our story.

This particular group of students not only connected their research practices to their current information needs, but to their future work as professional communicators.

The disciplinary context in which students wrote about comparing the value, nature and content of different sources, identifying gaps and unanswered questions, and reflecting on agreement and disagreement among sources was clear in their essays. Students also demonstrated awareness of limitations on knowledge about a topic, based on the availability and nature of sources found in the scholarly discourse of their disciplines. For example, a History student articulated an understanding of primary and secondary source types:

> two sources provided opposing perspectives, a trend followed by all the sources I found – secondary sources were largely sympathetic to the miners, whereas primary sources often took the side of the police and the mine owners. … In the absence of primary sources from the miners' perspective, I instead decided to draw upon [secondary research].

Likewise, an Anthropology student wrote, "When I found one area of my project was lacking research or had a multitude of conflicting sources … I would scale that aspect of the project down to what was truly known about tuberculosis." Here, the student demonstrates this awareness of the limitations of knowledge in a particular area while also acknowledging that sources may not come to the same conclusions.

Students provided insight into the thought processes, tactics and approaches they used to make sense of and evaluate the sources they found. They clearly identified with disciplinary approaches to research through the way they described their evaluation strategies. They evaluated the sources they found in relation to sources they had already seen or read and to assumptions about their topics, their disciplinary values, and to the outcome/purpose of their projects. For example, a History student expressed pride in

unexpectedly finding a historical map, and with their instructor's guidance, evaluating information from that primary source that "worked harmoniously with the rest of [their] argument." An Anthropology student likewise reflected on a decision to reject some initially promising articles because "attempting to integrat[e] this information into my research would have resulted in a weak connection of data and therefore weak research."

LIS research has shown that students can apply evaluation criteria to sources and know how to identify characteristics of "scholarly," "credible" or "authoritative" sources. Similarly, these essays show us that some students did apply generic concepts like "scholarly rigor" and "respected journals" to their evaluation efforts. What was more interesting, however, and perhaps more instructive, was that almost all students wrote about evaluation not in these generic terms but explicitly in the context of their projects. They revealed how their personal attachment to their research topic and their identification with their discipline impacted the source evaluation process, and that the process was not simply intuitive for them. A few students wrote about attachment to topics so deep that they found it challenging to stay true to the evidence and grudgingly changed direction when the evidence didn't support a strongly held conviction. As one student stated, "Letting go of an early research direction proved to be more difficult than I could have imagined" but going through the research process allowed them "to let go of an idea to find focus in the data." As this quote suggests, students described learning as experiencing the processes through which their research questions evolved, and being aware of how their selection, assessment and application of sources evolved along with their questions.

Becoming

Students' self-identification as researchers and as members of a disciplinary community was evident in how they wrote about their place in a community of scholars or professionals. Participants' descriptions of emotional journeys through the research process indicate their transformation from beginner to

apprentice researchers and show how they perceived the impact of their research projects as potential contributions to their disciplines. Comments ranged from idealized visions of scholarly work like "this project reaffirmed the fact that I stand on the shoulders of giants" to very pragmatic needs of practicing researchers, such as "finding a niche for our own findings in the greater context of the field." Prompted by the reflective essay guidelines, students wrote about how and why they would do things again in the future, and how their research transformed their understanding about a topic. They also reflected on disciplinary ways of knowing and on the impact of knowledge translation and scholarly communication on their imagined futures. Students wrote about how both the process of research and the content of their research topics would inform future research and practice as lawyers, entrepreneurs, nurses, historians, and graduate students. They frequently described their future aspirations for professional work or graduate school as motivating their works on these projects.

Several students seemed to accept and even appreciate the iterative process of research. As one student put it, “with information comes the acknowledgement that more must be discovered and investigated in this area to grasp a more complete understanding of the topic". Other students came to significant realizations about their education and their life through research. One student began their essay stating they had wanted to “drop out of university” but then involvement with a professor’s research project caused them to see "for the first time [...] how my degree applied to my life". Others were more pragmatic. Many talked about doing research as part of becoming something else. For example, a Business student wrote about the research project as a professional skill building exercise, reflecting on the opportunity to work “with different professors, individuals, and companies on the project as well as building my network” and to add research “as an interest and proficiency to my resume.”

Previous studies of first year and other “novice” researchers contain a common thread regarding the affective aspects of research and students’ overall negative feelings towards research.[30] By contrast, the students in this study had positive feelings about research. Even though many wrote about the process

with the words *frustrating, arduous, overwhelming, discouraging, and draining***,** these same students wrote about breakthroughs, inspiration, understanding and rewards gained through patience, persistence and resilience. The motivation of these students was clear in their choice of words: *enthusiasm, dedication, aspiration, curiosity, desire, growth, and appreciation.* Some students reflected that they themselves caused the frustration, difficulties, or stress: "even though my self-imposed high threshold for reliable source material made the research process frustrating at times, it paid off in the end." A few students reported on explicit prompts, directives, and insights gained from interactions from professors, librarians, and writing strategists, but very few of them referred to assignment requirements or directives on source types, writing formats, etc. This suggests that the students internalized the task and were motivated by things other than meeting grading requirements. As has been found elsewhere, students expressed feelings related to confidence and self-efficacy as well as.[31] Their essays also revealed the pride they felt and the struggles they overcame:

> "From getting a C in [a third-year biology class] and not understanding how to even navigate any academic databases, to finishing my B.Sc. and [the independent studies course] with an A+ with an abundance of tools at my disposal, I can honestly say that I have learned so much from my research experience."

Students who had the most transformative experience were those who identified and crossed thresholds through the research process to understand what it means to do research and how to see themselves as researchers. This kind of transformation is evident in statements about appreciating the nature of scholarly research ("This process has been long and tedious …reading and re-reading papers, scouring for the smallest details that the original authors may have failed to consider, and how other works and the findings of my own research might resolve those details"); about overcoming bottlenecks (accessing datasets "taught me a lot about how data is collected and distributed" and "was a crucial step in my research journey"); and making mental processes explicit ("I learned in this process that historians do not just analyze sources, but that they are also needed to create a story within their own research"). Becoming knowledgeable about disciplinary tools and ways of knowing developed students' confidence and pride in

their projects, ushering them through the transition from novice researchers to scholars and members of their disciplines. One history student remarked, “Having completed the arduous probe, I feel as though my researcher's eye has gained a new lens, allowing for even sharper focus when embarking on new research projects in the future." A Biology student also outlined future directions for the research started during this project: “This is just the tip of the iceberg in my exploration of human physiology. … I was accepted into a M.Sc. program… to continue working on related research.”

Recognition of the impact of their research on academic communities made them feel they had made a transition from student to practitioners. One student described how their “understanding of the literature allowed me to assist other researchers at the Experimental Biology conference poster presentations in designing their own experiments on related topics,” while another student described their project’s potential practical impact on the broader community:

> “I am planning to apply for my Masters in Social Work … to expand my research that I have completed in my undergrad and take it a step further by doing primary research for a longitudinal study…. I want to discover if implementing this [framework] will decrease the amount of bullying in schools and allow the students to develop healthier strategies to understand the damaging effects that bullying has on a person’s mental health long-term.”

The insights shared through these reflections reveal that exposure to disciplinary communities, processes and tools can cultivate researchers and motivate learners to pursue future academic aspirations as well as prepare them for their future careers. Students demonstrated that their projects inspired them to further contribute to their disciplinary fields and that navigating through their projects from beginning to end, although sometimes challenging, proved to be an enriching and rewarding experience. In most cases a clear transformation occurred, where students moved through roles of observer and information gatherer (*connecting*, *identifying*) to *becoming* those actively participating within their scholarly community.

Discussion

The reflective essays examined here reveal behavioral, cognitive and emotional aspects of students' learning experiences and also shed light on the context and conditions that shaped those experiences. The interconnected themes that emerged in these student narratives add some depth to our understanding of how students develop IL in academic contexts and provide evidence to inform critical approaches to IL instruction and support for learners.

Contextualizing IL

Robert Farrell and William Badke argue that "[b]y privileging librarian-defined research competencies and decontextualized critical thinking skills, we have neglected to develop the kinds of learning opportunities that position students as apprentice practitioners of the disciplines."[32] Our study found that students do see themselves as apprentice practitioners, as well as aspiring scholars and future professionals; this leads librarians to consider how we approach IL instruction to support students to develop metacognition, recognize transferable skills for future endeavors, and engage meaningfully with information in context.

Although there is evidence that a significant amount of information literacy instruction still relies on generic shortcuts and checklists to teach evaluation, researchers and educators are beginning to advocate for more nuanced approaches to teaching information evaluation and use based on the reality of the information environments students encounter.[33] One reason for the persistence of de-contextualized information literacy instruction in academic libraries may be the timing of that instruction. Evaluation checklists are often presented to first year students who are learning to do research before they learn about their discipline. Previous research has found that students follow a "predictable information-seeking strategy" that "appears to be learned by rote and reliant on using a small set of resources nearly each and

every time and this may be in part because of the way IL is often taught as a distinct, process-oriented set of skills divorced from the context of disciplinary approaches.[34] The students in this study identified with the sources, questions, methods and perspectives of their discipline, and did not make strong associations with generic IL concepts. The researchers saw pragmatic, pertinent, and contextual evaluation practices among students rather than responses to a checklist of generic source characteristics. In other words, these students did not see evaluation as value neutral or objective. Rather, their reflections provide evidence that disciplinary ways of knowing shape students' information environment (the sources, tools and experts around them) and that their personal identification with those ways of knowing impacts how and why they employ IL skills and knowledge in that environment.

Leveraging student motivation

These student essays reveal the nature of the association's student researchers make with their research topics, methods and epistemologies. Their narratives provide proof that research skills should not be separated from a larger learning process and that librarians "must move away from our often-fragmented approaches and enlist the aid of metanarratives based on the way scholars in disciplines actually think about and perform research to further knowledge."[35] Badke argues that metanarratives about a discipline help students understand the "why" and "what for" of research, and without embedding IL concepts in these metanarratives, instruction that focuses only on the "how" of research may fail to engage students or help develop their critical thinking skills. In addition to the disciplinary context in which IL skills are taught, librarians can also pay attention to the social context of learning, particularly who supports and enables students, who and what sparks their curiosity, and why. For the students in this study, the origin and direction of many of their research projects were guided by personal and sometimes idiosyncratic reasons, but almost all of them described their actions in relation to the intended purpose and audience for their work. In IL classrooms and around campuses, librarians can leverage the interest students have in the purpose and outcomes of their research and advocate for different kinds of assignments beyond the research paper and promote and celebrate the variety possible in both student research experiences and

outcomes, including knowledge translation products like journal articles, posters, podcasts or videos that can help illuminate the "why" and "what for" of students' research efforts.

Grounding IL in disciplinary discourses

Like previous studies have shown, our students were typical in their reliance on professors to be "research coaches" and guides to generate ideas, identify starting points and confirm appropriate paths in their research journeys.[36] However, this study also shows how and why they depend on their professors: desire and motivation to impress, to do research properly in the manner of their discipline, to be "like" a historian or an anthropologist, and to have an impact in a field, a community, or a particular audience. This understanding can have implications for approaches to IL instruction as well as reference services, programming and user engagement in libraries. Students' statements about research revealed their feelings of disciplinary inclusion and belonging; this suggests it is important for librarians to ground themselves as both research experts and cultured in disciplinary ways of knowing when designing instruction and learning materials, in order for students to recognize information literacy within their disciplinary language. Specifically, librarians can use this insight to shape communication and collaboration with faculty to more effectively incorporate IL instruction into students' programs and help them associate librarians with disciplinary research expertise. This might mean librarians function more as curricular consultants to disciplinary faculty, helping faculty understand how IL can fit into disciplinary discourses. This avoids the need to translate and map IL standards or frameworks for disciplinary faculty and can position disciplinary faculty as the information literacy experts themselves, as socio-cultural theory supports, and see the disciplines as owners of not one, but multiple kinds of discipline-specific "information literacies."[37]

Limitations

The purpose of this study was to examine reflective essays of award applicants, however, not all award applicants chose to participate in the study. Our population of study, therefore, is only those applicants

who consented to be part of the study. The implication of this is that the researchers cannot extend our conclusions to the slightly larger group of award participants. It is possible, for example, that only students who related to their discipline through their experience with the research process consented to participate.

A second limitation is the honesty and truthfulness of the student submissions. In their study of physiotherapy students, Stephen Maloney et al. found that only 20% of the students surveyed declared that they were 100 percent truthful in their reflective essays. The authors found several reasons for this including, the influence of assessment on task performance, misremembering events, and discomfort in writing about emotions.[38] Although this reflective writing task was not graded, either summatively or formatively, which Jo Anne Genua suggests influences student responses,[39] it was submitted to be evaluated for a student award and may have influenced the full truthfulness of their reflections.

Conclusion

Students' descriptions of how they connected research activities to their lives, identified with disciplinary approaches to research, and experienced transformative learning through the process tell us much about aspects of learning that librarians do not often get to see and assess. Their reflections provide evidence of competencies beyond library-specific IL skills (i.e. skills deemed the purview of librarians to teach) and allow us to see where, how and for what purpose they develop and practice these competencies. These narratives provide form and substance to "the typically inaccessible nuances of experience" that are so valuable to understanding student information literacy.[40]

The qualitative research methods used in this study allowed the researchers to find patterns and themes in the data that would not have been found through attempts to measure or quantify. In these reflective essays, students described what resonated with them about research in their own words. Their silence

about certain topics was also instructive, and allowed the researchers to identify significant patterns in undergraduate student research experience that would not have surfaced with quantitative approaches aimed at measuring pre-determined categories or assumptions about IL imposed by the researchers. “The complex and in-depth nature of the qualitative research process,” as Annemarie Lloyd has demonstrated, “may result in smaller-scale studies, but this allows researchers to focus on understanding the layered fabric of the practice (how it is shaped and the conditions that enable or constrain emergence) or interrogating the practice to develop deeper understandings of the meanings that information literacy has for people”.[41] Further research engaging different student populations (graduate students, or a sample taken from a broader undergraduate student population) could further the findings of this study and also delve more deeply into student reflections on specific disciplinary research pedagogies or particular curricula.

Undergraduate students experience research as connecting, identifying, and becoming. These experiences offer clues to improving information literacy instruction for undergraduates through contextualizing research behaviors to identify and position information literacy practices meaningfully within different disciplines. Librarians may see benefit in revisiting library instruction that balances a generalist approach to information literacy with further integrating disciplinary pedagogies and perspectives on becoming information literate in order to support students’ learning journeys as developing practitioners or scholars in their fields or disciplines. Future research may further explore the librarian’s role in developing students’ identities as researchers and how they are enculturated into disciplinary ways of knowing through research.

---

[1] Amy Catalano. "Development and Validation of the Metacognitive Strategies for Library Research Skills Scale (MS-LRSS)." *The Journal of Academic Librarianship* 43, no. 3 (2017): 178-183. https://doi.org/10.1016/j.acalib.2017.02.017; Trudi E. Jacobson, and Thomas P. Mackey. "Proposing a Metaliteracy Model to Redefine Information Literacy." *Communications in Information Literacy* 7, no. 2 (2013): 84-91. https://doi.org/10.15760/comminfolit.2013.7.2.138; Dane Ward, "Revisioning information literacy for lifelong meaning." *The journal of academic librarianship* 32, no. 4 (2006): 396-402. https://doi.org/10.1016/j.acalib.2006.03.006.

[2] Megan Oakleaf, "Dangers and opportunities: a conceptual map of information literacy assessment approaches." *portal: Libraries and the Academy* 8, no. 3 (2008): 233-253. https://doi.org/10.1353/pla.0.0011; Chris A. Portmann and Adrienne Julius Roush. "Assessing the effects of Library Instruction." *The Journal of Academic Librarianship* 30, no. 6 (2004): 461-465. https://doi.org/10.1016/j.acalib.2004.07.004; Katherine Schilling and Rachel Applegate, "Best Methods for Evaluating Educational Impact: A Comparison of the Efficacy of Commonly Used Measures of Library Instruction." *Journal of the Medical Library Association* 100, no. 4 (2012): 258-269. https://doi.org/10.3163/1536-5050.100.4.007.

[3] Sonia Bodi, "How do we Bridge the Gap Between What We Teach and What They Do? Some Thoughts on the Place of Questions in the Process of Research." *The Journal of Academic Librarianship* 28, no. 3 (2002): 109-114. https://doi.org/10.1016/S0099-1333(01)00302-0; Gloria J. Leckie, "Desperately Seeking Citations: Uncovering Faculty Assumptions about the Undergraduate Research Process." *The Journal of Academic Librarianship* 22, no. 3 (1996): 201-208. https://doi.org/10.1016/S0099-1333(96)90059-2; James T. Nichols, "The 3 Directions: Situated Information Literacy." *College & Research Libraries* 70, no. 6 (2009): 515–30. https://doi.org/10.5860/crl.70.6.515.

[4] Don Latham, Melissa Gross, and Heidi Julien, "Implementing the ACRL Framework: Reflections from the field." *College & Research Libraries* 80, no. 3 (2019): 386-400. https://doi.org/10.5860/crl.80.3.386.

[5] Jennifer L. Bonnet, Sigrid Anderson Cordell, Jeffrey Cordell, Gabriel J. Duque, Pamela J. Mackintosh, and Amanda Peters, "The apprentice researcher: Using Undergraduate Researchers' Personal Essays to Shape Instruction and Services." *portal: Libraries and the Academy* 13, no. 1 (2013): 37-59. http://dx.doi.org/10.1353/pla.2013.0007; Leanne Bowler, "A Taxonomy of Adolescent Metacognitive Knowledge During the Information Search Process." *Library & Information Science Research* 32, no. 1 (2010): 27-42. https://doi.org/10.1016/j.lisr.2009.09.005; Robert Detmering and Anna Marie Johnson, "Research Papers Have Always Seemed Very Daunting": Information Literacy Narratives and the Student Research Experience." *portal: Libraries and the Academy* 12, no. 1 (2012): 5-22. https://doi.org/10.0.5.73/pla.2012.0004.

[6] Anne Lee and Rowena Murray, "Supervising writing: Helping postgraduate students develop as researchers." *Innovations in Education and Teaching International* 52, no. 5 (2015): 558-570. https://doi.org/10.1080/14703297.2013.866329. ; Karen Manarin, April McGrath, and Miriam Carey, "Original Undergraduate Research in Classroom Contexts: Student Perceptions of a Scaffolded Approach." *Collected Essays on Learning and Teaching* 9 (2016): 11-18. https://eric.ed.gov/?id=EJ1104489; Rintaro Imafuku, Takuya Saiki, Chihiro Kawakami, and Yasuyuki Suzuki, "How do students' perceptions of research and approaches to learning change in undergraduate research?." *International journal of medical education* 6 (2015): 47. https://doi.org/10.5116/ijme.5523.2b9e; Anesa Hosein and Namrata Rao, "Students' Reflective Essays as Insights into Student Centered Pedagogies Within the Undergraduate Research Methods Curriculum." *Teaching in Higher Education* 22, no. 1 (2017): 109-125; Montserrat Castelló, Lynn McAlpine, Anna Sala-Bubaré, Kelsey Inouye, and Isabelle Skakni,"What perspectives Underlie 'Researcher Identity'? A Review of two Decades of Empirical Studies." *Higher Education* 81 (2021): 567-590. https://doi.org/10.1007/s10734-020-00557-8.

[7] Courtney J. Faber, Rachel L. Kajfez, Dennis M. Lee, Lisa C. Benson, Marian S. Kennedy, and Elizabeth G. Creamer, "A Grounded Theory Model of the Dynamics of Undergraduate Engineering Students' Researcher Identity and Epistemic Thinking." *Journal of Research in Science Teaching* 59, no. 4 (2022): 552-553. https://doi.org/ 10.1002/tea.21736

[8] Hosein & Rao, "Students' Reflective Essays"

[9] Rachel Wishkoski, Diana J. Meter, Sarah Tulane, Michael Q. King, Kevin Butler, and Laura A. Woodland. "Student attitudes toward research in an undergraduate social science research methods course." *Higher Education Pedagogies* 7, no. 1 (2022): 30. https://doi.org/10.1080/23752696.2022.2072362

[10] Louise R. Fluk, "Foregrounding the Research Log in Information Literacy Instruction", *The Journal of Academic Librarianship* 41, no. 4 (2015): 491. https://doi.org/10.1016/j.acalib.2015.06.010.
[11] Pamela McKinney, and Barbara A. Sen, "Reflection for Learning: Understanding the Value of Reflective Writing for Information Literacy Development." *Journal of Information Literacy* 6, no. 2 (2012):115. https://doi.org/10.11645/6.2.1747.
[12] Kirsten Hostetler and Tian Luo, "Understanding Academic Librarians' One-shot Instructional Design Process Via a Delphi Study." *The Journal of Academic Librarianship* 48, no. 2 (2022):10250. https://doi.org/10.1016/j.acalib.2022.102501; Latham et al., "Implementing the ACRL Framework", 389.
[13] Bonnet et al., "The Apprentice Researcher", 38.
[14] Bonnet et al., "The Apprentice Researcher"; Glenda M. Insua, Catherine Lantz, and Annie Armstrong, "In their own words: Using first-year student Research Journals to Guide Information Literacy Instruction." *portal: Libraries and the Academy* 18, no. 1 (2018): 141-161. https://doi.org/10.1353/pla.2018.0007.; Hannah Gascho Rempel, Stefanie Buck, and Anne-Marie Deitering, "Examining Student Research Choices and Processes in a Disintermediated Searching Environment." *portal: Libraries and the Academy* 13, no. 4 (2013): 363-384.
[15] William Badke, *Teaching Research Processes: The Faculty Role in the Development of Skilled Student Researchers*. Elsevier, 2012; Robert Detmering, and Anna Marie Johnson, "Research Papers Have Always Seemed Very Daunting": Information Literacy Narratives and the Student Research Experience." *portal: Libraries and the Academy* 12, no. 1 (2012): 5-22. https://doi.org/10.0.5.73/pla.2012.0004.; Nicole C. Eva, Marissa S. Rocca, and D. Bruce MacKay,"Aha moments and Continued Confusion: An Analysis of Threshold Concepts Through Student Reflections in the ACRL Framework." *College & Research Libraries* 82, no. 2 (2021): 199-218. https://doi.org/10.5860/crl.82.2.199.; Insua et al., "In Their Own Words"**;** Anesa Hosein and Namrata Rao, "Students' Reflective Essays as Insights into Student Centered Pedagogies Within the Undergraduate Research Methods Curriculum." *Teaching in Higher Education* 22, no. 1 (2017): 109-125. https://doi.org/10.1080/13562517.2016.1221804.; Ann Medaille, Molly Beisler, Rayla E. Tokarz, and Rosalind Bucy, "Honors Students and Thesis Research: A Study of Information Literacy Practices and Self-Efficacy at the End of Students' Undergraduate Careers." *College & Research Libraries* 82, no. 1 (2021): 92-112. https://doi.org/10.5860/crl.82.1.92.
[16] Bonnet et al., "The Apprentice Researcher", 44.
[17] Bonnet et al., "The Apprentice Researcher", 43.
[18] Sophie Bury, Dana Craig, and Sarah Shujah, "Celebrating Undergraduate Students' Research at York University: Information Literacy Competencies of High-Achieving Students." *Journal of Information Literacy* 11, no. 2 (2017): 21. https://doi.org/10.11645/11.2.2219.
[19] Bury et al., "Celebrating Undergraduate Students", 21.
[20] Bonnet et al., "The Apprentice Researcher", 43; Bury et al., "Celebrating Undergraduate Students", 21.
[21] John W. Creswell, and Timothy C. Guetterman. *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*. 6th ed. New York, NY: Pearson, 2019: 206.
[22] Margrit Schreier, "Sampling and generalization." In *The SAGE Handbook of Qualitative Data Collection,* edited by Uwe Flick. Sage Publications Ltd, 2018:90. https://dx.doi.org/10.4135/9781526416070.
[23] Creswell, John W., and Vicki L. Plano Clark. *Designing and Conducting Mixed Methods Research*. 3rd ed. Los Angeles: SAGE, 2018.
[24] Johnny Saldaña, *The Coding Manual for Qualitative Researchers*. 3rd ed. Los Angeles: SAGE, 2016; Graham R. Gibbs, *Analyzing Qualitative Data*. Qualitative Research Kit. London, England: SAGE Publications, Ltd, 2007. https://dx.doi.org/10.4135/9781849208574.
[25] Bonnet et al., "The Apprentice Researcher"; Nichols, "The 3 Directions: Situated Information Literacy."; Sara L. Davidson Squibb, and Anne Zanzucchi, "Apprenticing Researchers: Exploring Upper-Division Students' Information Literacy Competencies." *portal: Libraries and the Academy* 20, no. 1 (2020): 161–85. https://doi.org/10.1353/pla.2020.0008.
[26] Bury et al., "Celebrating Undergraduate Students"; Ann Medaille, Molly Beisler, Rayla E. Tokarz, and Rosalind Bucy, "Honors Students and Thesis Research: A Study of Information Literacy Practices and

Self-Efficacy at the End of Students' Undergraduate Careers." *College & Research Libraries* 82, no. 1 (2021): 92-112. https://doi.org/10.5860/crl.82.1.92; Jennifer Nutefall, "Paper trail: One method of information literacy assessment." *Research Strategies* 20, no. 1-2 (2004): 89-98. https://doi.org/10.1016/j.resstr.2005.07.004.

[27] Medaille et al., "Honors Students and Thesis Research".

[28] Barbara Fister, "Teaching the Rhetorical Dimensions of Research." *Research Strategies* 11 no. 4 (1993): 211-219; Medaille et al., "Honors Students and Thesis Research"; Nichols, "The 3 Directions";

[29] Hannah Gascho Rempel, Stefanie Buck, and Anne-Marie Deitering. "Examining Student Research Choices and Processes in a Disintermediated Searching Environment." *portal: Libraries and the Academy* 13, no. 4 (2013): 363-384.

[30] Nahyun Kwon, "A Mixed-Methods Investigation of the Relationship Between Critical Thinking and Library Anxiety Among Undergraduate Students in their Information Search Process." *College & research libraries* 69, no. 2 (2008): 117-131. https://doi.org/10.5860/crl.69.2.117.

[31] Hosein & Rao, "Students' Reflective Essays"; Medaille et al., "Honours Students and Thesis Research"; Jan HF Meyer and Ray Land, "Threshold concepts and troublesome knowledge (2): Epistemological considerations and a conceptual framework for teaching and learning." *Higher education* 49, no. 3 (2005): 373-388.

[32] Robert Farrell, and William Badke, "Situating information literacy in the disciplines: A practical and systematic approach for academic librarians." *Reference Services Review* 43, no. 2 (2015): 322. https://doi.org/10.1108/RSR-11-2014-0052.

[33] Alaina C. Bull, Margy MacMillan, and Alison Head, "Dismantling the evaluation framework." *In the Library with the Lead Pipe* (2021): 294-314. https://www.inthelibrarywiththeleadpipe.org/2021/dismantling-evaluation/

[34] Alison J. Head, and Michael B. Eisenberg. "Lessons learned: How college students seek information in the digital age*." Project Information Literacy First Year Report with Student Survey Findings, University of Washington's Information School*, (2009):15 http://dx.doi.org/10.2139/ssrn.2281478.

[35] William Badke, *Teaching research processes: The faculty role in the development of skilled student researchers*. Elsevier, 2012, 106.

[36] Head & Eisenberg, "Lessons Learned".

[37] Farrell & Badke, "Situating information literacy in the disciplines", 325.

[38] Stephen Maloney, Joanna Hong-Meng Tai, Kristin Lo, Elizabeth Molloy, and Dragan Ilic. "Honesty in critically reflective essays: an analysis of student practice." *Advances in health sciences education* 18, no. 4 (2013): 617-626. https://doi.org/10.1007/s10459-012-9399-3

[39] Jo Anne Genua, "The Relationship Between the Grading of Reflective Journals and Student Honesty in Reflective Journal Writing". *Nursing Education Perspectives* 42, no. 4 (2021):227-231. https://doi.org/10.1097/01.NEP.0000000000000826.

[40] Detmering & Johnson, "Research Papers Have Always Seemed Very Daunting", 6.

[41] Lloyd, "The Qualitative Landscape", 55.

Appendix A

Reflective Essay Guidelines

The following questions are provided only to help you reflect on aspects of your research process. DO NOT feel that you need to answer every one in your reflective essay! For one thing, not all of them may apply to your work, for another it would take much more than 1000 words.

Research question: How did your research question evolve? Did it narrow or broaden or change as you worked? What caused the changes?

Library/Information Research process: How did you determine what information you needed? How did you find what you needed? Which strategies worked, which didn't and why? Did anything in the process surprise you? Which tools were most useful and why? Did you learn to use new tools – and how?

Finding, evaluating and using information: What information did you find easily and what was more challenging to track down? What information are you most proud of locating? Were there challenges in determining if the information you found was reliable or suitable for your project? Were there any challenges in integrating the information you found into your work?

Overall reflection: What did you learn about information in your field? About research? Which parts of the process did you enjoy and which were more of a struggle than a joy? What has this experience brought you that you will use in your studies, your profession, and/or your life? What will you do differently in your next research project?