Partnership
Canadian journal of library and information practice and research
Revue canadienne de la pratique et de la recherche en bibliothéconomie et sciences de l'information

The First Year
Shifting Perceptions and Behaviours of Undergraduate Health Sciences Students' Online Research Process
La première année
Évolution des perceptions et des comportements des étudiants de premier cycle en sciences de la santé dans leur processus de recherche en ligne

Susanna Galbraith

Volume 19, Number 2, 2024

URI: https://id.erudit.org/iderudit/1117699ar
DOI: https://doi.org/10.21083/partnership.v19i2.7762

See table of contents

Publisher(s)

The Partnership: The Provincial and Territorial Library Associations of Canada

ISSN

1911-9593 (digital)

Explore this journal

Cite this article

Galbraith, S. (2024). The First Year: Shifting Perceptions and Behaviours of Undergraduate Health Sciences Students' Online Research Process. *Partnership*, *19*(2), 1–28. https://doi.org/10.21083/partnership.v19i2.7762

Article abstract

This study investigates the perceptions and behaviours of novice academic researchers in their first year of post-secondary education when conducting online research. Conducting online research in this context describes what students anticipate they will do during an information search process and the strategies and tools they use in practice to locate information. Data from semi-structured interviews and process maps were analyzed to identify themes regarding the students' perceptions and behaviours. While the participants were in university, they were providing a retrospective on past experience. Findings indicate that the experience of secondary students conducting research for school is one of frustration. Credible information is highly valued but difficult to obtain without the proper resources and skills. Students were initially hopeful that these frustrations would be appeased with access to better quality tools and learning the proper techniques of academic research. Because this study was undertaken immediately following the COVID-19 pandemic lockdowns of 2020–2022 it provides a unique window into how this experience impacted students and their choices and behaviours when conducting online research at the point of entering university and then further along in the first year. This exploratory research can serve to inform and provide insights into improving science and health sciences libraries' user experience, instruction, marketing, and eresource collections, as well as students' preparation for academic research in their secondary school years, particularly in the Canadian context.

PARTNERSHIP
The Canadian Journal of Library and Information Practice and Research
Revue canadienne de la pratique et de la recherche en bibliothéconomie et sciences de l'information

vol. 19, no. 2 (2024)
Theory and Research (peer-reviewed)
DOI: https://doi.org/10.21083/partnership.v19i2.7762

The First Year: Shifting Perceptions and Behaviours of Undergraduate Health Sciences Students' Online Research Process

La première année: évolution des perceptions et des comportements des étudiants de premier cycle en sciences de la santé dans leur processus de recherche en ligne

Susanna Galbraith
Health Sciences Library
McMaster University
galbrai@mcmaster.ca
https://orcid.org/0000-0002-5340-8478

Abstract / Résumé

This study investigates the perceptions and behaviours of novice academic researchers in their first year of post-secondary education when conducting online research. Conducting online research in this context describes what students anticipate they will do during an information search process and the strategies and tools they use in practice to locate information. Data from semi-structured interviews and process maps were analyzed to identify themes regarding the students' perceptions and behaviours. While the participants were in university, they were providing a retrospective on past experience. Findings indicate that the experience of secondary students conducting research for school is one of frustration. Credible information is highly valued but difficult to obtain without the proper resources and skills. Students were initially hopeful that these frustrations would be appeased with access to better quality tools and learning the proper techniques of academic research. Because this study was undertaken immediately following the COVID-19 pandemic lockdowns of 2020–2022 it provides a unique window into how this experience impacted students and their choices and behaviours when conducting online research at the point of entering university and then further along in the first year. This exploratory research can serve to inform and provide

insights into improving science and health sciences libraries' user experience, instruction, marketing, and eresource collections, as well as students' preparation for academic research in their secondary school years, particularly in the Canadian context.

Cette étude porte sur les perceptions et les comportements des chercheurs universitaires novices au cours de leur première année d'études postsecondaires lorsqu'ils effectuent des recherches en ligne. Dans ce contexte, effectuer des recherches en ligne décrit ce que les étudiants anticipent faire lorsqu'ils cherchent des informations ainsi que les stratégies et les outils qu'ils utilisent en pratique pour trouver de l'information. Les données d'entrevues semi-dirigées et de schémas de processus ont été analysées pour identifier des thèmes relatifs aux perceptions et aux comportements des étudiants. Quoique les étudiants soient à l'université, ils fournissaient un retour sur leurs expériences antérieures. Les résultats montrent que l'expérience des élèves du secondaire menant des recherches pour l'école est frustrante. L'information crédible est hautement valorisée mais difficile à obtenir sans avoir les bonnes ressources et compétences. Les étudiants étaient initialement optimistes que ces frustrations seraient apaisées grâce à un accès à de meilleurs outils et à l'apprentissage des bonnes techniques pour la recherche universitaire. Cette étude a été faite immédiatement après le confinement en raison de la pandémie de la COVID-19 en 2020-2022. Elle fournit donc un portrait unique expliquant comment cette expérience a eu un impact sur les étudiants ainsi que leurs choix et leurs comportements en effectuant de la recherche en ligne lors du début de leurs études postsecondaires et plus tard au cours de leur première année. Cette recherche exploratoire peut servir à informer et à fournir des perspectives pour améliorer l'expérience des usagers des bibliothèques de la santé et des sciences de la santé, la formation, le marketing et les collections électroniques ainsi que la préparation des étudiants à la recherche universitaire lors de leurs années au secondaire, surtout dans un contexte canadien.

Keywords / Mots-clés

user experience, undergraduate, health sciences, qualitative, thematic analysis, instruction; Mots-clés: expérience des usagers, étudiants de premier cycle, sciences de la santé, qualitatif, analyse thématique, formation

Introduction

User experience research is based on the premise that users are having positive or negative experiences. As researchers, we identify their "pain points" (Gibbons, 2021) and seek solutions to their problems. This study explores the broader context around the user experience to gain insights into student mental models when conducting online research, revealing potential opportunities for improvement. The researcher's position is that a "positive" user experience may not be a realistic goal for novice researchers when the very nature of academic work is complex and requires significant skill. This study seeks to investigate this intersection of information literacy (IL) skills and technology ease of use. This exploratory research can serve to inform and provide insights to improve science and health sciences libraries' user experience, IL instruction, and

eresource collections. While this study is atypical in its approach to user experience (Young et al., 2020), falling more under the sub-discipline of information-seeking behaviour, the study design was developed through a user experience lens.

Academic librarians and their online platforms (including websites, online learning guides, discovery searches, and eresources) strive to both provide a seamless user experience and to guide students into the most effective IL path for long-term student success. At times, these goals can seem in opposition. For example, in a health sciences library environment, students' ability to competently locate and identify the health sciences literature is often attributed to making database access prominent on a library website. And while this is one step toward improved usability, it may not go far enough. Database searching and the inherent complexities of navigating academic literature may not align with the prevailing standards for a seamless and effortless user experience. Other studies have found that regardless of the complexity of library databases, the usefulness of these tools prevails, making context and content important considerations when assessing usability (Cordes, 2014).

Literature Review

There is no shortage of research, both qualitative and quantitative, on various pieces of novice academic students' online research processes. Research has focused on their internet search behaviours, accessing eresources, searching databases, catalogues, discovery, and federated search. Because the students in this study were recruited in the first week of their undergraduate program, this meant reviewing literature on both the secondary school and post-secondary online research process.

Kuhlthau's (1983) dissertation explored the secondary student user perspective on the search process as a means to better understand first-year undergraduate student information-seeking behaviour, which led to a seminal work in information-seeking behaviour (Kuhlthau, 1991). Kuhlthau found that students' search process "causes confusion and doubt and is likely to be accompanied by feelings of anxiety" (1991, p. 370).

In addition to the literature on secondary students' information-seeking behaviour, there is much research assessing IL skills in secondary school, consistently showing the IL skills of secondary students are underdeveloped (Dolničar et al., 2020; Francke et al., 2011; Julien & Barker, 2009; Metzger et al., 2015; Saunders et al., 2017). A seminal article from 1995 (before the impact of the internet) pointed out the importance of metacognition (Moore, 1995). Moore defines this critical information problem-solving skill for elementary school students as the identification of information needs, the formulation of a good question, and the identification of appropriate sources. While this definition of metacognition is still relevant to studies in K–12 and post-secondary, the literature reflects a common sentiment in academic IL research: that metacognitive skills are underrepresented in secondary schools' instruction (Julien & Barker, 2009; Smith et al., 2013). Arguably this lack of skill has an impact on the user experience of online library research. Brem et al. (2001) found that high school students assessing science information on the internet were not successful in critically problem-solving their

information research process. The students did not demonstrate ample metacognitive skills and failed to understand the nature of science and publishing. This failure in critical-thinking skills is consistent with other findings (Julien & Barker, 2009) suggesting an ongoing pattern of inadequacy in secondary school IL education. Julien and Barker (2009) found that secondary school IL skills were less than adequate for university preparation. Students were unfamiliar with controlled vocabulary, lacked sophisticated evaluation criteria, and were not aware of how search engines identify relevant sources. More recently Smith et al. (2013) presented their study on secondary school student proficiency (and lack thereof) in IL in Alberta. Students could not articulate their information needs or use the necessary tools to meet these needs.

While a similar study investigating the IL skills of secondary school students has not been done in Ontario, the Ontario curriculum suggests students should be well equipped for navigating a complex information world at the time of graduation from secondary school: “Students engage in inquiry processes that include locating, processing, interpreting, synthesizing, and critically analyzing information to solve problems and make informed decisions. These processes involve critical, digital, and data literacy” (King’s Printer for Ontario, 2023).

Other research has explored the connection between IL skills and the students’ research process as an experience and the resulting choices they make about using library resources. As an output of the extensive ERIAL Project (Asher & Duke, 2011a), which investigated multiple angles of the undergraduate student research process, Asher and Duke (2011b) reported that undergraduate students struggled with conducting online research: “students who participated in this study exhibited significant difficulties that ranged across nearly every aspect of the search process” (p. 3). O’Brien and Symons (2005) studied the information-seeking behaviours of undergraduate students, finding that students had a definite preference for using the internet over library resources.

Other researchers have collected data on students’ perceptions of specific tools within the information landscape. The most prolific phenomenon studied in this way has been federated and discovery search, with authors finding that students’ trust in a tool (such as Google) is an integral element of a positive experience (Howard & Wiebrands, 2011). Joc and Chang (2010) found in a qualitative study that the implementation of a discovery search was perceived as an improvement and a preferred research tool over search engines, particularly for undergraduates. Similarly, an analysis of usage statistics indicated uptake of discovery searches correlated with a positive student experience (Way, 2010). A usability examination of a discovery search found that it was providing a positive experience for students (Williams & Foster, 2011). Asher et al. (2013) noted a need for qualitative research following their quantitative study on discovery tool impact on student search success and user experience. Head et al. (2020) did just this in their study, presenting findings on how college students conceptualize their constantly changing online information landscape.

In terms of research specifically focused on user experience when using the library website, most publications discuss usability testing in the form of case studies (Denton

et al., 2016; Dominguez et al., 2015; Jeng, 2005; Letnikova, 2004; Thorngate & Hoden, 2017). The findings of these studies are highly specific to the context of the library; however, one study found that the complexity of library websites can be a barrier to accessing resources (Demir & Parraci, 2018).

There have been many studies looking at Google as a tool for students, dating back to 2005 (Griffiths & Brophy, 2005). Since before 2010, library workers have acknowledged the trend in the student research process to shift away from libraries and toward the internet: “Users' time and attention are scarce, while resources are abundant with the development of the internet and web-based services (blogs, chat, social media sites, etc.), and easily accessed digitized content ” (Connaway et al., 2011, p. 179). Between 2005 and 2017 researchers explored how students make internet-based information-seeking decisions because of trust, convenience, and credibility (Connaway et al., 2011; Hargittai et al., 2010; He et al., 2012). This research suggests a positive user experience when conducting online research is one where students have quick online access but also have the skills to effectively locate the relevant information.

There continue to be gaps in the literature specifically looking at students’ online research process from a science and health sciences perspective as well as how the user experience can change with increasing skill. With these gaps in mind, the resulting research questions are:

1) What problems and opportunities within the student online user experience can be uncovered by studying the perceptions and behaviours of undergraduate health sciences students conducting online library research?

2) How does the student user experience when conducting online research change over the course of their educational journey?

Methods

The study method was qualitative, bringing together two sources of data: verbal descriptions of the research process and a visual mental model created by the students in the form of a process map. I sent a recruitment email with a $25 gift certificate incentive in the first week of September 2022 at McMaster University through the Bachelor of Health Sciences program. Following the email, I recruited in-person to a large group lecture. From these efforts, 13 students were recruited for the study.

The students were scheduled for one-hour online semi-structured interviews in the first week of the program. I conducted the interviews using Zoom and recorded them with auto-transcription. Students provided individual consent. Students were screened to ensure they met the criteria of being first-year students with no prior post-secondary education. I designed the ethnographic-inspired survey instrument (see Appendix) to gain an understanding of their perceptions and behaviours as well as their context and the user experience itself.

I conducted the follow-up interviews in January of the winter term of their first year at McMaster University. In late January 2023, I sent a follow-up email to the original 13 students and 10 were successfully interviewed. These semi-structured interviews were 15 minutes in length. The interview instrument was designed to gain insight into what had changed since September (see Appendix). These interviews were also recorded with auto-transcription. Notes and memos were recorded after each interview.

I removed all identifiable information from the transcripts and the final transcripts were shared with the students for verification. During both sets of interviews, students were asked to create a process map of their online research process. “A process map is a drawing, usually freehand, by a participant or researcher that depicts social action in relationship to or as it progresses through time and geographic or conceptual space” (Miles et al, 2020, p. 204). A verbal example of a process map was described to the students with different variations and parameters explained. The process map was chosen as a means of visualizing the verbal data collected in the interviews and as a way for students to conceptualize and interpret their process (Beisler & Medaille, 2016). In the second round of interviews I prompted the students to include representations of the emotions they felt during each step to conceptualize the user experience aspect of their research process. This was first captured by Kuhlthau (2004).

The six phases of Braun and Clarke’s thematic analysis (2022) were employed to analyze the interviews, memos, and notes. Themes were identified over the six phases, including familiarization and multiple rounds of coding without software by a single coder. During both the interviews and analysis, I paid close attention to how my position as a librarian (and therefore authority figure) as well as an instructional librarian influenced the interpretation. The process maps created by the students were analyzed using a method described by Miles et al. (2020). Rather than developing new codes, the maps underwent two phases of analysis. The first reflected on any symbolic and written data that supported or contradicted the verbal data. Both the absence and inclusion of certain steps and/or an emphasis on pieces of the process were also considered in the analysis. Following this phase, the written data within the process maps were coded using the codes developed when analyzing the verbal data. The resulting themes combine the analysis from both the interviews and the process maps.

Results

Due to the nature of the interview questions and the timing of recruitment, my questions centred around asking the students to recall a recent assignment that they could draw from to describe their research process. Since it was early in their university career, the students spoke primarily about their high school experience, so that is what the data reflects.

Local Educational Context

The demographic information of the students recruited for this study can be found in Table 1.

Table 1

Participant demographics

Category	Detail	Percentage
Age	18 years old	100%
Elementary education	Ontario	68%
Elementary education	Manitoba	8%
Elementary education	British Columbia	8%
Elementary education	Suriname	8%
Elementary education	Korea	8%
Secondary education	Ontario	84%
Secondary education	Manitoba	8%
Secondary education	British Columbia	8%

The students had quite different experiences with libraries in their secondary education depending on the school. Some had considerable support and others had no experience using the library other than one introductory session in Grade 9. A few had access to databases in high school; most relied on Google, Google Scholar, and YouTube. All had used Google to conduct part or all of their research process.

Entering their program at McMaster, the students were enrolled in a course called Interdisciplinary Questions in Health, which "builds a conceptual toolbox for problem-solving" (McMaster University, 2023). They were also enrolled in a course called Inquiry, which is "a problem-based course applying principles of scientific inquiry" (McMaster University, 2023). This was the course the students tended to draw from if they were not speaking to their high school experience—one where they were frequently required to look up information online.

Fall Interviews

The interviews conducted in September resulted in the identification of six subthemes within three overarching themes (Table 2).

Table 2

Fall interview themes

Themes	Number of times mentioned*	Percentage of participants who mentioned this theme
Perceived expectations: You want us to do what?	17	79%
Perceived expectations: The library will save us	16	79%
Perceived expectations: I can do this myself	9	54%
Tensions between time, trust, confidence, and validation: Online communities provide validation	11	31%
Tensions between time, trust, confidence, and validation: Credibility is paramount	36	100%
Impact of high school specialization programs: Comfort with scientific literature and search skills	8	31%

*Frequency calculation based only on interview vocalized data.

You want us to do what?

This theme (present in 79% of student interviews) was a sense from the students that expectations from teachers were unrealistic. The perception was that the students were being asked to do research without any useful resources or skills on how to do it. The students expressed frustration that it took so much time. They felt when they did find credible sources, these were often written at a level too difficult for them to understand and they did not have the skills to critically appraise them. Another sentiment in this theme that would be interesting to explore in more detail was that trying to find “specific information” (e.g., foreground questions) was exceedingly difficult on Google.

- “A lot of the time when I'm doing research, I’ll like run into an article that's just way more in-depth than I need it to be. But I can't really find anything else. But reading it I'm kind of just lost. So, I'll like have to read it all for the ten percent that I can understand and that doesn't feel great.” (P8)

- “I mostly use Google. But I found it’s kind of hard to find specific stuff on Google…I found a lot of the time when I would ask questions, I had to do all my stuff separately and then put it together myself.” (P12)

- “We didn't really receive any information about how we properly do research. We only learned how to do like citations but like how we did the research was mostly just Google. Like those kind of search engines.” (P10)

The library will save us

In contrast to these perceptions of frustration were ones of hope. A strong theme indicated in 79% of participant responses, was identifying the university library as a saviour in making research easier. The library, or in some cases articulated more as ‘the university’, would help them understand the contradicting information they often found on online communities. It would help them with valid and reliable sources and high-quality information (Figure 1).

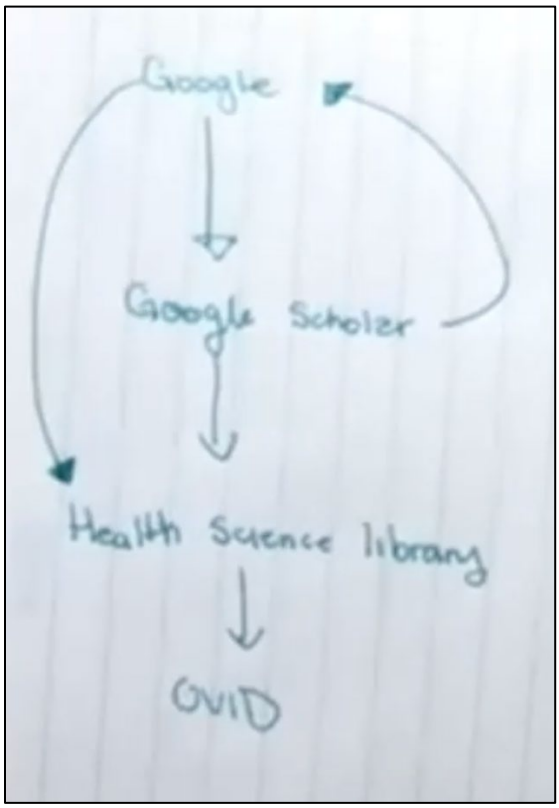
- “I think maybe learning to access the Health Sciences library will help. And maybe like I think that would be a more reliable source. Just because it would be a collection of like credible sources to use.” (P7)

- “It was also on the Health Sciences Library website like at the top. So that was helpful. It brought you to a site that had reputable sources.” (P6)

- “Going forward I'll probably use the database more. It might be easier than Google just because you don't have to do like a CRAAP test…You're less likely to run into garbage.” (P8)

Figure 1

This process map illustrates the library's central place in the research process (P11)



I can do this myself

In contrast to the library as important and relevant was this notion of 'I can do this myself.' In other words, searching is easy, no instruction is necessary. Just over half (54%) mentioned something related to this theme. It was expressed alongside a feeling of pride in growing up with the internet from an early age, implying they had already learned everything they needed to know.

- "I feel like I was definitely taught how to kind of assess if something is credible. I wasn't usually super overwhelmed by a general search because I could kind of be like, yeah that's not really what I'm looking for." (P6)

- "I think it was instinctual, like to not use anything that could be easily disproven or easily changed by anyone who doesn't have the credentials to kind of be talking on the topic." (P5)

- "I grew up like in a time where we were taught to use like laptops and computers as part of our education really commonly." (P2)

Online communities provide validation

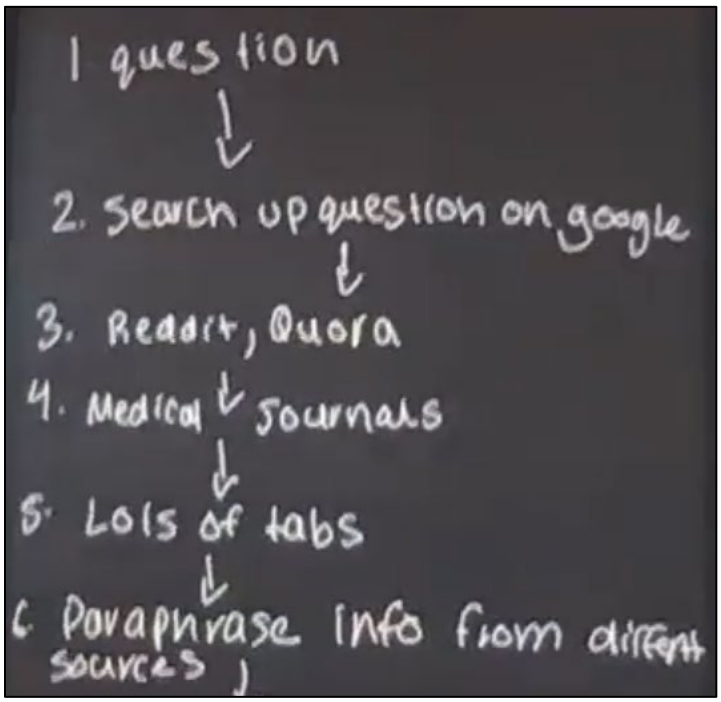
The tension between time, trust, confidence, and validation is illustrated in a secondary theme that was noted by just under a third (31%) of respondents: that of online communities providing validation. Students who described this behaviour used Reddit or Quora (Figure 2) not to find sources, but to confirm understanding. Students tried to ensure the validity of the information by seeking expertise associated with the posts. If claims were made to having some authority, such as being a university student, professor, or doctor, the information they provided was accepted as sufficiently credible. Interestingly, these same individuals who used online communities for validation contradict themselves by not accepting information that is editable anonymously on the internet (for example Wikipedia) but will use online communities to validate their ideas. This validation behaviour may be an outcome of the pandemic and having little contact with peers in person.

- “this little trick, I sometimes use Reddit. Like I search up my question then I type 'Reddit' at the end of it because that provides answers from people like who um I guess sort of an unfiltered way to get peoples like opinions that isn't like a formal website.” (P2)

- “There's a Reddit community for IB participants. Um so that like it really helped us hearing like other people's stories…..it was interesting to see how other people approached the same problem.” (P7)

Figure 2

Using Reddit and Quora for resource identification (P2)



Credibility is paramount

This theme was noted in 100% of participant interviews. As previously mentioned, the students were mostly researching to find credible sources (Figure 3); however, their perceptions and strategies for ensuring credible sources were highly varied.

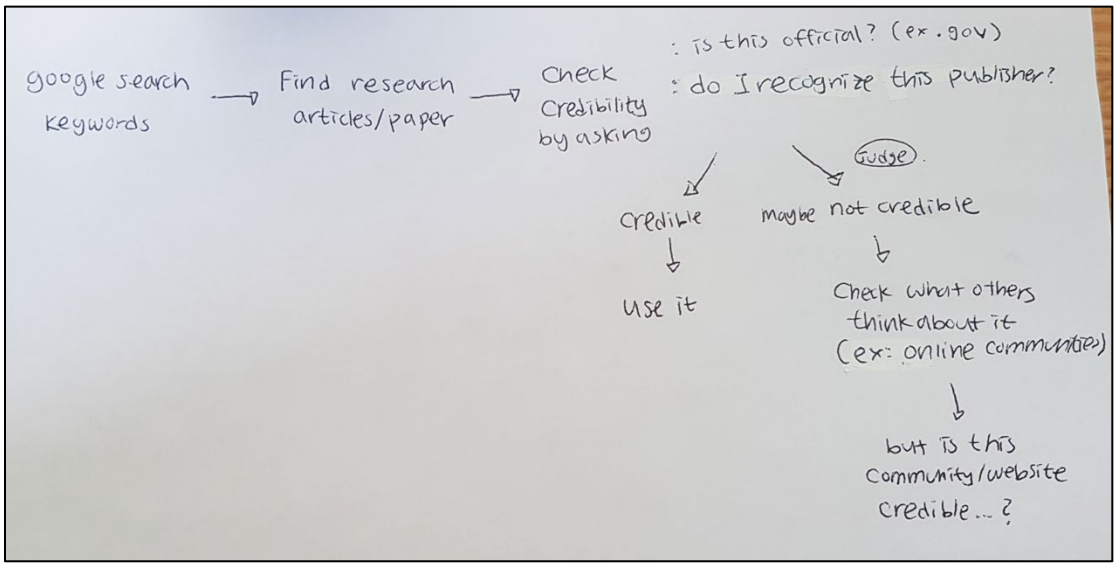
- “It was like embedded in like all of us that whatever you do don’t go with Wikipedia. You know if it has an author listed then that’s probably trustworthy.” (P2)

- “And like usually website that's .org. Um I usually check them out but I depending on what it is I don't usually cite it. Like I just read it like to learn more about it. I personally don't think it's that credible.” (P4)

- “I wouldn't really go towards anything that could be like peer edited or changed by anyone on the Internet.” (P5)

Figure 3

Process map supporting the theme of ‘credibility is paramount’ (P10)



Comfort with scientific literature and search skills

Another secondary theme indicated by 31% of participants was a comfort and general understanding of the scientific literature landscape. These students understood that scientific information was built on evidence, and consensus. There was even evidence of confidence in searching the databases.

- “We were just kind of exploring what research exists in the field just to get background knowledge on whatever we’d be presenting or discussing. We would read a lot of research study like abstracts. Um just to kind of get like a sense of

what existed….so like general consensus articles would be typically what we would read." (P5)

- "[The IB program] definitely influenced how I do research. I had a lot more experience finding like more scientific articles and looking at more scientific journals." (P9)

Student P5 wrote the following process map of seeking consensus from sources:

1. Research the topic (search keywords on Google, understand the topics conceptually)
2. Brainstorm ideas within the topic (What do I find interesting? What does the current research look like? What do I want to know more about? What can propose further research?)
3. Research the questions I've brainstormed on mainstream search engines
4. Research the questions I've brainstormed on databases provided by HSL
5. Once I find interesting sources of information and solidify my knowledge on the topic, I will typically derive a final research question
6. Look for studies / articles explaining consensuses in science relative to my research question on credible sources and databases

From these six subthemes three overarching themes were identified, as can be seen in Table 2. The data from the process maps created by the students strongly supported each of the three themes.

Perceived expectations

The students in their interviews commented often on the expectations of themselves and their teachers. They also commented on their expectations of the library.

Tensions between time, trust, confidence, and validation

Another overarching theme identified from the fall interviews was interconnectedness between time, trust, confidence, and validation. For example, time-saving strategies used would often contradict the students' credibility goals—they would sacrifice credibility to save time. They would also boost their confidence in their choice by seeking validation, which impacted their decision-making around what sources to trust.

Impact of high school specialization programs

A final overarching theme was the impact of high school specialization programs. The data suggests these programs have an impact on students' comfort with scientific literature as well as database search skills.

Winter Interviews

By the winter of 2023, the students had completed their Interdisciplinary Questions in Health and Inquiry courses. They also finished a required course that was co-taught by health sciences librarians called Praxis Pathways where they learned basic database searching skills.

Ten of the original 13 students completed the winter interviews. As with the fall interviews, four subthemes were identified for the winter interviews, with two overarching themes (Table 3).

Table 3

Winter interview themes

Themes	Number of times mentioned*	Percentage of participants who mentioned the theme
Tensions between library research as saviour and burden: The library did save us / I love my new skills	53	100%
Tensions between library research as saviour and burden: This is too much work	16	79%
Choosing own path: Not using library resources	10	50%
Choosing own path: Format preferences guide choices	4	20%

*Frequency calculation based only on interview vocalized data.

The library did save us/I love my new skills

This theme, present in 100% of the winter interviews, focused specifically on the resources the library provides, particularly the databases. Students mentioned using books and how this makes them feel more assured that their information is reliable. Along the same lines, students expressed appreciation for the skills they had acquired since September.

- “I think that using the database is just better for specific research. So, if I want to do a search that is on one very narrow topic. It's better to do a database search and get just few results, rather than doing a Google search and getting millions of results. (P9)“

- “I've been using textbooks a lot. And even just in general. I just notice that there's a lot of great books in all the libraries at McMaster.” (P10)

- “Also being able to find specific information which I think was what I was struggling with. I didn't want to put in the effort to learn to use the databases, but I did eventually, and I love them.” (P12)

This is too much work

However, in contrast, 79% of students (often the same as those from the previous theme) also expressed that database searching overall was tedious and was not saving time, so they instead shifted to Google searching and new frustration (Figure 5).

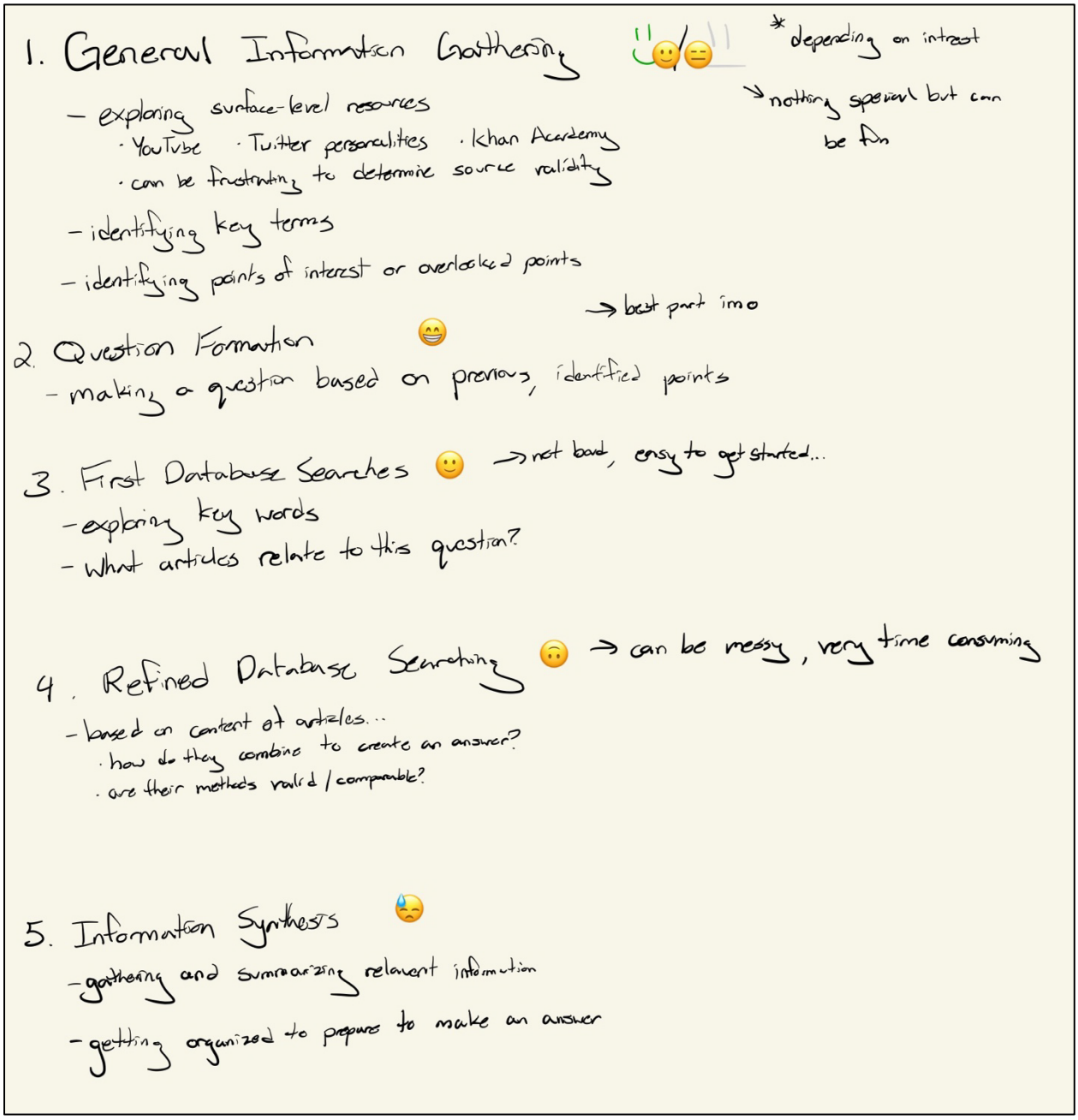
- “Sometimes using like a database is really tedious and kind of like, it gives you like great results but it's like a longer process. Sometimes it's tempting to just like, go on your phone and use Google rather than getting on a laptop and typing in all your searches and like putting them together and combining them and stuff.” (P1)

- “It's also super interesting though to like realize how much thought should go into a research question, and like the actual search for it. So, it definitely is like tedious. Which makes it frustrating at times.” (P7)

- “Like the pure amount of time you have to invest in going through all the sources that come up on databases, because there's so many, even with the relevance. And then I think the research process itself, like searching is so much easier and faster. But I think the results that you get you obviously can't use all of them. So, it's yeah, it's going through to the results, reading the abstract.” (P5)

Figure 5

Frustration with database searching came through more strongly on the process maps than the verbal data (P8)



Not using library resources

50% of the students shared that they had not substantially changed their research process and are still using Google (Figure 6), though contradicted themselves by sharing sentiments about the database search experience. Many of the students expressed that they had not done ‘real research’ yet. These same students defined

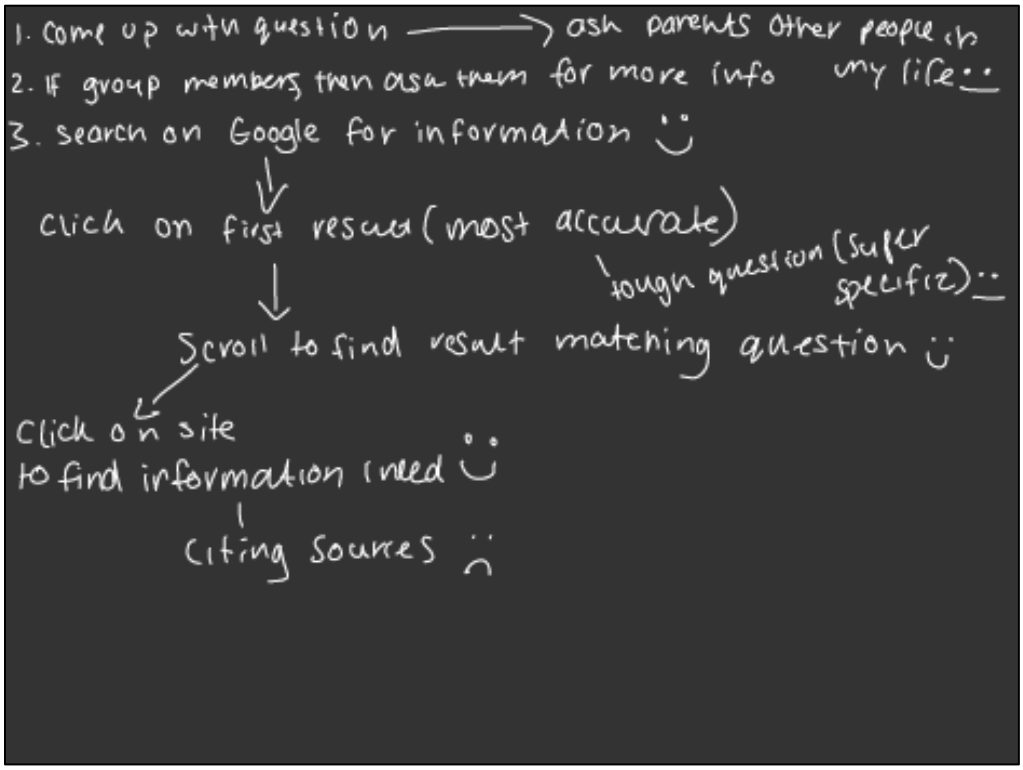
research as looking up credible sources for an essay. They had learned the skills but had not yet needed to apply them for an assignment.

- “I would say I still use Google, but I try to use like Google Scholar when I'm trying to look for credible information and stuff.” (P12)

- “I would still start with Google, probably especially if on the topic that I'm not familiar with yet. Or I don't have a set topic that I want to look at.” (P9)

Figure 6

Process map with no mention of library resources, only Google (P12)



Format preferences guide choices

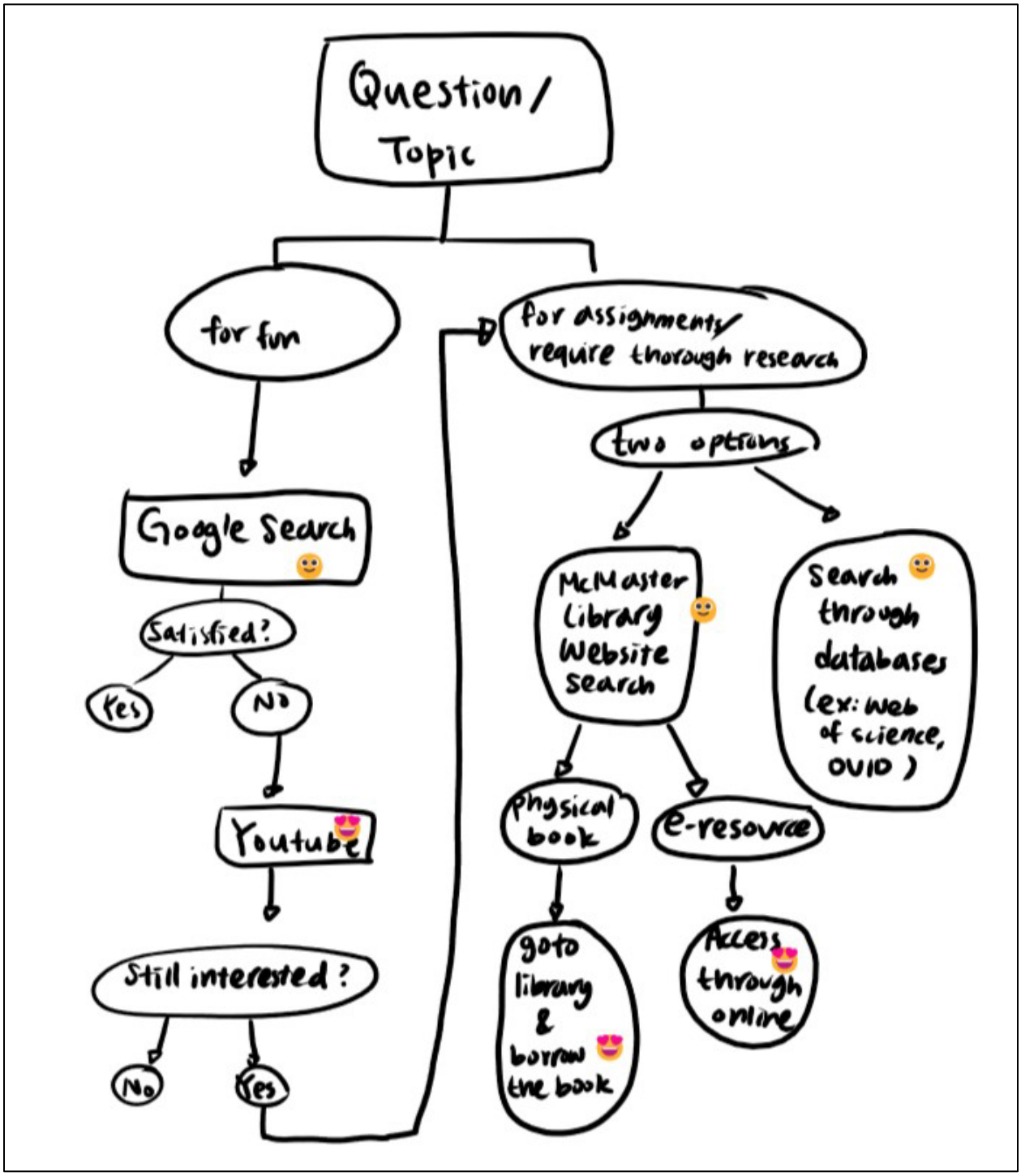
A contradictory theme, present in 20% of the winter interviews, was identified from comments about making choices based on formats (Figure 7). These students preferred to find sources through podcasts, select specific databases because they provide an audio option, or read physical print books.

- “I like to read and listen to articles which I think a lot of the databases have like they can read it to you.” (P12)

- “So I think it's definitely just like the time it takes in like the tedious nature of typing and everything.” (P1)

Figure 7

Physical books were a format chosen as a less distracting alternative to online research (P10)



From these four subthemes, two overarching themes were identified:

Choosing own path

The first broad theme identified in the data for the winter interviews was that of the students choosing their path—one different from that being taught. Students who had been using online forums as a tool for validation no longer believed these tools to be credible sources. Interestingly, this theme came through in the verbal data but was contradicted in the process map analysis. The process maps strongly illustrated changes in the students' process. They showed more focus on search question development with the search as the central focus of the process; the majority shifted to database searching over Google and online communities.

Tensions between library research as a saviour and a burden

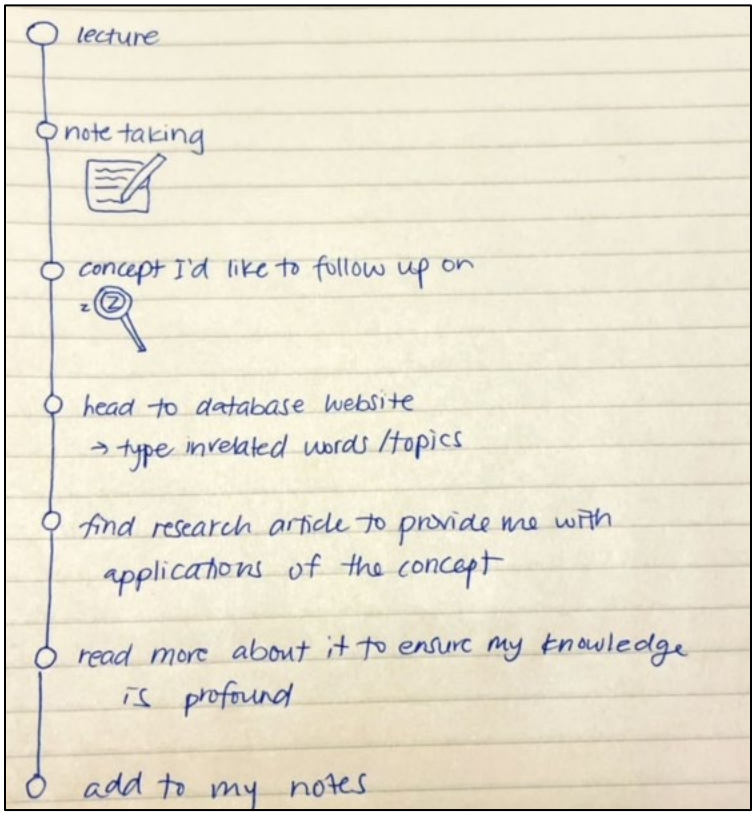
Another broad theme was that the students' frustration with the search process had both increased but also decreased with their new access to library resources and accompanying search skills. There was a tension suggested between the library research process as a saviour but also as a burden. The process maps supported this theme and also weighed more heavily on the side of an increase in frustration with database searching. However, these students were approached in January and may have been at the peak of a new learning curve.

Discussion

Despite the interview preamble defining research as "looking up any information online," some students continued to define research only as looking up credible sources for their papers. Others also included researching to learn or solidify their understanding of a new concept. The process maps illustrated this understanding of research (Figure 8) quite well. Depending on the goal, students would have different strategies, use different resources, and have different standards for making decisions. Given that the end goal for many of the students was finding credible sources, the processes illustrated in their maps were primarily focused on resource identification. The maps created in the fall reveal some insights that did not come through in the verbal data: the processes gave little weight to the search itself, keywords, or concept identification. The maps created in the fall interviews were highly linear, with little iteration expressed. Most of the students' research, as it was conceptualized, followed a step-by-step process.

Figure 8

Process map of the student research process including conceptualization of the definition of research as an activity to solidify learning (P1)



Returning to the original research question (*What problems and opportunities within the student online user experience can be uncovered by studying the perceptions and behaviours of undergraduate health sciences students when conducting online library research?*), several problems and opportunities can be identified.

The theme of *credibility is paramount* identified in this study suggests that despite societal concerns that novice researchers, adolescents, and undergraduate students are unconcerned and unskilled at identifying credible information for their schoolwork (Wineburg et al., 2016), these health sciences students are highly aware of credibility's significance. The students' perceptions and behaviours confirmed findings on the importance of convenience for this demographic (Biddix et al., 2011; Connaway et al., 2011) but also demonstrated how dedicated these students were to doing high-quality research. Unfortunately their secondary school experience, potentially impacted by pandemic restrictions, was less than ideal in meeting students' high expectations. Opportunities regarding the user experience include using language on library websites and online learning guides to highlight this desire for reliable, credible information.

One way the user experience of online research can be broken down is into reso urce identification and the search process itself. When focusing on the process of resource

identification, as the themes *credibility is paramount*; *you want us to do what?*; and *the library will save us* illustrated, library resources are often touted as credible. Therefore, they are perceived as simplifying the process for students who are accustomed to identifying their resources on Google. Because the students lack an understanding of what is considered authoritative in a web context, they place a lot of hope in authoritative sources as an improvement. As a result, the students' perceptions of these resources before using them are often positive. Ironically, the students' expectation that the library will make research easier sets up a user experience expectation that is difficult to achieve given the complexity of academic research. The students have yet to perceive research as a skill to be developed. There are clear opportunities for secondary schools to provide students with superior resources and skills rather than leaving them to frequently rely on Google.

Similarly, the theme *I can do this myself* presents an opportunity for further exploration around the lack of uptake of library resources and whether it results from a perception of a negative user experience of these resources. In terms of turning to *online communities* to support background learning and resource identification, there are opportunities for librarians to learn from these platforms. Interesting themes around the validation of sources and seeking consensus among experts confirm previous research in this area (Metzger & Flanagin, 2013). Further research is needed to understand how these students' experiences and the contradictions that lie within them were impacted by socioeconomic factors.

Problems arise when the students find the search process and using their newly acquired database searching skills to be *too much work*. In line with theories such as gratification theory (Chatman, 1991), these students were dismayed by the work involved with conducting academic research. The students who received more training in IL skills seemed to demonstrate that this increase in skill positively affected their user experience with search in health sciences databases. While students will often describe the user experience of databases as poor because of too many search results, this could be an issue with their skills rather than the interface. There are opportunities to ensure our user experience conversations make the distinction between true interface frustrations and legitimate learning of a complex task.

There are always ways to improve interfaces for usability. Understanding how students perceive library resources provides opportunities to inform technologies designed for information retrieval, such as dictating search and providing audio formats. When librarians do not strive to create a positive experience for students, there is a risk that they will turn to shortcuts and easier paths. Understanding the broad context of where students are coming from can help to inform how to make experiences of the library's online resources more positive while also ensuring students continue to learn the necessary critical thinking skills for conducting academic research.

This study aimed to address the student research process in the health sciences and what opportunities could be uncovered. At first glance, the students who specialized in science programs in secondary school came to university with an increased skillset in seeking credible sources. However, many of the students described learning during

their elementary years, unrelated to their science specialization. This is in contrast to earlier research (Julien & Baker, 2009) which did not focus on secondary students in the sciences. What is notable from the students enrolled in science specialization programs was their understanding of how scientific literature is created and different levels of evidence (e.g., consensus articles). While this research is not meant to be generalizable, it suggests a need for further exploration of this relationship.

The analysis revealed that the second research question (*how does the student user experience when conducting online research change over the course of their educational journey?*) was problematic. Since the interview instrument was not focused on a particular interface, it was not possible to make a direct comparison. This is a recognized limitation of this study. Following up with the students over time showed their new skills were appreciated but they were also deep within a new learning curve—any frustration expressed may have reflected this. That being said, this study reveals that exploring the intersection between user experience and IL is a worthwhile exercise that can shed light on underlying perceptions and motivations within both fields. Within the academic library context, incorporating changing perspectives over time as separate use cases when making design decisions for online resources, websites, and learning objects is recommended. How would a student with zero database experience and an expectation for an easier experience when entering university be better guided through our library resources to not push them back to Google? It may be possible to do better at managing student expectations through interface design.

Because this study was undertaken immediately following the COVID-19 pandemic lockdowns of 2020–2022 it provides a unique window into how this experience impacted student choices and behaviours when conducting online research at the point of entering university and then further along in that first year. Two aspects of the data in particular may reflect a shift in behaviours post-pandemic. The first is the reliance on Google when the switch to online learning may have inhibited finding alternative avenues for conducting research. And the second is the validation of information through online communities. However, this was not the focus of the study but instead a byproduct. Opportunities exist for future research on student use of online communities such as Reddit during their research process.

Conclusion

This study focuses on the intersection between user experience and IL for first-year health sciences students at an academic library. The conclusions are:

1) Credible information is highly valued among students in the health sciences and they hope to find it more easily at an academic library. This result must be taken within the geographic context (Ontario, Canada) and may not be generalizable to all students. However, when designing library instruction and user interfaces, including these use cases and personas in their development would be valuable.

2) Resource identification is equated with the online research process, with little thought given to keywords or search strategies. The students have yet to see

research as a skill that needs to be developed. Managing first-year student expectations through library instruction and interface design should be a priority. Ideally this could be developed in secondary school.

3) While the study design did not provide a clear picture of how the student experience changed positively or negatively over time, the research did shed light on how user experience shifts not only from undergraduate students to graduate students, or from one discipline to another, but even within these typical demographic scenarios. Understanding the complexity and variety of use cases across the spectrum can help to make interfaces and IL instruction more usable and effective.

This research is important for academic librarians to bring insights to both their user experience work as well as their teaching and instruction practices with first-year undergraduate students in mind. The context of the study in a health sciences faculty may make the results particularly useful for science and health sciences librarians. Moreover, exploring the student research process through both user experience and IL lenses is a worthwhile exercise that can illuminate the underlying student perceptions and motivations for both fields.

Acknowledgments

Canadian Health Libraries Association for funding this research project.

Ethics Approval and Positionality Statement

Ethics approval was obtained from the Hamilton Integrated Research Ethics Board (HIREB).

Braun and Clarke's Thematic Analysis involves identifying themes of meaning across the dataset. This method was chosen due to its inductive nature. The method encourages reflection from the perspective of the researcher and "acknowledges the inherent subjectivity of the researcher's analysis. The researcher's own experience contributes to the final analysis" (Braun & Clarke, 2022). This study was conducted by a non-neurodiverse, White, cis-gendered, able-bodied, Canadian settler working as an academic librarian.

References

Asher, A., Duke, L. M., and Wilson, S. (2013). Paths of discovery: Comparing the search effectiveness of EBSCO Discovery Service, Summon, Google Scholar, and conventional library resources. *College and Research Libraries*, *74*(5), 464–488.

Asher, A., and Duke, L. M. (2011a). Ethnographic research in Illinois academic libraries: The ERIAL Project. In *College libraries and student culture: What we now know*. American Library Association, 13-24.

Asher, A., and Duke, L. M. (2011b). Searching for answers: Student research behavior at Illinois Wesleyan University. In *College libraries and student culture: What we know now*. American Library Association, 66-76.

Beisler, M., and Medaille, A. (2016). How do students get help with research assignments? Using drawings to understand students' help seeking behavior. *The Journal of Academic Librarianship*, *42*(4), 390–400.

Biddix, P. J, Chung, C. J., and Park, H. W. (2011). Convenience or credibility? A study of college student online research behaviors. *Internet and Higher Education*, *14*(3), 175–182.

Braun, V., and Clarke, V. (2022). *Thematic analysis: A practical guide*. SAGE.

Brem, S. K., Russell, J., and Weems, L. (2001). Science on the web: Student evaluations of scientific arguments. *Discourse Processes*, *32*(2–3), 191–213.

Chatman, E. (1991). Life in a small world: Applicability of gratification theory to information-seeking behavior. *Journal of the American Society for Information Science*, *42*(6), 438–449.

Connaway, L. S., Dickey, T. J., and Radford, M. L. (2011). If it is too inconvenient, I'm not going after it: Convenience as a critical factor in information-seeking behaviors. *Library and Information Science Research*, *33*(3), 179–190.

Cordes, S. (2014). Student perceptions of search tool usability. *Internet Reference Services Quarterly*, *19*(1), 3–32.

Demir, F., and Parraci, W. (2018). The more complex the less success in online library services: Evaluating the user experience for international students. *Issues and Trends in Educational Technology*, *6*(2).

Denton, A. H., Moody, D. A., and Bennett, J. C. (2016). Usability testing as a method to refine a health sciences library website. *Medical Reference Services Quarterly*, *35*(1), 1–15.

Dolničar, D., Boh Podgornik, B., Bartol, T., and Šorgo, A. (2020). Added value of secondary school education toward development of information literacy of adolescents. *Library and Information Science Research*, *42*(2).

Dominguez, G., Hammill, S. J., and Brillat, A. I. (2015). Toward a usable academic library web site: A case study of tried and tested usability practices. *Journal of Web Librarianship*, *9*(2–3), 99–120.

Francke, H., Sundin, O., and Limberg, L. (2011). Debating credibility: The shaping of information literacies in upper secondary school. *Journal of Documentation*, *67*(4), 675–694.

Georgas, H. (2013). Google vs. the library: Student preferences and perceptions when doing research using Google and a federated search tool. *Portal: Libraries and the Academy*, *13*(2), 165–185.

Gibbons, S. (2021, May 16). *Three levels of pain points in customer experience*. Nielsen Norman Group.

Griffiths, J. R., and Brophy, P. (2005). Student searching behavior and the web: Use of academic resources and Google. *Library Trends*, *53*(4), 539–554.

Hargittai, E. Fullerton, L., Menchen-Trevino, E., and Thomas, K. Y. (2010). Trust online: Young adults' evaluation of web content. *International Journal of Communication*, *4*(0), 27.

He, D., Wu, D., Yue, Z., Fu, A., and Thien Vo, K. (2012). Undergraduate students' interaction with online information resources in their academic tasks: A comparative study. *Aslib Proceedings*, *64*(6), 615–640.

Head, A. J., Fister, B. and MacMillan, M. (2020). *Information literacy in the age of algorithms: Student experiences with news and information, and the need for change*. Project Information Literacy Research Institute.

Herrera, G. (2011). Google Scholar users and user behaviors: An exploratory study. *College and Research Libraries*, *72*(4), 316–331.

Howard, D. and Wiebrands, C. (2011, February). *Culture shock: Librarians' response to web scale search*. 2011 ALIA Information Online Conference, Sydney, Australia.

Jamali, H. R., and Asadi, S. (2010). Google and the scholar: The role of Google in scientists' information-seeking behaviour. *Online Information Review*, *34*(2), 282–294.

Jeng, J. (2005). Usability assessment of academic digital libraries: Effectiveness, efficiency, satisfaction, and learnability. *Libri (København)*, *55*(2–3), 96–121.

Joc, K., and Chang, K. (2010 February). *The impact of discovery platforms on the information-seeking behaviour of EFL undergraduate students*. VALA2010 Conference, Melbourne, Australia.

Julien, H., and Barker, S. (2009). How high-school students find and evaluate scientific information: A basis for information literacy skills development. *Library and Information Science Research*, *31*(1), 12–17.

King's Printer for Ontario. (2023). Transferable Skills. *Curriculum and Resources*.

Kuhlthau, C. C. (1983). *The library research process: Case studies and interventions with high school seniors in advanced placement English classes using Kelly's Theory of Constructs.* [Rutgers the State University of New Jersey]. Proquest Dissertations Publishing.

Kuhlthau, C. C. (1991). Inside the search process: Information-seeking from the user's perspective. *Journal of the American Society for Information Science, 42*(5), 361–371.

Kuhlthau, C. C. (2004). *Seeking meaning: a process approach to library and information services*. (2nd ed.) Libraries Unlimited.

Letnikova, G. (2004). Usability testing of academic library web sites. *Internet Reference Services Quarterly*, *8*(4), 53–68.

McMaster University. (2023). *Program: Bachelor of Health Sciences (Honours) (B.H.Sc.)*.

Metzger, M. J., and Flanagin, A. J. (2013). Credibility and trust of information in online environments: The use of cognitive heuristics. *Journal of Pragmatics*, *59*, 210–220.

Metzger, M. J., Flanagin, A. J., Markov, A., Grossman, R. and Bulger, M. (2015). Believing the unbelievable: Understanding young people's information literacy beliefs and practices in the United States. *Journal of Children and Media*, *9*(3), 325–348.

Miles, M. B., Huberman, A. M., and Saldaña, J. (2020). *Qualitative data analysis: a methods sourcebook*. (4th ed.). SAGE.

Moore, P. (1995). Information problem solving: A wider view of library skills. *Contemporary Educational Psychology*, *20*(1), 1–31.

O'Brien, H. L., and Symons, S. (2005). The information behaviors and preferences of undergraduate students. *Research Strategies*, *20*(4), 409–423.

Rowlands, I., Nicholas, D., Williams, P., Huntington, P., Fieldhouse, M., Gunter, B., Withey, R., Jamali, H. R., Dobrowolski, T., and Tenopir, C. (2008). The Google

generation: The information behaviour of the researcher of the future. *Aslib Proceedings*, *60*(4), 290–310.

Saunders, L., Severyn, J., and Caron, J. (2017). Don't they teach that in high school? Examining the high school to college information literacy gap. *Library and Information Science Research*, *39*(4), 276–283.

Smith, J. K., Given, L. M., Julien, H., Ouellette, D., and DeLong, K. (2013). Information literacy proficiency: Assessing the gap in high school students' readiness for undergraduate academic work. *Library and Information Science Research*, *35*(2), 88–96.

Thorngate, S., and Hoden, A. (2017). Exploratory usability testing of user interface options in LibGuides 2. *College and Research Libraries*, *78*(6), 844.

Way, D. (2010). The Impact of Web-scale Discovery on the Use of a Library Collection. *Serials Review*, *36*(4), 214–220.

Williams, S. C., and Foster, A. K. (2011). Promise fulfilled? An EBSCO Discovery Service usability study. *Journal of Web Librarianship*, *5*(3), 179–198.

Wineburg, S., McGrew, S., Breakstone, J., and Ortega, T. (2016). Evaluating information: The cornerstone of civic online reasoning. *Stanford Digital Repository*.

Young, S. W. H., Chao, Z., and Chandler, A. (2020). User experience methods and maturity in academic libraries. *Information Technology and Libraries*, *39*(1), Article 1.

Appendix

Fall Interview Instrument

1) Tell me a bit about yourself. Where did you go to high school?

2) What was your library like in high school? Did you use it at all?

3) Think about the last time you did an assignment for school. Where did you do the work for this assignment?

4) Did you need to look up anything for this assignment?

5) Think back to a time recently where you needed to do some online research. This could have been for the assignment or something else, following up on a lecture, or after doing some readings. It can include the library's resources or not. Draw a timeline or map to paint a picture of your online research.

6) Using the map, think about one of the tools you used, and can you comment on the user experience of using this tool when conducting your research?

7) Is there a time recently when you asked for help or talked through a project with someone else? How did (or did not) they help you?

8) Recall a time you were distracted during your online research. Describe that scene.

9) Do you have an upcoming assignment where you need to do some research? What do you plan to do?

Winter Interview Instrument

1) How has your first year at university been so far?

2) After reviewing your transcript from our interview in the fall, how has your online research process changed since then?

3) If your process has changed, please draw a new map illustrating what your process is now.

4) What is currently causing any frustration, if any, with how you conduct online research for your courses and assignments?

5) Is there anything else you would like to share about positive or negative experiences you are having with conducting online research? Anything else you feel I should know?