LIS 9410 Individual Study Final Report:

Inciting Curiosity and Embedding Information Literacy to Promote Scientific Literacy

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August 8, 2016.

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> "Information literacy rarely is something that stands alone. […It] is something that you *apply* to what you do. By and large, it's about application *to* research"
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> (A. Colgoni, personal communication, July 27, 2016).

Upon noticing the recurring appearance of the word *curiosity* in numerous academic libraries' mission statements, I laid the foundation for my investigation on how academic librarians could use curiosity-driven pedagogy to improve information literacy programming in Module 1, with an historical overview of curiosity and a discussion on its underlying causes that led me frame my individual study with the information-gap perspective of curiosity advanced by professor of economics and psychology George Loewenstein (1994). In Module 2, I underlined the parallel between the emphasis of "research as inquiry" within the Association of College and Research Libraries (ACRL)'s *Framework for Information Literacy for Higher Education* (2016a) and the "science as inquiry" pedagogical approach in the science education literature to make my case for academic libraries to promote scientific literacy as a practical and outcome-focused endeavour to fulfill their information

literacy mandates. After reviewing *Curious: The Desire to Know and Why Your Future Depends on It* by Ian Leslie (Yu, 2016a) and taking a quick tour around two post-secondary science literacy programs (Yu, 2016b) in Module 3, my personal quest in promoting science literacy via academic libraries was further solidified. In this final module, I will wrap up my individual study with a literature review on how the concept of curiosity is presented in the library and information science literature, and close with some first-hand insights from Andrew Colgoni, the Services Librarian for the Honours Integrated Science (iSci) Program at McMaster University, on promoting science literacy at an academic library.

Curiosity in Library and Information Science Literature

In identifying the calls to transform the curriculum, Randy Hensley (2004), who was the Public Services Division Head at the University of Hawaii at Manoa Library, demonstrated how curiosity fits within the context of individuality and intellect and argued that it is vital to incorporate curiosity and creativity into the teaching and learning of information literacy. "[C]reativity and curiosity cannot be taught in the traditional sense of teaching," Hensley (2004) asserted, "They are not skills, but rather characteristics of the individual that can be fostered by providing a rich environment that asks why, embraces problems and weaknesses in process" (p. 33). As an information professional who strongly believes that curiosity is an attribute that characterizes an inquiring intellect, I fully embrace Hensley's premise that learning is more of an individual endeavour (2004). Inquiry-based learning, with the emphasis on asking the "why" rather than the "how," fosters individual curiosity and

encourages knowledge creation based on a deeper sense of personal connection to the learning material and process. Furthermore, we can incorporate curiosity into our teaching through experience, practice and application via active learning techniques such as reflective writing and collaboration to ensure mastery of a skill or concept (Hensley, 2004). In the end, Hensley's article reminds me that information literacy is not only about how to find, use, and evaluate information. It is about navigating this complex world of information through personal inquiry and critical thinking.

In describing some of the theories and concepts of motivation, Small (1998) presented a model for designing motivating instruction and ways to apply motivation theories to information literacy instruction. Motivating information literacy programs not only help students acquire the skills they need to solve information problems, but also stimulate intellectual curiosity, encourage continued information seeking, help integrate information literacy skills with the curriculum, and spark a passion for lifelong learning. In applying the motivational aspects of information literacy skills instruction in post-secondary education settings, the majority of the strategies used by the librarians were to gain and maintain students' attention (Small, Dodge & Jiang, 1996; Small, Zakaria & El-Figuigui, 2004). These attention-gaining strategies brought in elements of surprise, novelty and variety, which essentially correspond to the curiosity-inducing factors identified by the pioneering curiosity researcher Daniel E. Berlyne (1960) as discussed in Module 1.

A motivating information literacy (IL) program "involves more than just teaching IL skills so that students can complete assignments or solve information problems. Information literacy is more than a framework of knowledge and a set of skills, it is an attitude that reflects an interest in seeking solutions to information problems, recognition of the importance of acquiring information skills, information confidence rather than information anxiety, and a sense of satisfaction that comes from research competence" (Small, Zakaria & El-Figuigui, 2004, p. 97). However, the "teaching-the-tool," repetitious nature of the majority of information literacy sessions focusing on database searching is detrimentally boring to most students. "Although students appear to value learning search strategies and using technology, the overemphasis on searching, without *situating* the search within a relevant problem-solving context and providing students with enough practice with feedback, may result in lowered student motivation" (Small, Zakaria & El-Figuigui, 2004, p. 115, emphasis added). Because students are usually concerned with grades, they will respond to information literacy lessons that are integrated to the curriculum by way of course activities or assignments (McKinzie, 1997). As one of the recommendations hence, faculty-librarian collaborations are key to produce effective and motivating information literacy programs (Small, Zakaria & El-Figuigui, 2004).

In a study exploring the role of personality in inquiry projects, Heinström, Sormunen and Kaunisto-Laine (2014) measured openness to experience with respect to learning-related information behaviour in terms of intellectual curiosity.

Spanning learning-related information behaviour across the entire inquiry process from information need to information use, the study showed that intellectually curious students preferred topics that enabled them to explore new ideas, felt confident in their inquiry, and favoured sources that contained alternative or even conflicting point of views. The results confirmed with the previous findings on personal factors in scientists' information behaviour that innovative people with high levels of intellectual curiosity tend to be process oriented (Palmer, 1991). It has been suggested that in order to bring about students' academic success, intellectually curious students need to channel their initial need for cognition into the seeking of a deeper understanding of any topic of interest (Komarraju et al., 2011), or into what Berlyne (1960) termed "epistemic curiosity" as discussed in Module 1. As Leslie writes, "knowledge drives curiosity as much as curiosity drives the acquisition of knowledge" (2014, p. 192). Similar to Leslie's argument, intellectual curiosity alone might prompt an information need but did not guarantee further engagement in information use (Heinström, Sormunen & Kaunisto-Laine (2014).

"Pulling bad science apart is the best teaching gimmick I know for explaining how good science works," states *The Guardian* science blogger Ben Goldacre (2011). Riehel (2012) argued that information should not be merely evaluated against a checklist of accuracy, authority, currency, objectivity and coverage, while the role of a teacher is "not to impart knowledge, but to facilitate dialogue, to prompt, and to challenge" (p. 229). By inciting curiosity through reflection and discussion about *The*

Guardian's "Bad Science" blog by Goldacre, Riehel (2012) engaged students in learning about information evaluation in the real-life contexts of the scientific publication cycle beyond peer-reviewed literature. Through exploration of self-selected blog postings, the students got the opportunity to develop their own inquiries, synthesize personal meanings and draw individual conclusions in the context of science communication and information resources in general.

Relevant to my own workflow and time management efforts, Bowler (2010) found that curiosity could incite feelings of both pleasure and pain in adolescents during the search process and that self-regulation of curiosity was required to balance their need to know with the need to produce when it comes to completing their school assignments. Meanwhile, information encountering is the serendipitous acquisition of information that requires low or no active involvement and expectation from an individual (Jiang, Liu & Chi, 2015). In attributing curiosity as the human cognitive characteristic that impels people to explore the unknown, Jiang, Liu and Chi (2015) modeled the explicit process and the implicit factors in order to clarify the "how" and "why" questions of online information encountering, and identified curiosity as one of the seven user-related factors that influences information encountering.

First-Hand Insights of a Services Librarian at iSci

While the role of teacher has become a fundamental responsibility for librarians (Kilcullen, 1998), Mednick (2002) described academic librarians as key members of instructional teams and instructional partners with faculty. Student-centered

teaching methods such as problem-based or inquiry-based learning are most effective for teaching information literacy skills in a way that is integrated with curriculum content, structure, and sequence (Association of College & Research Libraries, 2016b). Based on the candid conversation I had with the Services Librarian for McMaster University's iSci Program, Andrew Colgoni, science communication is *the* outlet that I was after in my *Module 2: Science Literacy and Inquiry* that bridges the gap between scientific literacy and information literacy (personal communication, July 27, 2016).

As mentioned in my second Module 3's blogpost, the iSci Program is a four-year specialized program centers on supervised, inquiry-based and project-oriented science learning. According to its program structure, "[e]ssential knowledge and skills from each of the fundamental scientific disciplines will be linked partly through 'thematic modules' that emphasize the overlapping content between discipline areas" (McMaster University, n.d.). The science literacy portion is fully integrated into the curriculum and co-taught with a faculty member, with its own share of grades allocated throughout the program alongside with the other science core subjects (A. Colgoni, personal communication, July 27, 2016). In Year 1, the weekly science literacy sessions introduce students to oral and written forms of science communication such as blogging and poster presentations used to communicate science to both scientists and non-scientists. Students develop the ability to convey scientific data and concepts clearly and concisely through weekly exercises. In developing the research skills critical to future course work, students

also become familiar with a variety of information sources, and how to find and use that information effectively. In the subsequent years, the program becomes progressively more self-directed while the information literacy portion becomes more personalized. The choose-your-own-adventure model allows students to participate in a variety of science communication outlets, including a student peer-reviewed journal, student-run symposium and various photojournalism opportunities, where the communication content along with its self-reflection are evaluated holistically by a team of faculty members depending on subject areas of focus as well as by the Services Librarian on its information literacy merits. Overall, constant feedback, group work and peer-learning are the key features throughout the entire program.

When asked about the challenges in differentiating between science literacy versus information literacy, Colgoni said, "I'm the librarian who's teaching the information literacy content, but I'm also teaching the science communication content, right? I guess one part of it is basically blurring the line between what it means to be teaching information literacy and what it means to be teaching science literacy. We try to make it part and parcel" (personal communication, July 27, 2016). According to Colgoni, students appreciate well-designed and relevant information literacy sessions that are curriculum-integrated more because they are contextualized and tie information literacy to students' other learning, thereby making it just-in-time as opposed to just-in-case.

Echoing Colgoni's remarks, "[s]tudents do not achieve information literacy by attending one or more library sessions. Rather, students learn relevant information skills when they are systematically integrated and sequenced throughout the curriculum," argued Ward (2006, p. 397) in his article *Revisioning Information Literacy for Lifelong Meaning*. Highlighting the crucial ingredients of students' curiosity, intrinsic motivation, self-understanding and "willingness to love the question" (p. 399), Ward (2006) contended that information literacy is a dynamic concept that requires more than just thinking critically about information for your next research paper. It requires a holistic approach that focuses on learning rather than teaching, and explicitly addresses meaning and quality of life so that students realize *why* to care. In order to help students become lifelong learners, "[w]e need to open the doors of communication, to be co-learners with them, to grow with them. We must live the reality that life is a relationship, not about separation by role or department," insisted Ward (2006, p. 401). By redefining failure and learning through problems, Hensley (2004) pressed that information-literacy instructors need to teach through the weaknesses and issues of information use and evaluation. This would encourage the co-learning partnership between instructors and learners. Last but not least, faculty buy-in is critical when it comes to integrating information literacy into the curriculum. In order to be successful as collaborators with faculty, we need to listen more carefully to the way that disciplinary faculty talk about information, and to respond in kind, urged Ward (2006).

"In science, being stuck can be a sign that you are about to make a great leap forward. The things that don't make sense are, in some ways, the only things that matter" (Brooks, 2009, p. 6). Over the course of my individual study, I have channeled Michael Brooks' inquiring spirit from that favourite quote of mine. Drawing upon my own aspiration to "better understand and advance the flow of scientific knowledge within and beyond the scientific community" (Yu, n.d.), this inquiry is personal, as it should be according to the literature in this final report. To me, promoting science literacy with the support from academic libraries makes total sense. Whether libraries would get the resources and faculty buy-in, however, is a different story, or another research project… ☺

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