Information Literacy in Nova Scotia:

Systematic Mapping of Learning Outcomes

By

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Abstract

Information literacy has never been more important for the functioning of the democratic process, and for autonomy over one's decisions. The Association for College and Research Libraries (ACRL) created a framework for information literacy, which lists six threshold concepts that an information literate individual should understand. This paper seeks to identify when and how information literacy is embedded in the 2015-2021 Nova Scotia high school curriculum learning outcomes. Information literacy threshold concepts were mapped in the learning outcomes using qualitative coding. Codes were built based on the three integrated abilities found in the ACRL's definition of information and their six threshold concepts. Findings from this study reveal where information literacy in embedded in the education system in Nova Scotia.

List of abbreviations used

AASL – American Association of School Librarians

ACRL – Association of College & Research Libraries

EU – European Union

EuPI – European Policies Initiative

IB – International Baccalaureate Diploma Programme

IL – Information literacy – a set of integrated abilities

LO – Learning outcomes

ML – Media literacy

SNS - Social networking sites

TC – Threshold Concepts

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Chapter 1: Introduction

An increasing number of Canadians use social media sites to find their news information, with persons between the ages of 18 and 24 being the highest number of users (Mai, 2020). Matsubayashi & Freund (2019) conducted a study that found 86% of Canadian undergraduate students used specific sites, including social media, to find news information, and 40% of Canadian undergraduate students used search engines, like Google. When using search engines, Canadian young adults often accept the first or second source that appears in a list of search results (Matsubayashi & Freund, 2019).

The problem

The statistics mentioned above are alarming given that social media sites and search engines do not prioritize accurate information. Instead, search engines are designed to populate results based on what their algorithm determines you, as a user, will like (Bergstrom & Bak-Coleman, 2019). Further, social media sites like Facebook, Twitter, Tik Tok, and Instagram do the same thing; they filter news feed results based on how you interact with information that their algorithm exposes you to. Based on how you respond, the algorithm customizes specific content in your social media feed (Bergstrom & Bak-Coleman, 2019). Accuracy, credibility, and reliability are not prioritized because there is no monitoring of these sites because information is created by everyone and curated by algorithms based on enjoyability, social media sites are a hot spot for misinformation(Bergstrom & Bak-Coleman, 2019). As Allcott and Gentzkow (2017) contend, most fake news circulation takes place on social media news feeds. This is the case because social media sites are "systematically exploited to manipulate and alter public opinion" (Ferrara, 2017, p. 1).

Misinformation remains a considerable concern for many around the world, especially countries where misinformation is used as a political tool against democratic processes. The chief communications officer of Finland states, "[fake news] aims to erode our values and norms, the trust in our institutions that hold society together" (Henley, 2020). Fake news is a form of propaganda that has the potential to influence our thoughts and decisions. Finland, like many other countries, recognizes that fake news disrupts the democratic process by spreading misinformation that makes us question our beliefs and decisions (Henley, 2020).

During the 2016 United States presidential election, Russia used disinformation as a tactic to confuse Americans and spread mass amounts of misinformation regarding the election (Badawy et al., 2018). Allcott and Gentzkow (2017) conducted research surveying 156 fake news articles that spread during the three months prior to the American election in 2016. Results from this study indicate the fake news articles analyzed were shared 37.9 million times (Allcott & Gentzkow, 2017). Misinformation is not only used by non-democratic countries as an attack on the democratic countries, but also by political figures. Politicians use misinformation as a political tool and politicians often side with information that coincides with their political agenda. In Allcott and Gentzkow's (2017) study, 73% of the fake news articles analyzed were anti-Clinton; only 41% articles were pro-Clinton.

Between lying and misleading rhetoric from politicians, especially from Donald Trump during his presidency, and the rate at which false/misleading information travels on the internet, public trust in the media has been declining (Allcott & Gentzkow, 2017). More and more radical news outlets, sensationalized clickbait, and false or misleading articles are appearing online. People will share information they find on their affiliated social media sites, where others are then exposed to the same radical information. Moreover, people can find information that aligns

with their beliefs far faster and in greater quantity than before the rise of internet because information is so easily accessed on the web. For these reasons, people all over the world are losing trust in their media and in their government; mass amounts of information and the way people access information on social media sites allows for mass spread of falsified or misleading information (Allcott & Gentzkow, 2017). In Canada, almost 70% of citizens believe scientific information is being shared in the media with selective interests in mind ("Public Trust in Science News Is Low," 2017). Most Canadians believe there is a specific agenda, set by those in a position of power, when scientific information is disseminated. An example of "selective interests" behaviour can be seen with anti-vaccination information. Though the belief in the anti-vaccination movement has been proven to be false, there are still people who publish information supporting the anti-vaccination movement as though the evidence they provide is evidence-based science.

The most recent case of this is the infodemic regarding the Coronavirus pandemic. Over 80% of Canadian Facebook users admit to having been exposed to at least one form of false information about the Coronavirus since January 2020. Many scholars have suggested promoting information literacy in the public as a possible solution for combatting mis/disinformation (Anderson & Johnston, 2016; Anderson & Rainie, 2020; Austin et al., 2012; Cronin, 2010; Horn & Veermans, 2019; Kahne & Bowyer, 2017; Kupiainen et al., 2008; Lähdemäki, 2019; Nold, n.d.; O'Neill, 2010; Rubin, 2020). Odede (2020) explains that information literacy is crucial for developing "skills and abilities necessary for the rapidly changing information environment of the 2020s and beyond" (p. 15).

Information literacy as a possible solution

The Association for College and Research Libraries (ACRL) (2015) defines information literacy as a "set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning" (p. 3). Information literates can retrieve, use, and disseminate information based on values and ethics regarding the influence and responsibility they have over sharing and disseminating information. Additionally, those who are information literate understand the importance of sharing new knowledge with their community, whether online or in-person, in an ethically responsible manner. In a natural science context, Downey (2016) describes information literacy as a "a cognitive process that can be taught as a series of discrete and observable skills because we assert that human behavior follows a logical and rational pattern" (p. 3).

Historical practice has viewed information literacy as a set of skills; however, in recent years, scholars have contested this idea. Mackey and Jacobson (2016) believe information literacy needs to be more than a set of skills; instead, it needs to include metacognitive self-reflection of one's contribution to information transfer. Information literacy gives people the tools and knowledge to make an informed decision during information transfer. At the same time, information literacy teaches people about information ecosystems and how people abuse them by spreading false information.

Research conducted by the Social Media Lab at Ryerson University show Canadians turning to social media for their information needs (Mai, 2020). Yet, very little research has been done regarding the promotion of information literacy in Canadian secondary education. Given the increasing number of Canadians who are looking to social media for their information needs,

this gap is important for understanding how much information literacy is promoted within the curriculum. As more Canadians turn to social media, there is an increasing need for developing information literacy skills and competencies to enable better understanding of information surrounding civic decision making and health practices. Additionally, as more people become accustomed to using social media as their primary resource for information, a higher rate of information literacy among the public is needed to navigate online information ecosystems.

Purpose of this study

The purpose of this research is to systematically map the promotion of information literacy embedded in Nova Scotia high school courses and apply those findings to educational practices, curriculum development, and future research in the field of information literacy instruction in Canada. Currently, there is no research mapping information literacy in the Nova Scotia secondary education system.

In this thesis, I explore how information literacy competencies are reflected in the learning outcomes of courses in the Nova Scotia high school curriculum. I performed an abductive case study of the Nova Scotia curriculum using the ACRL's information literacy threshold concepts for the purpose of using the data to recommend future research regarding improvements in practice and policy. Broadly, I am interested in the presence of information literacy in Nova Scotia high school learning outcomes.

Research questions

In designing this study, I wanted to explore which Nova Scotia high school courses promote information literacy, as seen in their learning outcomes, and what aspects of the ACRL

information literacy framework appear more frequently in Nova Scotia high school courses. To explore this topic, I sought to answer the following questions:

1. In what courses is information literacy promoted in the Nova Scotia high school curriculum and is there potential for indirect acquisition?
2. Which integrated abilities, as seen in the ACRL's definition of information literacy, are promoted in the Nova Scotia high school course learning outcomes?
3. How do the Nova Scotia high school learning outcomes promote foundational concepts of the ACRL's *Information literacy for higher education framework?*
4. In what grades are information literacy skills being developed in the Nova Scotia high school curriculum?

Chapter summaries

Chapter 2 of this thesis provides background information on how Canadian use information online and the condition of online ecosystems, specifically social media sites, and how promoting information literacy contributes to the development of more critical and savvy information users. Additionally, this chapter provides insight into the ACRL's information literacy framework. The ACRL's *Information literacy* document contains three integrated abilities, as outlined in the ACRL's definition of information literacy and six threshold concepts that further describe the three integrated abilities. The six threshold concepts provided by the ACRL's *Information literacy framework for higher education* will be described in detail as they were used to create coding schemes for this research. Chapter 3 of this thesis outlines the methods used to conduct this research. A systematic mapping of learning outcomes was conducted to explore how and where the ACRL's information literacy integrated abilities and the

six threshold concepts outlined in the ACRL's framework appear in individual courses from the Nova Scotia high school curriculum. Chapter 3 also provides an in-depth description of how the data was analyzed, including tables that describe how the ACRL's framework was used to determine information literacy embedded in the Nova Scotia high school curriculum are provided in this chapter. Chapter 4 and chapter 5 provide the results and discussion sections for this research. These chapters provide a detailed account of the results found in this study and how they are significant in assessing information literacy promotion within the curriculum. The discussion section also describes any limitations to the study. I conclude this study with recommendations for future research, both within Nova Scotia, and broadly within Canada.

Chapter 2: Literature Review

This chapter covers seven sections: Canadian social media use; Information disorders; Information ecosystems as enablers of fake news; the COVID-19 infodemic; Human information behaviours online; Information literacy education; and the ACRL's information literacy threshold concepts. The first section, Canadian socia media use, includes current information regarding young Canadians' social media use and which social media sites are most commonly used by young Canadians. The section on information disorders describes the difference between misinformation, disinformation, and malinformation. The third section, Information ecosystems & fake news, describes the way information moves online, specifically on social media sites, and describes how, because of the way social media sites operate, fake news spread more rapidly. The section on human information interaction online speaks to the human nature of information interaction. This section describes common behaviours associated with online information interaction. The last two sections highlight information literacy as an educational tool and give an overview of successful promotion of information literacy. The six threshold concepts provided by the ACRL's information literacy framework (2015) are the basis for the abductive coding methods used in this research.

Canadian social media use

In Canada, people between the ages of 18 and 24 are the largest group of social media users (Mai, 2020a). According to a survey conducted by the Social Media Lab in 2020, most Canadians have accounts across various social media sites: 83% of Canadians have a Facebook account, and of those Canadians, 77% use Facebook daily (Gruzd & Mai, 2020). Though this is the most used platform, its popularity among young people continues to decrease (Gruzd & Mai,

2020; Pangrazio & Selwyn, 2018). Research indicates young people see Facebook as a platform for the older generation (Pangrazio & Selwyn, 2018), and as a result, young people are looking to other platforms for their social media needs. Not only are young people (18-24 years-old) the largest population of Canadian Instagram account holders, but the growth rate of young Instagram users is almost double that of older age groups (Gruzd & Mai, 2020). Social media sites are becoming more and more integrated into the lives of the younger generations. A study conducted by Matsubayashi & Freund (2019) found young adults in Canada seek their news information from social media platforms. This information seeking behaviour is not isolated to Canada; a study conducted by Project Information Literacy (2018) found that 89% of American college students get their news from social media. What should be of concern is the amount of fake news that spreads on these sites. Social media sites are super-conductors for the spread of all types of distorted information (Allcott & Gentzkow, 2017).

Information Disorders

There are three kinds of information disorders: malinformation, disinformation, and misinformation (Kandel, 2020).

The main distinction between malinformation and other forms of falsified information is that malinformation is usually hard to fact check because it is often private information about someone meant to harm their person or reputation (Kandel, 2020).

Disinformation is financially, politically, psychologically and/or socially motivated and is the spread of intentionally falsified information for the purpose of harming another (Kandel, 2020). In today's world, misinformation and disinformation run rampant, particularly on social media sites where the content is almost entirely user contributed. Misinformation is described as "false information that is spread, regardless of whether there is intent to mislead" (Definition of

Misinformation, 2021, para. 1). In the scientific community, being misinformed equates to both "holding inaccurate views and being uninformed about scientific facts and processes" (Scheufele & Krause, 2019). Kandel (2020) points out that misinformation often stems from disinformation; however, sometimes the person spreading the falsified information does not intend to do harm to another and people may not realize that the information they are sharing is false or deceptive. For the purposes of this paper, misinformation and disinformation refers to any type of information spread deceptively and is interchangeably used with the term "fake news."

Fake news

Fake news articles try to mimic real news articles by disguising disinformation or misinformation as legitimate news. Fake news does not follow standardized processes of evidence-based information seeking and adds elements that provoke conversation online with the purpose of reaching more viewers (Faix & Fyn, 2020; Lazer et al., 2018). For example, articles may become sensationalized or focus on an extreme circumstance that does not reflect the entirety of the situation, the purpose of which is to get more clicks from people viewing the headlines.

Information ecosystems as enablers of fake news

The term information ecosystem refers to all institutional, meso and macro forms of communication by which citizens are "affected by politics, day to day events and community issues…"(Levak, 2020). Some examples of information ecosystems include online news articles, communication across various communities, social media, and traditional communication outlets like radios, televisions, and print newspaper. Mackey and Jacobson (2016) explain the "internet has expanded and become such a vital part of our lives by encompassing the transmission of all

of our data, the chances for error have grown in tandem, and so, too, have the opportunities for deception on a massive scale" (p. 103).

Social media sites

The effects of fake news are magnified on social media sites (Allcott & Gentzkow, 2017). Scholars speculate a variety of reasons for this. Allcott and Gentzkow (2017) believe the low cost to advertise on these sites, how information is presented, and the algorithms in which these sites create small groups of individuals with similar ideologies are reasons for the rapid spread of inaccurate information. Social media sites like Facebook and Instagram gain their profits through marketing and advertising (Allcott & Gentzkow, 2017). Thus, the content we see on these sites is largely influenced by marketing manipulation and monetary gain. Allcott and Gentzkow (2017) contend that because it costs very little to create content on social media sites and because the user interface is usually through a small phone and only shows "thin slices of information," people's ability to determine the veracity of the information presented to them is difficult (p. 219). Social networking sites (SNS) allow economic and politically powerful people or organizations to control information (Guarda et al., 2018).

Gerrymandering and filter bubbles

Between gerrymandering and filter bubbles, people's social media news feeds never present information equally, allowing plenty of room for error. Gerrymandering is when people misperceive truth because of over-exposure or under-exposure to certain topics, political opinions, or social issues (Bergstrom & Bak-Coleman, 2019). Facebook uses algorithms with the main prerogative of adjusting content based on the actions of the user; this creates filter bubbles, which is when a user only sees an "algorithmically curated subset of [a] larger

conversation" (Bergstrom & Bak-Coleman, 2019, p. 40). Given the way social media sites algorithmically curate information for each user, gerrymandering becomes a big concern, especially during election season.

Sometimes gerrymandering is intentional; some people use social media platforms with the intentions of changing other people's perceptions of reality (Bergstrom & Bak-Coleman, 2019). For example, gerrymandering can be used during a federal election by exposing a person to more liberal supporters than conservative. This gives the impression that more people are voting for liberals than conservatives when the reality could be the opposite. It is a tactic used to encourage people to vote a certain way by controlling what a person is exposed to on their SNS (Bergstrom & Bak-Coleman, 2019). This along with the multiplicity of voices and the ease with which one can disseminate whatever information they choose has made it harder to determine the veracity of any information encountered in the online space. Julien and Barker's study (2009) shows that Canadian students do not understand how search engines determine which information is populated or considered relevant. A study conducted by Brisson-Boivin et al. (2021) supports this idea by highlighting that most young Canadians between the ages of 13 and 17 are not aware of how complex information ecosystems work. Thus, they are not aware of how or what information they are being exposed to nor why they are being exposed to it.

Human information behaviours online

There is support within the current literature to suggest that human psychology presents a major obstacle to an individual's ability to identify disinformation (Corbu et al., 2020; Kahne & Bowyer, 2017; Leeder, 2019; Tsipursky, 2017). We live in a world where decision making is influenced by emotions, subjective opinions, religious beliefs, and political alliances instead of truth (Tsipursky, 2017). While there seems to be a general acknowledgement within society that

fake news presents a clear danger to the democratic process, most people are reluctant to believe that they are susceptible to it (Leeder, 2019). In a survey conducted by the Pew Research Centre, only 9% of Americans indicated that they were not confident in their ability to identify fake news (Jang & Kim, 2008). A possible explanation for this is the "third person gap," which is the tendency for individuals to believe that they are less likely to be tricked by fake news than individuals belonging to opposing socio-economic or political groups (Corbu et al., 2020, p. 166). Additionally, other psychological explanations rooted in logical fallacies provide evidence for the human inclination to fall for disinformation, such as confirmation bias (Kahne & Bowyer, 2017). When seeking information, people tend to search for information that aligns with their beliefs (confirmation bias or directional motivation) and also tend to disagree or dismiss information that states otherwise (disconfirmation bias) (Kahne & Bowyer, 2017). Therefore, human psychology has an important role to play in the swift and easy spread of fake news online. It is difficult for people to accept claims, accusations, or facts that go against their belief system. In fact, the majority of the population's decision making relies on emotion and their own personal beliefs rather than objective truth (Kahne & Bowyer, 2017). In doing this, people hold information that aligns with their views to be a higher calibre than information that challenges their views (Kahne & Bowyer, 2017). The most recent wide-spread example of this phenomenon is the COVID-19 infodemic.

COVID-19 infodemic

COVID-19 is the most recent example of how falsified content can have severe repercussions on democratic processes and civic decision making. The amount of fake news circulation regarding the pandemic has caused a COVID-19 infodemic. For example, many Canadians are turning to SNS for their COVID-19 information, with Facebook and Reddit being

the most popular (Mai, 2020). Furthermore, a survey conducted by the Social Media Lab in May 2020 concluded with Canadians reporting exposure to COVID-19 misinformation on all social media platforms, including messaging apps (Mai, 2020). As Mai (2020) points out, while this suggests Canadians are able to identify some misinformation online, they also found that almost 60% of Canadians who spotted fake news on social media platforms did not report it supporting the notion that Canadians may not understand the role they play in contributing to a healthy information ecosystem. Social media companies expect its users to flag misinformation (Mai, 2020).

Our current social environment and human psychology work against democracy and the search for truth using social media platforms which are a breeding ground for fake news. Therefore, many scholars and educators are turning to information literacy as a possible solution (Eshet, 2012; Gretter et al., 2017; Henley, 2020; Horn & Veermans, 2019; Leeder, 2019; Phillips & Lee, 2019; Sample, 2020).

Information literacy education in secondary school

The idea of information literacy as a source of political power began in 1976 when Owens believed that "voters with information resources are in a position to make more intelligent decisions than citizens who are information illiterate" (Sample, 2020, p. 27). Connected to Owens' idea, the fact that most people, including youth, rely on the internet and social media to find news information, is a growing concern for information literacy scholars. In 2017, Gretter et al. conducted a study which concluded that 80% of middle school students are unable to distinguish between web ads and real news stories. People are using unverified platforms with user-generated content to source important information. A study conducted in 2019 found high school students were able to correctly identify 64% of fake news articles and

61% of real news articles (Leeder, 2019). Students with higher levels of critical thinking skills and verification skills performed better; however, their ability to critically evaluate information and use verification skills had no bearing on their willingness to share news stories they encounter online (Leeder, 2019). The statistics mentioned above provide insight on the urgency to address the growing problem of information illiteracy. However, there is little to no regulatory body for implementing information literacy in secondary schools in Canada.

The purpose of implementing information literacy in secondary education systems seems to be similar across many countries. Information literacy education for secondary students focuses on preparing students to be successful college students (Julien & Barker, 2009a; Varlejs et al., 2014; Walk, 2015). According to Eshet (2012), the most important skills for identifying disinformation and fake news is digital information literacy, which involves analysis and critique of the writing style and information contained within an online source to speculate regarding its veracity (Eshet, 2012). This concept is built on throughout the relevant literature, with several sources recommending an assessment of information based on language and syntax, and the identification of language-based indicators of falsehood such as shallow expressions and jargonistic phrasing (Conroy et al., 2016; Koc & Barut, 2016). Koc and Barut (2016) further break down these skills into four main concepts, identifying specific functional and critical criteria that can be used to assess critical thinking in students.

Information literacy education legislation is rare, with there only being one state in the United States having information literacy education legislation (Phillips & Lee, 2019). In 2015, the Utah State Government passed a law stating that elementary and secondary education institutions "provide for education and awareness on safe technology utilization and digital citizenship" (Phillips & Lee, 2019, p. 1). However, very little has been done to improve digital

citizenship after the bill was passed. Philipps and Lee's (2019) study contends that librarians and teachers have little support regarding digital citizenship and often need to develop their own approaches to teaching digital citizenship. Often, teachers are reluctant to receive help or offer class time to educate students on proper searching techniques and other information literacy skills (Correll, 2019).

Information literacy instruction in Canada

Julien and Barker (2009 conducted a study with high school students in Alberta, Canada to understand how the information literacy skills embedded in the grade 11 and grade 12 science curriculum translated into applicable information literacy skills. From this study, they found almost 60% of students used the internet to find their sources, with Google being the most used search engine (Julien & Barker, 2009b). Alberta's high school curriculum contains a document called "focus on inquiry" that supports information literacy skills (Julien & Barker, 2009b). The Government of Alberta describes inquiry-based learning as

> "a process where students are involved in their learning, formulate questions, investigate widely, and then build new understandings, meanings and knowledge. That knowledge is new to students and may beused to answer a question, to develop a solution or to support a position or point of view. The knowledge is usually presented to others and may result in some sort of action" (Alberta Government et al., 2004, p. 3).

This document highlights the importance of metacognition in inquiry-based learning. This means students become aware of their own thought processes (Alberta Government et al., 2004). The purpose of emphasizing inquiry-based learning in Alberta is for students to have the opportunity to develop life-long skills in information seeking, understand and cope with problems where a clear solution is not present, have the ability to "deal with changes and challenges to

understand," and develop life-long search strategies (Alberta Government et al., 2004, p. 3). Even though information literacy skills are explicit in the curriculum, so much so that they have a supporting document, Alberta students' search skills are "unsophisticated" (Julien & Barker, 2009, p. 14).

Other information literacy frameworks

Information Literacy Standards for Student Learning

The American Association of School Librarians (AASL) created an information literacy framework in 1998 that provides a topical conceptualisation of information literacy for secondary education. This framework has three main categories of learning: information literacy standards, independent learning standards, and social responsibility standards. For information literacy standards, student must meet three criteria; a student who is "information literate:"

- Accesses information efficiently and effectively;
- Evaluates information critically and competently;
- And, uses information accurately and creatively (American Association of School Librarians & Association for Educational Communication and Technology, 1998)

National Information Literacy Framework for Scotland

The *National Information Literacy Framework for Scotland's* definition of information literacy is the ability to understand information need, availability, how to find information, how to evaluate results, how to work with or exploit results, the ethics and responsibility of information use, how to communicate or share findings, and how to manage your findings (Irving & Crawford, 2018). Information literacy is an interactive process (Irving & Crawford,

2018). The education process for information literacy should include problem solving, specific objectives, activities and tasks, strategic planning, assessments and evaluations, and promote independent thinking (Irving & Crawford, 2018). Within this framework, secondary education is responsible for teaching information handling skills and defining information literacy. In secondary schools, students will learn planning and organising, defining a topic, identification of keywords, identification of suitable information sources, effective searching, evaluating information, understanding ethics and responsibility of use, and understanding how to communicate or share your findings (Irving & Crawford, 2018).

Finland's media literacy education

Learning information literacy skills in secondary education has proven to be successful in enhancing citizens' media literacy skills and critical thinking skills; the World Economic Forum considers Finland to have one of the best education systems in the world (Dickinson, 2019). Finland has historically been concerned with the education and critical thinking skills of its citizens and talks of embedding critical thinking in its curriculum date back to the 1970s (Kupiainen et al., 2008). In their report, Kupiainen, Sintonen and Suoranta (2008) state: "In many ways the history of Finnish media education can be perceived to be a part of the birth of Finland—the winning of independence, the development of Finnish language and the construction of Finish identity…" (p. 3). Finland uses information media literacy education as a defense mechanism against Russia which uses fake news to create tension within Finland (Henley, 2020). Finland's initiatives to educate its citizens in media literacy have proven to be successful. In the Media Literacy Index for 2019, released by the European Policies Initiative (EuPI) of the Open Society Institute, Finland ranked first for the ability to prevail against fake

news because of "quality of education, free media and high trust among people" ("The Media Literacy Index 2019," 2019, para. 1).

In the fall of 2016, the 2016 Finnish National Curriculum was implemented, which "understood that the skills and competences needed to succeed in society and working life were…dramatically changing and thus, education, pedagogy, and the role of the school itself needed to change" (Lähdemäki, 2019, p. 13). The system focuses on sustainable living and environmental education, which provides the basis for critical thinking in schoolwork, and applies it to every aspect of a student's life (Lähdemäki, 2019). As mentioned above, Henley (2020) explains,

> "In maths lessons, [elementary school students] learn how easy it is to lie with statistics. In art, they see how an image's meaning can be manipulated. In history, they analyse notable propaganda campaigns, while Finnish language teachers work with them on the many ways in which words can be used to confuse, mislead and deceive." (Henley, 2020, para. 2.)

Horn and Veermans (2019) concede that Finland's education system has led to "widespread critical thinking skills" (p. 23). Finland enhanced their curriculum to include a stand-alone course specifically about information and media literacy, while also embedding information literacy into all other courses, whereas the United States has only embedded information literacy into some of their courses (Horn & Veermans, 2019). In their study, Horn and Veermans (2019) used quantitative methods to compare results between students entering and leaving a two-year pre-university International Baccalaureate Diploma Programme (IB) in Finland and students in public schools from California, USA. The results of the study showed that the students in Finland scored significantly higher in recognizing fake news than those who did not take the stand-alone course (Horn & Veermans, 2019). The literature is entirely positive when discussing the Finnish school system with little negative feedback on the critical thinking curriculum.

The 2016 Finnish National Curriculum is creating more active and engaged citizens, suggesting very positive outcomes of incorporating information literacy into secondary education. However, there are few qualitative and quantitative studies of information literacy education outside of Finland, especially in Canada. It is difficult to determine the quality of information literacy education in Canada as there is little research on this topic. However, internationally, the ACRL framework has been successfully used as a tool for assessing information literacy promotion in curriculums and syllabi by many scholars (Anderson & Johnston, 2016; Dubicki, 2019; Khailova, 2021). Since the adoption of the framework, information literacy evaluation has evolved from a checklist of actions to a conceptual approach that is flexible and develops effective research strategies and critical evaluation skills for information encountered online (Faix & Fyn, 2020).

ACRL's Information literacy for higher education framework

The ACRL's *Information literacy for higher education framework* focuses on conceptualisation of information literacy rather than being skills based (ACRL, 2015; Latham et al., 2019). Metaliteracy, which is a "renewed vision of information literacy as an overarching set of abilities in which students are consumers and creators of information who can participate successfully in collaborative spaces", was a significant contributor to the creation of the *framework* (ACRL, 2015, p. 2). A study conducted by Gross et al. (2020) showed that students who received information literacy instruction were given skills-based information literacy instruction rather than conceptual learning. Latham et al. (2019) report librarians suggesting that the ACRL framework be used to guide instructors in developing learning outcomes, and to teach them over time by "focusing on the frame(s) most relevant to a particular session, for example, in relation to a specific course assignment" (p. 391). Those that implement information literacy

have noted that collaboration between professionals (i.e. librarians, others in the instructors' department) is an important component for implementing information literacy instruction (Latham et al., 2019). Information literacy instruction promotes an active learning pedagogy and provides students with more opportunities to apply what they learn (Latham et al., 2019). Both students and librarians have noted that being able to search for information and the ability to learn how to evaluate information is very important (Julien et al., 2020a).

Threshold concepts are "rooted in and developed around stumbling blocks in disciplinary learning," thus, they can be found in learning outcomes (Julien et al., 2020b, p. 4). The ACRL *framework* has six distinct threshold concepts: authority is constructed and contextual, information creation as a process, information has value, research as inquiry, scholarship as conversation, and search as strategic exploration (ACRL, 2015). Threshold concepts are

> foundational concepts that, once grasped by the learner, create new perspectives and ways of understanding a discipline or challenging knowledge domain. Such concepts produce transformation within the learner; without them, the learner does not acquire expertise in that field of knowledge. Threshold concepts can be thought of as portals through which the learner must pass in order to develop new perspectives and wider understanding. (ACRL, 2015, p. 9)

Authority is Constructed and Contextual

The *Authority is Constructed and Contextual* threshold concept focuses on ownership and authorship by defining types of authority and determining credibility, accuracy, reliability, and generally, the social nature of information. Authority, as a construct, is broken into three types: subject expertise, societal position, and special experiences (ACRL, 2015). Individuals with subject expertise are persons who have education and special training in a subject area.

Individuals with societal positions include persons with authoritative titles such as Queen Elizabeth or Prime Minister of Canada. Societal position also includes positions within smaller communities or cohorts such as actors or community leaders. The final type of authority listed in the ACRL's *Information Literacy framework for Higher Education* are those who have experiences that are unique within history. An example of this is persons from marginalized groups who have experienced colonialism and racism. People from marginalized groups experience oppression and discrimination in ways that are incomprehensible to those who have not experienced these things. Our lived experiences (or lack of experience) shape the way we perceive the world. *Authority is Constructed and Contextual* emphasizes that authority is presented in many forms and includes information from various types of media (ACRL, 2015). It also challenges the authority of information, including scholars, using research tools to determine credibility (ACRL, 2015).

Information Creation as a Process

Information Creation as a Process expands students' understanding of proper citation, intellectual property and the laws that govern it, and using information ethically (ACRL, 2015). This threshold concept develops students' skills in citation creation, understanding the difference between open access and paid resources, understanding the use of copyright laws and fair use, and in general, understanding the importance of proper recognition of others' work (ACRL, 2015). Additionally, students should learn the different information creation processes. For example, students should be able to recognize the difference between web ads and a news article. Students should also be able to recognize the difference between peer-reviewed articles and non-peer-reviewed work.

Information Has Value

The value of information is determined based on commodity, education, influence, negotiation and understanding of the world, and/or by civic, socioeconomic, or personal gain (ACRL, 2015). The value of information is different for everyone. The value of information is important for recognizing intellectual property. An information literate person possesses the ability to understand the importance and creation of appropriate citations or attributions. Information literates also recognize how information may be used to oppress marginalized voices (ACRL, 2015).

Research as Inquiry

Research as inquiry seeks to answer complex or innovative questions through processes that require problem solving that focuses on the needs of an individual, a profession, or society (ACRL, 2015). An information literate person discovers and interacts with information through a critical, yet open-minded analysis (ACRL, 2015). Research as inquiry focuses on the methodical approach to investigation (ACRL, 2015). Therefore, individuals who are information literate understand the importance of systematically approaching research through previous methodologies, or develop a new, appropriate methodology that challenges the boundaries of current research methods.

Scholarship as Conversation

New discoveries, interpretations, perspectives and/or issues are shared with scholars and professionals all over the world to exchange accurate, authentic, credible and reliable information. Participating in information sharing ensures accountability and challenges authority.

While participating in scholarly discourse, researchers, scholars, and professionals are made accountable regarding quality of work because ideas are contested, revised, and "weighted against one another" (ACRL, 2015, p. 8). New forms of conversation may enable voices that were previously silenced to be heard and recognized, like new scholars (ACRL, 2015). Additionally, sharing information and perspectives pushes academia forward through innovation, collaboration, and accountability.

Search as Strategic Exploration

Searching as Strategic Exploration is a process where the searcher sources information, broadly or comprehensively, by determining appropriate search strategies for scope, while also recognizing that the value of information is dependent on the nature of the study, whether the information is packaged formally or informally (ACRL, 2015). Information searching skills need to be adaptable to changing information environments.

Challenges for implementing information literacy instruction.

There are many challenges for implementing information literacy instruction. The most common challenges are lack of time, lack of support, and whether conceptual or practical learning is best.

Lack of Time

The main challenge instructors face when trying to incorporate information literacy into their lesson plans is the lack of time needed to understand information literacy enough to implement it effectively (Crary, 2019; Latham et al., 2019). Instructors in other disciplines may not have the conceptual knowledge to incorporate information literacy into their lesson plans.

This problem occurs at both the secondary education level and in higher education. Julien et al. (2020) reveals that students are learning how to search from instructors (in college and high school), librarians and in one-on-one help sessions, with college instructors being the most influential in setting research quality standards. Walk (2015) conducted a study at a High School Early College institution that looked at information literacy instruction in two high school history courses taught by professors with doctorate degrees. This study shows that even for the professors with doctorate degrees, "one had never heard of the term information literacy," while the other professor had heard of it but did not have a working understanding of information literacy (Walk, 2015, p. 295). Professors may have little practical knowledge of information literacy, which is why collaboration between librarians and instructors is important for implementing information literacy (Crary, 2019).

In the secondary school context, collaboration between teachers and school librarians could pose a possible solution to this problem; however, a study conducted by Crary (2019) showed that the main reason teachers do not collaborate with school librarians is because they do not have the time. Any extra time teachers have outside of class is used to prepare lesson plans and grade assignments and tests (Crary, 2019). When university librarians are given the opportunity to teach information literacy concepts to classes, they are often only given a "one-time shot" to teach students, which does not allow students the education opportunities needed to learn information literacy effectively (Latham et al., 2019).

Lack of support

In Nova Scotia, there has been a substantial decrease in school librarians over the last 10 years. In 2012, the Nova Scotia government laid-off 41 librarians in the Chignecto-Central region alone (CBC News, 2012). Nova Scotia librarians often work at more than one school.

Even if there is an opportunity to collaborate with teachers, there are not many librarians that work for the Department of Education & Early Childhood Development. This conundrum is not isolated to Nova Scotia; a study conducted in the United States showed that school librarians were being laid off and other librarians went unused (Correll, 2019).

The study conducted by Correll (2019) had 21 survey respondents who worked in high school libraries in Pennsylvania or New Jersey. Of those respondents, less than half reported any formal information literacy curriculum or information literacy learning outcomes; only three reported having information literacy integration, but only in the English Language Arts course (Correll, 2019). This study suggests that the reasons why there are issues in secondary school information literacy instruction could be the following: lack of a universal instructional methods; students pursuing various academic levels or; lack of collaboration between teachers and librarians. Students receive various information literacy skills and different levels of education, thus there is an imbalance of information literacy skills among citizens. There is also a lack of collaboration and teachers are resistant to help embed information literacy. Most teachers do not have the necessary information literacy skills, and their courses lack research assignments (Correll, 2019). Librarian participants in the Correll study (2019) have concerns that some students are graduating high school having never received information literacy instruction or research skills from a school librarian.

Conceptual vs. skills-based learning

In a study conducted by Latham et al. (2019) university librarians highlighted difficulties in using the conceptual framework compared to the *Information Literacy Competency Standards* because the framework requires a level of interpretation that the *Standards* did not. Information

literacy is not something that one obtains overnight. It is an impactful yet hard to detect change that takes place throughout a person's life (Latham et al., 2019).

Summary of literature review

This chapter has described information ecosystems online, and how Canadians seek information. This chapter also highlights the challenges of teaching information literacy to young people and how young people perceive their search skills. There is a need for developing information literacy in Canada, especially in younger generations. Very little research has been done regarding information literacy in secondary education across Canada and none has been done in Nova Scotia. This study seeks to understand where there is evidence of information literacy in the Nova Scotia secondary curriculum learning outcomes.

Chapter 3: Method

Introduction

This chapter describes the research methods used to collect and analyze data in the Nova Scotia secondary curriculum. Curriculum mapping was chosen as it "embraces the critical-thinking and life-long learning intents of the *framework for Information Literacy for Higher Education"* (Julien et al., 2020b, p. 6). Deductive research design using the six threshold concepts in the ACRL's *Information literacy framework* was used to create categories for coding curriculum learning outcomes. To accomplish this coding, 110 courses from the Nova Scotia secondary curriculum were extracted from the Nova Scotia Department of Education and Early Childhood Development's website and coded for evidence of information literacy promotion. There were three main steps to coding: 1. I identified whether each learning outcome had the potential to promote information literacy. 2. I broke down the ACRL's definition of information literacy so that each integrated ability was its own code. 3. I coded each learning outcome according to the six threshold concepts outlined in the ACRL's *Information literacy framework for higher education* documents.

Data collection

Nova Scotia curriculum documents

A total of 111 course documents were collected from the Nova Scotia Department of Education and Early Childhood Development's website. There are 165 courses offered between grade 10 and grade 12 in Nova Scotia. Only courses that were designed by the provincial government were included in this study. Learning outcomes from courses in 12 of the province's

16 subject areas were analyzed: arts education, business education and entrepreneurship, career education, English language arts, family studies, learning strategies, mathematics, physical education, science, skilled trades, social studies, and technology education. The breakdown of the number of documents used for the 16 subjects included in this study are as follows: arts education = 15; business education and entrepreneurship = 7; career education = 3; English language arts = 11; family studies = 7; learning strategies = 3; mathematics = 12; physical education = 6; science = 17; skilled trades = 3, social studies = 14; and technology education = 12. A breakdown of included and excluded courses for all subjects in the Nova Scotia high school curriculum can be found in Table 1.

Table 1. Number of courses included in this study.

Subject	**Total Courses**	**Excluded**	**Included in study**
Mathematics	13	1	12
Science	17	0	17
English language art	11	0	11
Learning Strategies	3	0	3
Family Studies	7	0	7
Physical Education	7	1	6
Technology Education	14	2	12
Skilled Trades	5	2	3
Social Studies	17	3	14
Arts Education	15	0	15
Business Education and Entrepreneurship	8	1	7

Career Education	8	5	3
Advanced Placement	20	20	0
Gaelic language	3	3	0
International Baccalaureate	7	7	0
Core French	3	3	0
Other Languages	6	6	0
Total	**164**	**54**	**110**

For each course in the Nova Scotia curriculum, the province provides a condensed document of all learning outcomes for that course, titled Outcomes. *Outcomes* is a condensed document of all the learning outcomes for the assigned course. The provincial government also provides two other documents for courses: the *Foundation*s document and the *Guide* document; however, the *Foundations* document is not consistently present among all courses. The *Guide* documents are typically around 200 pages long and have content not necessary for this study, such as pathways, assessments, suggestions for learning and teaching resources, confidentiality, and other important aspects of teaching and learning. This study focused solely on the learning outcomes for each course. For those reasons, the *Guide* document and the *Foundations* document for each course were excluded from this study. To maintain consistency, the compact briefing document about course outcomes was chosen as the main source of data. Any course that did not provide a bullet point PDF document called *Outcomes* was excluded from this study.

Courses excluded from this study.

The College Board's Advanced Placement Program (AP) documents were not included in this study because the AP curriculum is not regulated by the provincial government. The AP

program is governed by a not-for-profit organization, the College Board, where the Board of Trustees delegates and reviews materials for their programs (About Us | College Board, 2018). Since this research aims to understand the Nova Scotia curriculum, Advanced Placement courses were not included in this study. Like AP courses, the International Baccalaureate program (IB) creates curriculum materials and learning outcomes. They provide all schools with material to successfully implement the program and provide schools with tests at the end of the course. The provincial government is not responsible for developing learning materials and curriculum documents for the IB program; thus, it was also excluded from this study.

Further, core language courses focus on proficiency in vocabulary and dialogue. Students learn the fundamentals of grammar through listening, speaking, reading, and writing. Content is simple and focuses on retention and production of vocabulary and sentence structure. Language classes do not focus on acquiring new information or using information. Instead, language courses focus on the ability to communicate efficiently and develop independent skills in the specified language. Information literacy focuses on the content and quality of information, including retrieving, producing, synthesizing, and evaluating information. The knowledge practices and dispositions of the ACRL's IL threshold concepts are not consistent with the learning objectives of language classes. For those reasons, language classes were excluded from this study.

The province of Nova Scotia has two education systems: English and French. The French education system is known as Conseil Scolaire Acadien Provincial (CSAP). Admission into the CSAP school system requires at least one parent in the family to be francophone. All school documents are written in French. I am not bilingual thus, I must excluding CSAP from this study.

Extracted learning outcomes

Within the Nova Scotia secondary curriculum, courses that are offered both at the academic level and advanced level share the same learning outcomes. For example, Chemistry 11 and Advanced Chemistry 11 share the same document for learning outcomes, with Advanced Chemistry 11 having additional learning outcomes. In advanced courses, students must complete the learning outcomes for the academic level course plus additional learning outcomes outlined in the document. For this reason, all learning outcomes associated with both the academic and advanced courses were recorded as such. For example, all learning outcomes for Chemistry 11 were recorded as Chemistry 11, and not duplicated for Advanced Chemistry. Only those learning outcomes specifically for advanced levels of said course were recorded as advanced learning outcomes.

Coding learning outcomes for embedded information literacy

A total of 4352 learning outcomes were extracted from the curriculum documents. Another student and I coded all learning outcomes for this project. To maintain consistency, learning outcomes were first extracted from one course in technology education, two courses in science, and two courses in English language arts. Courses from these three subjects were chosen because they were hypothesized to be the most difficult to code. While coding, we confirmed consistency and addressed discrepancies for a total of 160 learning outcomes from the following five courses: Physics 11, Advanced Physics 11, Communication Technology 11, English 10, and English 10 Plus. Once all discrepancies were cleared, all coding took place synchronously so that both coders were able to consult with one another if it was difficult to determine appropriate codes.

Once each learning outcome was coded, I analyzed the codes to see which learning outcomes contained various integrated abilities and threshold concepts. The percentage of each information literacy threshold concept embedded in the learning outcomes for each course was calculated by counting the number of learning outcomes that included IL threshold concepts. The objective for calculating the number of outcomes that contain information literacy threshold concepts was to determine what aspects of information literacy are strongest and weakest in the learning outcomes. An example of learning outcomes that were coded for each threshold concept can be seen in Table 2.

Table 2. Sample of learning outcomes coded for each threshold concept.

Threshold Concept	***Knowledge Practice***	***Example from Curriculum***
Authority is constructed and contextual	Understanding and recognizing different types of authority and different ways of displaying authority (formally and informally); recognizing the importance of challenging authority, even of scholarly work; understanding the social dynamics and connections between and within information environments; and identifying one's voice as authoritative and understanding the impact of their participation in information ecosystems (ACRL, 2015)	"Articulate their understanding of ways in which information texts are constructed for particular purposes" (NS English Language Arts 10-12, p. 18)
Information creation as a process	Recognition towards information creation as a process and a responsibility; understanding one's creation as impactful. Creators of information recognize that different information needs require various information creation processes (ACRL, 2015)	"Articulate, advocate, and justify positions on an issue or text in a convincing manner, showing an understanding of a range of viewpoints" (NS English Language Arts 10-12, p. 26)
Information has value	Reference to citation creation, intellectual property, copyright education, and reference to open access; understand and acknowledge the systematic racisms of marginalized peoples in information creation and	"Consider social, ethical, and environmental implications of the findings from their own and others'

	dissemination; make decisions regarding where to disseminate and publish information; and continuing to advocate against issues of privacy and taking advantage of people's personal information (ACRL, 2015)	investigations" (NS Science 10 Guide, p. 2)
Research as inquiry	Create research questions based on current knowledge; understand how to limit the scope of the study through creating simple questions from the main research question; change research practices based on the type of research being conducted; organize, synthesize and draw meaningful conclusions based on analysis of information (ACRL, 2015)	"Collaboratively and individually plan, select, and use appropriate investigation methods, including fieldwork and lab experiments, to collect reliable data (qualitative and quantitative)" (NS Science 10 Guide, p. 1)
Scholarship as conversation	Includes all forms of communication, whether online, in person, recorded, written, spoken, etc. at the appropriate intellect level for the audience; acknowledging the work of others in one's work through proper citation; evaluation of others works and its contribution to knowledge acquisition (ACRL, 2015)	"Dealing effectively with different communication situations including those addressing unfamiliar audiences" (NS English 12 Outcomes, 2019, p. 112)
Search as strategic exploration	Systematically determines the scope, identifies contributors to specific information and access their data; changing search strategy based on the tools and software presented; and use divergent and convergent thinking when retrieving information (ACRL, 2015)	"Select text that supports their learning needs and range of special interests" (NS English 12 Outcomes, 2019, p. 113)

Identifying the potential for information literacy

All learning outcomes were extracted from the course *Outcomes* documents and recorded in Microsoft Excel. The first step in the coding process was to determine if information literacy was explicitly promoted in individual learning outcomes or if there was potential for information literacy to be promoted. The purpose of this is to understand whether information literacy is

explicit or not in the outcome. Some of the learning outcomes were explicitly requiring information literacy, while others had the potential to include information literacy but only if the instructor interpreted it as such. Regardless of if it was explicit or not, any learning outcome that was related to information literacy was included and assessed further. Determining sufficient evidence of mandatory information literacy in learning outcomes was dependent on keywords such as "analyze," "interpret," "illustrate," and "display" (See Appendix A), and conditional upon whether the verb in the learning outcomes was related to evidence-based information seeking, introspective writing, thinking critically, listening, or producing information. For example, the learning outcome "select and integrate information from various print and electronic sources or from several parts of the same source" (Chemistry 12, p. 2) requires students to seek information from various sources and combine that information to form new information. This learning outcome was then further coded as having information literacy. Learning outcomes where information literacy is less explicit yet there is potential for indirect acquisition were also coded and further assessed for information literacy. An example of this can be found in Biology 11: "propose courses of action on social, economic, and cultural issues related to Earth's carrying capacity and demands on natural resources, referencing the energy pyramid" (p. 3).

Introspective writing such as poetry and fictional stories were considered not applicable as they do not pertain to objective information. To determine if the learning outcomes promoted information literacy, an evaluation of the relationship between the action verb and the information interaction behaviour was determined. For example, the following learning outcome would be considered to have the potential to promote information literacy: "demonstrate awareness of the range of human and physical resources, including natural and built

environments, supportive of physical activity, sport, and recreation in the community, region, and province" (Physically Active Community 11, p. 2). This learning outcome uses the action verb "demonstrate," which relates to the third integrated ability, *use of information in creating new knowledge and participating ethically in communities of learning*, and because it is related to information retrieval. For that reason, this learning outcome is considered to have the potential to promote information literacy. In another learning outcome, the action verb "demonstrate" is attached to "creativity in all movement categories" so, for this study, I did not consider this learning outcome to be promoting information literacy.

At this stage in the coding process, I was also looking for evidence of social media literacy. To do this, I looked specifically for the words "social media," or "social networking sites," or anything to do with social networking platforms online.

Identifying the presence of information literacy integrated abilities

Integrated abilities are what make up the ACRL's definition of information literacy, which is a "set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning" (ACRL, 2015, p. 3). Information literacy conceptualizes these abilities as integrated with one another, rather than as separate, unrelated abilities. For this reason, when determining the difference between learning outcomes that explicitly promoted information literacy and learning outcomes that had the potential to promote information literacy, those that were coded as having at least two of the integrated abilities were considered to explicitly promote information literacy. Learning outcomes that contained only one integrated ability were considered to have the potential to promote information literacy but were deemed not explicit. It is important to distinguish between

the two because, as stated above, each of the three integrated abilities are conceptualized as working in conjunction with one another.

Reflective discovery of information

The first integrated ability is *reflective discovery of information.* It focuses on metacognition, which is "an awareness of one's own thought processes" (ACRL, 2015). It is an understanding of how one may perceive the information they are exposed to and how they process new information based on their culture, experiences, and privileges. Any learning outcome that included retrieval of information, or reflexivity was coded in this category.

Understanding how information is produced and valued

The second integrated ability*, understanding how information is produced and valued*, refers to understanding that information may be packaged formally and informally and that, how information is packaged does not dictate the quality and validity of information. Additionally, the second integrated ability includes understanding that different culture, ethnicities, and countries value information differently. Moreover, how information is produced and valued has a direct connection to one's personal biases and experiences. Any learning outcome that reflects this was coded as relating to the second integrated ability.

Use of information in creating new knowledge and participating ethically in communities of learning

The third integrated ability, *use of information in creating new knowledge and participating ethically in communities of learning*, refers to the production of information. Information literacy instruction teaches learners that their participation in information

dissemination is as important as their ability to find accurate information. The way we produce and disseminate information has a direct influence on the people we associate with. For those reasons, it is important to consider ourselves as a pivotal part of information transfer within information ecosystems. Everyone has the authority to minimize the spread of fake information by ethically participating in creating new knowledge and disseminating information. Any learning outcome that showed evidence of ethically participating in information transfer was coded as relating to the third integrated ability.

Identifying the ACRL's threshold concepts

Once the previous stage was complete, those learning outcomes that had a minimum of two integrated abilities of information literacy were coded for the six threshold concepts of information literacy. The threshold concepts were created so they could be adjusted and embedded into any course (ACRL, 2015). Additionally, the ACRL framework includes knowledge practices and dispositions, which are the learning goals of information literacy. Knowledge practices allow learners to practice information literacy skills in different ways to fully grasp the threshold concepts (ACRL, 2015). Dispositions describe the reflexive, ethical nature of learning information literacy. A disposition is a "cluster of preferences, attitudes, and intentions, as well as a set of capabilities that allow preferences to become realized in a particular way" (ACRL, 2015, p. 3). Therefore, students gain proper understanding of information they interact with and how their own perceptions of information may change based on culture and bias through disposition. The instructor is then able to measure how well students are understanding the concepts through knowledge practices.

Six codes were created based on the six information literacy threshold concepts: 1. Authority is constructed and contextual; 2. Information has value; 3. Information creation as a

process; 4. Research as inquiry; 5. Scholarship as conversation; and 6. Searching as strategic exploration. Each learning outcome was given a code of 0 or 1 that indicated evidence of the threshold concepts. Learning outcomes that require students to memorize certain factual content was not included. An example of such exclusion includes the following learning outcome: students are asked to "classify simple acids, bases, and salts based on their characteristics, name, and formula" (Science 10 Guide, 2019, p. 34). Once all learning outcomes were coded for integrated abilities and threshold concepts, I organized the data in an SQL database.

Data organization

Data from the study was examined to find commonalities among learning outcomes at various grades and across different levels of study. A relational data model was created to store the data in MySQL Server. The entity relationship diagram is available, along with all the documentation that provides information on the data, in the appendix.

Summary of methods

This chapter outlined the methods for data extraction. Using deductive coding, I coded the learning outcomes to find information literacy integrated abilities and threshold concepts. By doing this, I was able to better understand which aspects of the ACRL's *framework* are embedded in the learning outcomes of the Nova Scotia high school curriculum.

Chapter 4: Results

Introduction

Coding and analysis of course learning outcomes was helpful in determining where information literacy is most present in the Nova Scotia secondary curriculum. This chapter describes the results found in this study. The codes were analyzed to understand which integrated abilities and threshold concepts are present in each subject and in each grade.

RQ1: In what courses is information literacy promoted in the Nova Scotia high school curriculum and is there potential for indirect acquisition?

Figure 1 shows how many learning outcomes explicitly promote information literacy versus how many learning outcomes have the potential to promote indirect acquisition of information literacy. As you can see from the graph, most subjects have less than 25% information literacy promotion explicit in the learning outcomes. English Language Arts and Social Studies exhibit the most information literacy embedded in the curriculum, with English being 55% and Social Studies being 34%. There is a significant dip between English Language Arts and Social Studies in the number of learning outcomes containing explicit information literacy, with there being a 20% difference.

The least amount of information literacy promotion can be seen in Skilled Trades, with only 11% of the learning outcomes containing explicit information literacy. The subjects Learning Strategies, Family Studies, Career Education, Physical Education, Mathematics, and Skilled Trades all contain less than 20% explicit information literacy in the learning outcomes for those subjects.

Indirect acquisition

Interestingly, Social Studies has the highest potential for students to indirectly gain information literacy skills through implicit learning. Approximately 37% of the learning outcomes in Social Studies contain the potential to promote information literacy. On average, there are an additional 18.6% of learning outcomes where students have the potential to gain some form of information literacy competency. In Family Studies, Learning Strategies, Business Education & Entrepreneurship, and Social Studies, more learning outcomes were seen as having the potential to promote information literacy through indirect acquisition than were explicitly containing information literacy.

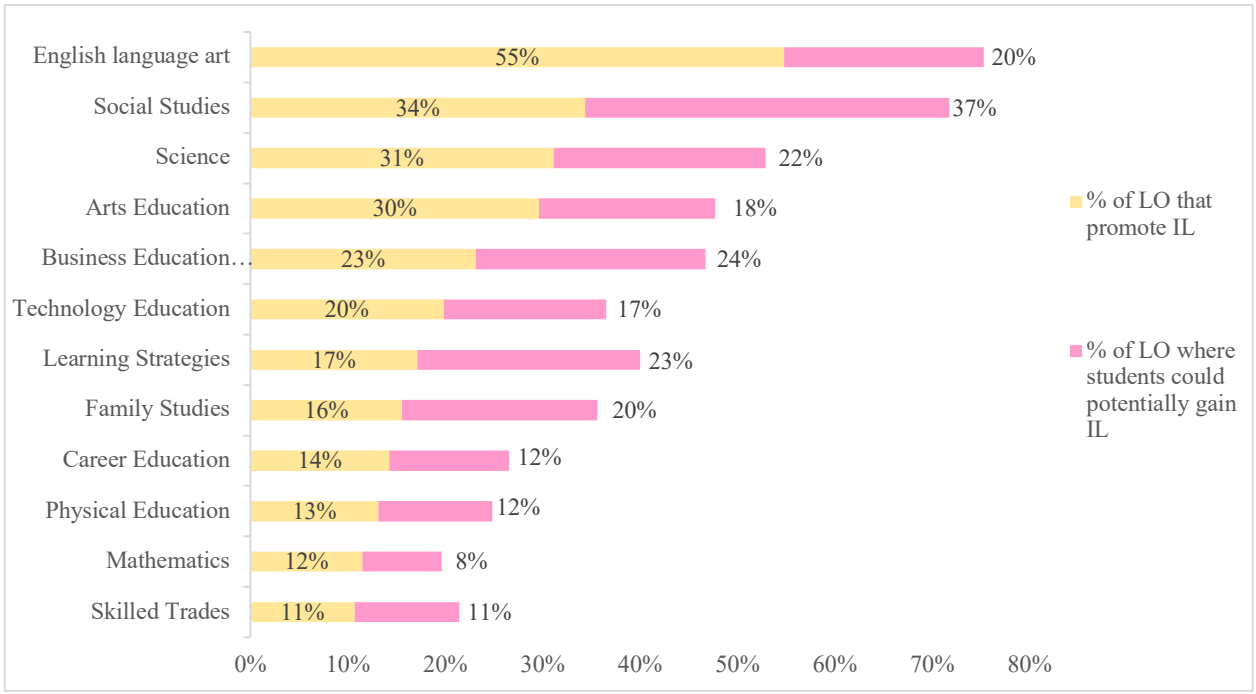

Figure 1. Percentage of learning outcomes that contain information literacy compared to learning outcomes that may create indirect acquisition of information literacy.

RQ2:Which integrated abilities, as seen in the ACRL's definition of information literacy, are promoted in the Nova Scotia high school course learning outcomes?

Table 3 highlights the number of integrated abilities assigned to learning outcomes per subject. As can be seen, all subjects except for Skilled Trades and Career Education have at least one learning outcome that contains all three integrated abilities. In Skilled Trades and Career Education, the most integrated abilities found in the learning outcomes is two. On average, learning outcomes contain less than one integrated ability, except for English Language Arts and Social Studies where, learning outcomes contain, on average, more than one integrated ability.

Table 3. Average number of integrated abilities in the learning outcomes for each subject.

Row Labels	**Total Learning Outcomes**	**Min of n_ia**	**Max of n_ia**	**Average of n_ia**
English language art	522	0	3	1.44
Social Studies	407	0	3	1.14
Science	694	0	3	0.91
Arts Education	442	0	3	0.81
Business Education and Entrepreneurship	229	0	3	0.72
Learning Strategies	105	0	3	0.61
Technology Education	454	0	3	0.59
Family Studies	250	0	3	0.55
Physical Education	137	0	3	0.41
Career Education	49	0	2	0.41
Mathematics	1007	0	3	0.34
Skilled Trades	56	0	2	0.32

Table 4 shows the number of integrated abilities in each grade level. As we can see, there is a slight increase in the integrated abilities with each grade. Grade 10 has the lowest number of integrated abilities, while grade 12 has the highest amount. That being said, the percentage of integrated abilities promoted in learning outcomes seems to stay relatively consistent throughout the three grades. In the integrated abilities *Use of information in creating new knowledge and participating ethically in communities of learning* has a 3% increase from grade 10 to grade 12, while *Understanding of how information is produced and valued* has a 5% increase. The biggest increase we can see is with the integrated ability *Reflective discovery of information*, which has a 5% increase. The most a single grade promotes an integrated ability is no more than 26%.

Table 4. Number of learning outcomes that contain integrated abilities per grade.

	Grade 10		**Grade 11**		**Grade 12**	
Integrated Ability	*N of LO with IA*	*% of LO with IA*	*N of LO with IA*	*% of LO with IA*	*N of LO with IA*	*% of LO with IA*
Reflective discovery of information	204	20.90%	494	21.80%	696	26.20%
Understanding of how information is produced and valued	159	16.30%	400	17.60%	542	20.40%
Use of information in creating new knowledge and participating ethically in communities of learning	127	13.00%	331	14.60%	417	15.70%

1. RQ3: w do the Nova Scotia high school learning outcomes promote foundational concepts of the ACRL's *Information literacy for higher education framework?*

RQ3: How do the Nova Scotia high school learning outcomes promote foundational concepts of the ACRL's Information literacy for higher education framework?

Table 5 describes the number of learning outcomes that contain threshold concepts. This table also provides insight into how many threshold concepts have been assigned to one learning outcome. Courses like Learning Strategies, Skilled Trades, and Career Education contain a maximum of three threshold concepts per individual learning outcome, with career education only containing a maximum of two threshold concepts per learning outcome. On average, less than one threshold concept has been coded for each learning outcome. It is only in English Language Arts that we see an average of one threshold concept per learning outcome. The only subjects where a learning outcome contains all six of the threshold concepts are Technology Education, Social Studies, Science, and English Language Arts.

Table 5. Average number of learning outcomes that contain threshold concepts per subject.

Subject	**# of learning outcomes**	**Min of n_tc**	**Max of n_tc**	**Average of n_tc**
English language art	522	0	6	1.17
Science	694	0	6	0.90
Social Studies	407	0	6	0.66
Career Education	49	0	2	0.39
Family Studies	250	0	4	0.37
Business Education and Entrepreneurship	229	0	4	0.35
Technology Education	454	0	6	0.33
Arts Education	442	0	5	0.30
Physical Education	137	0	4	0.27
Learning Strategies	105	0	3	0.25

Skilled Trades	56	0	3	0.20
Mathematics	1007	0	5	0.16

Table 6 shows which threshold concepts are more prominent in the learning outcomes and which are missing. As can be seen, *Research as Inquiry* is at least 4% higher than other learning outcomes. *Information has value* is present in 2.14% of the learning outcomes and is the least amount of any threshold concept. *Scholarship as conversation, authority is constructed and contextual,* and *information creation as a process* range from 6.14-7.69%. Those three threshold concepts are similar in quantity. As seen in the table below, approximately 60% of the learning outcomes do not contain threshold concepts.

Table 6. Percentage of learning outcomes that contain each threshold concept.

Threshold Concepts (TC)	**Number of learning outcomes containing TC**	**Percentage of learning outcomes containing TC**
Authority is constructed and contextual	442	7.69%
Information creation as a process	407	7.08%
Information has value	123	2.14%
Research as inquiry	735	12.79%
Scholarship as conversation	353	6.14%
Search as strategic exploration	210	3.65%
No threshold concepts	3477	60.50%

RQ4: In what grades are information literacy skills being developed in the Nova Scotia high school curriculum?

Table 7 shows how many learning outcomes promote information literacy threshold concepts for each subject. As can be seen, there is no consistency as to when or how many learning outcomes appear in the curriculum. Arts Education is consistent across each grade, with

only ~1.5% variation. Similarly, English Language Arts also has a slight variation of ~1.3%. Career Education and Skilled Trades appear to have no information literacy threshold concepts promoted in the learning outcomes in grade 12; however, there are learning outcomes in grade 10 and grade 11 that contain information literacy threshold concepts. In those grades, we can see a slight increase from grade 10 and grade 11. Overall, many of the subjects see an increase in information literacy threshold concepts being promoted in the learning outcomes from grade 10 through to grade 12, with Technology Education having the greatest increase between grade 11 and grade 12 with +8.5%. Notably, Science and Mathematics have a decrease in the percentage of learning outcomes that contain information literacy threshold concepts between grade 11and grade 12.

I took this approach to see if there are interesting patterns here across grade levels; however, as evident in the data, no discernable patterns are present.

Table 7. Percentage of learning outcomes that contain threshold concepts per subject for each grade.

	Grade 10		**Grade 11**		**Grade 12**	
Subject	*# of LO with TC*	*% of LO with TC*	*# of LO with TC*	*% of LO with TC*	*# of LO with TC*	*% of LO with TC*
Arts Education	11	11.5%	23	10.3%	17	10.0%
Business Education and Entrepreneurship	0	0.0%	10	9.6%	14	8.4%
Career Education	6	20.0%	6	23.1%	0	0.0%
English language art	12	7.3%	21	6.6%	28	7.0%
Family Studies	4	12.1%	4	6.2%	16	7.7%
Learning Strategies	4	9.3%	2	5.4%	3	7.5%
Mathematics	8	2.6%	16	4.3%	18	3.8%
Physical Education	1	3.3%	16	14.8%	3	15.8%
Science	6	11.1%	45	10.0%	46	7.1%
Skilled Trades	3	11.5%	5	13.5%	0	0.0%
Social Studies	6	8.7%	14	9.2%	41	12.4%
Technology Education	3	5.9%	20	6.7%	30	15.2%

Chapter Summary

Information literacy can be seen in less than 10% of learning outcomes for many courses. At most, English Language Arts has close to 50% learning outcomes containing information literacy. There is a significant drop in information literacy embedded in learning outcomes for the other subjects. There is no evidence of a linear increase or decrease in information literacy per grade level. The amount of information literacy seen in each grade level remains inconsistent. In conclusions, majority of the learning outcomes do not contain information literacy.

Chapter 5: Discussion

Introduction

This chapter describes how the results from this study are relevant to the information gathered in the literature review regarding Canadians' information seeking behaviours and information literacy instruction around the world and in Canada. The results from this study show that many of the Nova Scotia high school curriculum learning outcomes do not contain or promote information literacy. This study suggests students in Nova Scotia are not receiving the level of information literacy instruction needed, as indicated in the relevant literature (Brisson-Boivin & McAleese, 2021; Julien & Barker, 2009b), to provide the skills necessary for navigating the 21st century online information ecosystems.

Practical implications

Information literacy is promoted the most in the Nova Scotia high school curriculum within the English Language Arts courses and Social Studies courses. English Language Arts classes often discuss the use of language in altering a person's perception, which aligns with the integrated ability *understanding how information is produced and valued*. In most subjects, the majority of learning outcomes do not contain any information literacy integrated abilities, as defined by the ACRL's *Information Literacy for Higher Education* document. In courses like Career Education and Skilled Trades, the most a single learning outcome will possess is two integrated abilities.

At most, information literacy is promoted 55% of the time, while the average amount is about half that. Students have the potential to gain information literacy skills from a large portion of the learning outcomes that were considered to not have information literacy embedded. This

was surprising as I would have thought that information literacy within the learning outcomes would have been more explicit, rather than having a large portion fall in a "potential area". To really understand if students are gaining any information literacy skills from the learning outcomes where there is potential to gain indirect acquisition, it would be essential to understand the level of conceptual knowledge of information literacy the teachers in Nova Scotia possess. Walk (2015) reveals that even those with doctorate degrees in a High School Early College setting have little knowledge of information literacy.

Underdeveloped skills

Information ecosystems change rapidly, especially with the mass amounts of information people have access to on the internet, and the ability for anyone to create a communication platform online. Because of this, it may be difficult to create learning outcomes that address the current condition of information ecosystems unless revisions are made frequently. The province of Alberta has developed a curriculum that supports inquiry-based learning and highlights the importance of metacognition in inquiry-based learning. Though there is clear use of information literacy instruction in the Alberta's curriculum, the students graduating from high school still possess underdeveloped search skills (Julien & Barker, 2009b). When comparing the results from this study to other studies like the Julien and Barker (2009) study of Alberta high school students, and the Walk (2015) study on information literacy knowledge in high school teachers, it may be unlikely that there are higher levels of indirect acquisition in Nova Scotia; however, this is inconclusive due to a number of variables that were not included in this study. *Research as inquiry,* which focuses on search skills, is the most frequent threshold concept seen in the curriculum, however, its presence is still minimal.

Lack of awareness of social media as an information resource

Research as inquiry was the most common threshold concept seen in the curriculum. This affirms that students are gaining some level of skills in finding information. Out of all threshold concepts, *Research as inquiry* was seen in the learning outcomes significantly more – almost twice as much – than *Authority is constructed and contextual.* I found this surprising as Matsubayashi and Freund (2019) point out that social media sites are frequently used by young adults to obtain information. *Authority is constructed and contextual* is an important competency because young Canadians are seeking their information from platforms in which anyone can write anything. This often leads to uncensored information that may be packaged as though it is legitimate when it is not. *Authority is constructed and contextual* defines authority, which provides skills in understanding and recognizing different types of authority and the different ways of displaying authority, is seen in about 8% of learning outcomes.

There are clear examples of critical thinking and information literacy within the curriculum learning outcomes. For example, "listen critically to analyze and evaluate ideas and information in order to formulate and refine opinions" (English 10, 2015, p. 3) clearly has information literacy competencies through critical assessment of information. As you can see in this learning outcome, there is a purpose behind listening critically and evaluating ideas. Students are expected to perform these tasks for the purpose of forming opinions. Students are required to use evidence to support their opinions. It is clear that there is a strong potential for students to learn critical thinking and other skills related to information literacy from this learning outcome. That being said, learning outcomes that contain information literacy embedded in them are scarce.

There is very little mention of media and no mention of social media within the curriculum learning outcomes even though young people are the largest users of social media sites. Most learning outcomes that promote information literacy are very topical, much like the learning outcome example from English 10. Naturally, media is mentioned more in technology education; however, little media literacy can be found. For example, in Design 11 (2015) students must "apply techniques and procedures needed to manipulate (including text) in a range of media, including digital and electronic media" (p. 2). This learning outcome could be interpreted many ways, thus indicating it is the responsibility of the teacher to determine if this learning outcome will promote information literacy. It sounds like it could have an information literacy layer to it, but it is not explicit. Most learning outcomes focus on technical skills rather than critical thinking, awareness, or self-reflection. Learning outcomes such as these enable students to learn useful skills required for navigating and/or creating online information; however, they do not teach reflective awareness or personal responsibility surrounding information interaction and dissemination.

Social media continues to be an increasingly important part of the lives of young Canadians. Yet, there are no learning outcomes in the Nova Scotia curriculum that enhance student understanding of the information environments that young people are exposed to through social media. This lack of social media education is not isolated to Nova Scotia; only a few countries have been changing their curriculums to reflect this change in society. Finland remains the exemplar for media literacy education.

Finland promotes critical thinking and information literacy in a way that is accessible to all its citizens. Because they have high levels of media literacy, Finland citizens have high levels of trust in their government (Henley, 2020). Like Canada, the education system in Finland is

funded by its government, thus, education is accessible to all. The Finnish Government has implemented high levels of information literacy, specifically media literacy, in all its elementary and secondary courses, in addition to having a stand-alone course (Horn & Veermans, 2019). As Jones-Jang et al. (2021) contend, a person's ability to detect fake news is heavily associated with economic status, education, political affiliations, age, and gender. The public education system seems to be the most logical place to provide information literacy instruction to as many Canadians as possible.

Science class as a tool against the COVID-19 infodemic, and other scientific conspiracies

In Science, at most, 31% of the learning outcomes have information literacy embedded in the learning outcomes. As the world has witnessed in the last year, scientific information is prone to mis/disinformation. Social media sites, platforms where information is not monitored, are the main source of COVID-19 information for Canadians (Mai, 2020). The results from this study align with Mai's (2020) study, which indicates that Canadians can spot misinformation. The learning outcomes that contained information literacy in the Science courses focused mainly on *Research as inquiry* and *Authority is constructed and contextual*. While *Research as inquiry* focuses on answering questions through research and analysis, *Authority is constructed and contextual* determines credibility, accuracy, reliability, and the social nature of information (ACRL, 2015). The knowledge practices that align with *Authority is constructed and contextual* give people the skills to help them decipher between mis/disinformation and reliable information. *Authority is constructed and contextual* is only seen in approximately 10% of the learning outcomes for Science. For that reason, it is difficult to say if students are really gaining the dispositions and knowledge practices for *Authority is constructed and contextual.* There is a

small number of learning outcomes in Science courses that promote the evaluation of credible versus non credible sources.

If anything, COVID-19 has highlighted the need for information literacy competencies. Most Canadians who interact on social media sites have seen at least one piece of fake news regarding the COVID-19 pandemic (Gruzd & Mai, 2020). Fake news challenges a government's ability to maintain trust from its citizens. People need to be able to detect falsified or sensationalized information, especially involving health related information. The most equitable way to provide Canadians with this skill set is through the public education system.

Critical thinking course and Finland as an exemplar for information literacy instruction

It was surprising to see so little integrated abilities within the Learning Strategies course because I assumed that Learning Strategies would enable students to gain lifelong learning strategies, which is a major objective for information literacy. Learning strategies implemented by the education system in Finland focuses on applying critical thinking skills to all aspects of a student's life. As mentioned in the literature review, the Finnish government has been working on implementing critical thinking into their education system since the 1970s (Kupiainen et al., 2008). The critical thinking skills acquired by Finnish students are lifelong learning skills that start in elementary school where students learn about deception and propaganda; they continue to teach their students from when they first enter the school system until adult education, including having a standalone course in critical thinking and media literacy (Henley, 2020; Horn & Veermans, 2019). The Government of Finland sees information literacy as a primary part of its security policy (Henley, 2020). Finland has taken measures to train its citizens and public

servants in media literacy to ensure they can make evidence-based decisions and are able to interact with information online in a responsible and informed manner.

Government officials and policy makers need to decide if fake news is a national security threat and if so, what their plans are to diminish the influence fake news has on Canadians. It is evident in Matsubayashi and Freund's (2019) study that young adults are entering Canadian society with problematic information seeking behaviour. In secondary schools in Finland, critical thinking and information literacy is one of the main objectives in every course; Finland has embedded information literacy and significant critical thinking learning strategies across their entire curriculum (Henley, 2020). Finland promotes critical thinking and information literacy in a way that is accessible to all its citizens. Because they have high levels of media literacy, Finland citizens have high levels of trust in their government (Henley, 2020).

The information literacy skills necessary for navigating today's information ecosystems should be reflected in education systems across Canada. There is no debating that social media will progressively become a larger part of our lives. Globally, information transfer is as easy as sending a tweet. Thus, people need to understand fully that their contribution to these social networks can have a global impact. Countries that adopt a curriculum that includes a standalone information literacy course have seen higher levels of active citizenship and government trust (Dickinson, 2019).

Summary of discussion

Social media plays a large role in the lives of many people in 2020, especially youngpeople. Yet, the curriculum in Nova Scotia has no mention of social media and very little evidence of information literacy in the learning outcomes. Schools should support the democratic

process by teaching students to construct informed opinions using credible and reliable facts through critically examining information and staying informed about controversial issues (Kahne & Bowyer, 2017). The results from this study suggest that Nova Scotian high school graduates may not be learning the information literacy competencies needed to navigate 21st century information environments. The results from this study correlate with past literature describing information seeking behaviour in young Canadians.. It appears the education system does not provide students with sufficient learning strategies, self-reflection, or the skills to understand the impact their participation on social media sites and other online platforms has on them, their community, and our nation. However, to get conclusive results, a deeper investigation is required to understand the many variables that intersect within the education system.

Chapter 6: Conclusion

Introduction

This research sought to understand the condition in which information literacy is embedded in the course learning outcomes for the high school curriculum in Nova Scotia. To do this, the learning outcomes were analyzed and coded using the ACRL's *Information literacy for higher education framework.* Finland has been invested in media literacy since the 1970s; media literacy is not something that can be embedded overnight. It takes thorough planning and an understanding of the condition of online information ecosystems, the condition in which other countries are meddling with Canadian affairs, and of course, Canadian culture. The learning outcomes were used to guide this research in exploring what elements of information literacy are embedded in the curriculum in Nova Scotia. The purpose of this study was to map information literacy threshold concepts to the Nova Scotia secondary learning outcomes created by the Department of Education and Early Childhood Development through ACRL's information literacy lens. Evidence from this study suggests the government should consider examining the curriculum further to understand where information literacy is lacking. The evidence of information literacy embedded in the curriculum is less than expected, with no mention of social media in any learning outcome. Of course, there are learning outcomes that mention online media, but none specify social media, which has a huge influence on young people in Canada.

Contribution to theory

The absence of information literacy elements in the course learning outcomes should not be interpreted as a failure to adopt this framework, or as a failure to meet some other standard. The *Information literacy framework for higher education* was designed for post secondary

education, however it makes for an excellent evaluation tool for information literacy in curriculums. The threshold concepts enable a person to understand information and enact new perspectives and ways of knowing (ACRL, 2015). For those reasons, the ACRL's *Information literacy for higher education* is an excellent tool for evaluating the presence of information literacy in the curriculum.

Practical implications

Evidence from this study suggests the Nova Scotia government should consider examining the curriculum further to understand where information literacy is lacking. As stated in Chapter 2, social media sites are significantly influential platforms because they remain one of the most common places for young people to find information. It seems as though the learning outcomes implemented by the Department of Education and Early Childhood Development should be revised to better suit the 21st century information-seeking behaviors.

Limitations

There are a handful of limitations to consider for this study. First, vague language in the learning outcomes made it difficult to assess information literacy embedded in the learning outcomes. Second, the ACRL's *Information literacy for higher education* is specifically geared towards post-secondary education, rather than high school education. And last, this study does not take into consideration the other variables that influence a student's learning.

Vague language

It seems like vague language is a major contributor to the lack of information literacy in the Nova Scotia course learning outcomes. Those that contain threshold concepts mostly focused on

teaching students how to answer complex questions through developing research methodologies and determining the credibility of the resources they find. However, the learning outcomes that promote information literacy often use vague terminology and lack clarification as to the motivation of the learning outcome. For example, English 10 (2015) has a learning outcome that states "students will be able to select, read, and view with understanding of a range of literature, information, media, and visual texts" (p. 2). The language in this outcome is problematic because the responsibility falls on the instructor to interpret the learning outcomes with an information literacy framework in mind if information literacy is to be promoted. What the students are expected to understand within the literature, information, media, and visual text is unclear. The majority of the learning outcomes that were coded for information literacy are vague, like the English 10 example. Another example of the vagueness of learning outcomes is in Food Science 12 (2015): students must "analyze a food package ingredient list" (p. 2). There is no indication as to the reason for analyzing the food package; thus, interpretation of this learning outcome will vary between teachers.

ACRL's framework

One limitation to this study is that the ACRL framework is not targeted towards secondary education, though it is still an appropriate tool to use as a starting point to guide the implementation of building information literacy into secondary curriculum if this is considered a desirable outcome. While the ACRL information literacy framework was not originally created for this purpose, it is proving to be a useful analytical tool to examine the presence of information literacy in the curriculum, and to understand where information literacy deprivation occurs. A literature search was conducted to find a framework specific to secondary students; however, it was unsuccessful. There are Open Education Resources to help teachers implement

information literacy into their curriculum; however, that would require teachers to seek out that information independently without any guidance from a school librarian or curriculum documents.

Important variables to consider

Another limitation to this study is that it does not include other variables such as a teachers' information literacy competencies or a teacher's interpretation of the learning outcomes, nor does it include evidence of the students' success rate for learning and using the information literacy that is currently embedded in the curriculum. An assessment of the current school curriculum should be completed and an evaluation of teacher education should be conducted to determine if teachers in Nova Scotia, and across Canada, are receiving enough pre-service information literacy instruction to interpret curriculum learning outcomes with the information literacy framework in mind. There are many factors other than learning outcomes that contribute to understanding the condition of information literacy education in secondary schools in Nova Scotia. Moreover, a study examining these variables would show the true nature of information literacy in Nova Scotia secondary education.

Trying to understand the level in which social media or online media is embedded in the learning outcomes is even more difficult as there were some learning outcomes that, based on the discretion of the instructor, may help students learn online media literacy. For example, "determine and create solutions to design problems that can persuade or entertain an audience using a variety of electronic communications tools" (Exploring Technology Ten, p. 2).

Subjective analysis

The study conducted in this research relied on subjective analysis of learning outcomes. Therefore, there is a possibility that the way the learning outcomes were coded may be different from another information literacy researcher. To mitigate this issue as much as possible, as mentioned in the methodology section, over 150 learning outcomes were coded by two coders and checked for consistency.

Further research

It is important to assess the level at which teachers are familiar with information literacy. In understanding this, researchers could better assess the level of information literacy instruction facilitation within the classrooms in Nova Scotia.

Comprehensive study of the entire education program

To enhance civic responsibility so that Canadians are better informed decision makers, would require a complete analysis of information literacy embedded in the education systems across the country. The learning outcomes in the Nova Scotia secondary education curriculum are vague and require teachers to decide how much information literacy instruction they want to provide and in what context. Teachers' intepretations of the learning outcomes may differ because many learning outcomes lack sufficient reasoning for why specific learning skills are important.

Social media literacy framework

Another recommendation is to create a social media literacy framework, which provincial governments across Canada can use to guide them when implementing a stand-alone media literacy course and embedding information literacy more thoroughly within high school courses.

The ACRL's *Information literacy for higher education framework* is a great resource for higher education; thus, it is recommended that a similar document be created specifically for information literacy instruction for Canadians in primary and secondary schools. A case study of Finland's media literacy education strategic plan should be conducted to understand how they have become world leaders in media literacy. It would be interesting to apply those strategies to the Canadian provincial education systems, but with consideration of Canadian culture and values.

In conclusion, the results of this study suggest that Nova Scotia high school course learning outcomes may be lacking the information literacy needed for 21st century society. Today, most people gather information online, particularly, social media sites however, they do not possess strong enough knowledge of information ecosystems to critical evaluate what they read in order to make informed decisions. Though this is the case, it does not have to be. Information literacy is a way of learning and navigating information. If given the opportunity, Canadians can become stronger in their ability to assess information in order to make effective, evidence-based decisions. They just need the educational opportunity to gain these skills.

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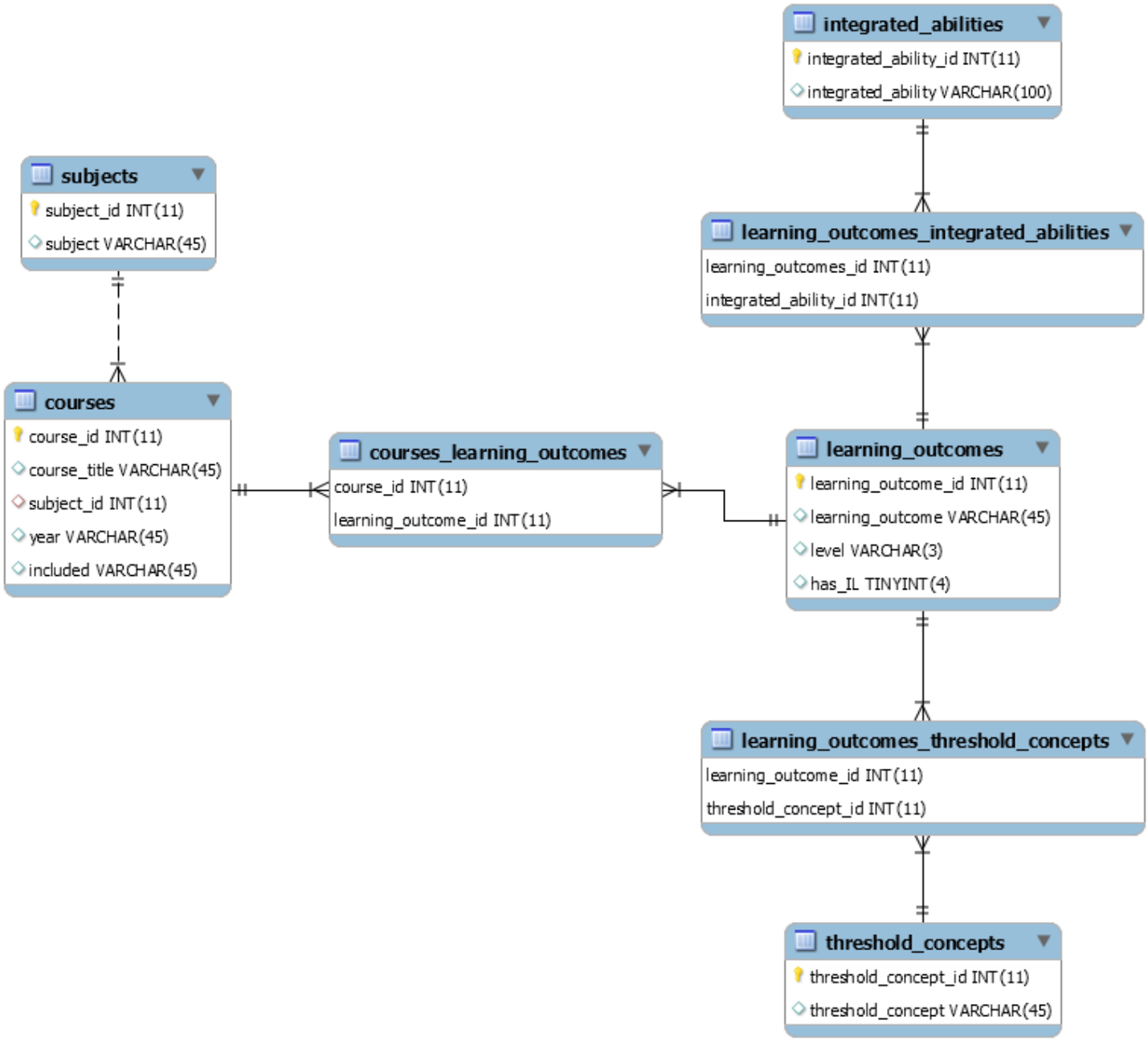
APPENDIX A: Database Structure



APPENDIX B: Table for Database Structure

Table	*Field*	*Description*
courses	course_id	Numerical value assigned to each course curriculum document
	course_title	Title of course
	year	The grade in which the course is taught
	subject_id	Number assigned to the various subjects included in this study
	included	Learning outcomes that explicitly or implicitly contains information literacy
learning_outcomes	learning_outcome_id	Numerical value assigned to each learning outcome
	level	The grade in which the subject is taught
	has_IL	Learning outcomes that explicitly contain information literacy
	learning_outcomes	Actual written learning outcome as seen in the course documents
integrated_abilities	integrated_ability_id	Numerical value assigned to each of the three integrated abilities that make up the ACRL's definition of information literacy
	Integrated_ability	Integrated abilities stated in the ACRL's information literacy definition.
threshold_concepts	threshold_concept_id	Numerical value between 1 and 6 are assigned to the six threshold concepts
	threshold_concept	Threshold concepts as seen in the ACRL's *information literacy framework for higher education*

subject	subject	Subject category in which the learning outcome comes from (i.e. science, English language arts)

APPENDIX C: Documents used in this study.

Subject	Course
Mathematics	Mathematics Ten
Mathematics	Mathematics at Work Ten
Mathematics	Mathematics Essentials Ten
Mathematics	Mathematics Eleven
Mathematics	Mathematics at work Eleven
Mathematics	Mathematics essentials Eleven
Mathematics	Pre-Calculus Eleven
Mathematics	Calculus Twelve
Mathematics	Mathematics Twelve
Mathematics	Mathematics at work Twelve
Mathematics	Mathematics essentials Twelve
Mathematics	Pre-calculus Twelve
Social Studies	Geography Ten
Social Studies	History Ten
Social Studies	African Canadian Studies Eleven
Social Studies	Canadian History Eleven
Social Studies	Geography Eleven/Geography of Canada Eleven
Social Studies	Advanced Global Geography Twelve
Social Studies	Advanced Global History Twelve
Social Studies	Advanced Global Politics Twelve
Social Studies	Geomatics Twelve
Social Studies	Global Geography Twelve
Social Studies	Global History Twelve
Social Studies	Global Politics Twelve
Social Studies	Law Twelve
Social Studies	Sociology Twelve
Physical Education	Physical Education Ten
Physical Education	Fitness Leadership Eleven
Physical Education	Physical Education Eleven
Physical Education	Physically Active Living Eleven
Physical Education	Yoga Eleven
Physical Education	Physical Education Leadership Twelve
Business Education and Entrepreneurship	Accounting Eleven
Business Education and Entrepreneurship	Accounting Twelve
Business Education and Entrepreneurship	Business Management Twelve
Business Education and Entrepreneurship	Business Technology Eleven

Business Education and Entrepreneurship	Business Technology Twelve
Business Education and Entrepreneurship	Tourism Eleven
Business Education and Entrepreneurship	Tourism Twelve
Career Education	Career Development Eleven
Career Education	Life Work Transition Ten
Career Education	Workplace Health and Safety Eleven
Skilled Trades	Skilled Trades Ten
Skilled Trades	Construction Trades Eleven
Skilled Trades	Transportation Trades Eleven
Technology Education	Construction Technology Ten
Technology Education	Exploring Technology Ten
Technology Education	Communications Technology Eleven
Technology Education	Design Eleven
Technology Education	Electrotechnologies Eleven
Technology Education	Energy, Power, and Transportation Technology Eleven
Technology Education	Audio Recording and Production Twelve
Technology Education	Communication Technology Twelve
Technology Education	Computer Programming Twelve
Technology Education	Construction Technology Twelve
Technology Education	Film and Video Production Twelve
Technology Education	Multimedia Twelve
Science	Science Ten
Science	Advanced Biology Eleven
Science	Advanced Chemistry Eleven
Science	Advanced Physics Eleven
Science	Agriculture/Agrifood Eleven
Science	Biology Eleven
Science	Chemistry Eleven
Science	Oceans Eleven
Science	Physics Eleven
Science	Advanced Biology Twelve
Science	Advanced Chemistry Twelve
Science	Advanced Physics Twelve
Science	Biology Twelve
Science	Chemistry Twelve
Science	Food Science Twelve
Science	Geology Twelve
Science	Physics Twelve
Arts Education	Advanced Music Eleven
Arts Education	Advanced Music Twelve
Arts Education	Advanced Visual Arts Eleven

Arts Education	Advanced Visual Arts Twelve
Arts Education	Arts Entrepreneurship Twelve
Arts Education	Dance Eleven
Arts Education	Drama Ten
Arts Education	Drama Eleven
Arts Education	Drama Twelve
Arts Education	Music Ten
Arts Education	Music Eleven
Arts Education	Music Twelve
Arts Education	Visual Arts Ten
Arts Education	Visual Arts Eleven
Arts Education	Visual Arts Twelve
English language art	English Ten
English language art	English Ten Plus
English language art	Advanced English Eleven
English language art	English Eleven
English language art	English/Communication Eleven
English language art	Technical Reading and Writing Eleven
English language art	Advanced English Twelve
English language art	Canadian Literature Twelve
English language art	English Twelve
English language art	English Twelve: African Heritage
English language art	English/Communication Twelve
Family Studies	Family Studies Ten
Family Studies	Child Studies Eleven
Family Studies	Canadian Families Twelve
Family Studies	Food Studies and Hospitality Twelve
Family Studies	Health and Human Services Twelve
Family Studies	Housing and Design Twelve
Family Studies	Textile Technology Twelve
Learning Strategies	Learning Strategies Ten
Learning Strategies	Learning Strategies Eleven
Learning Strategies	Learning Strategies Twelve