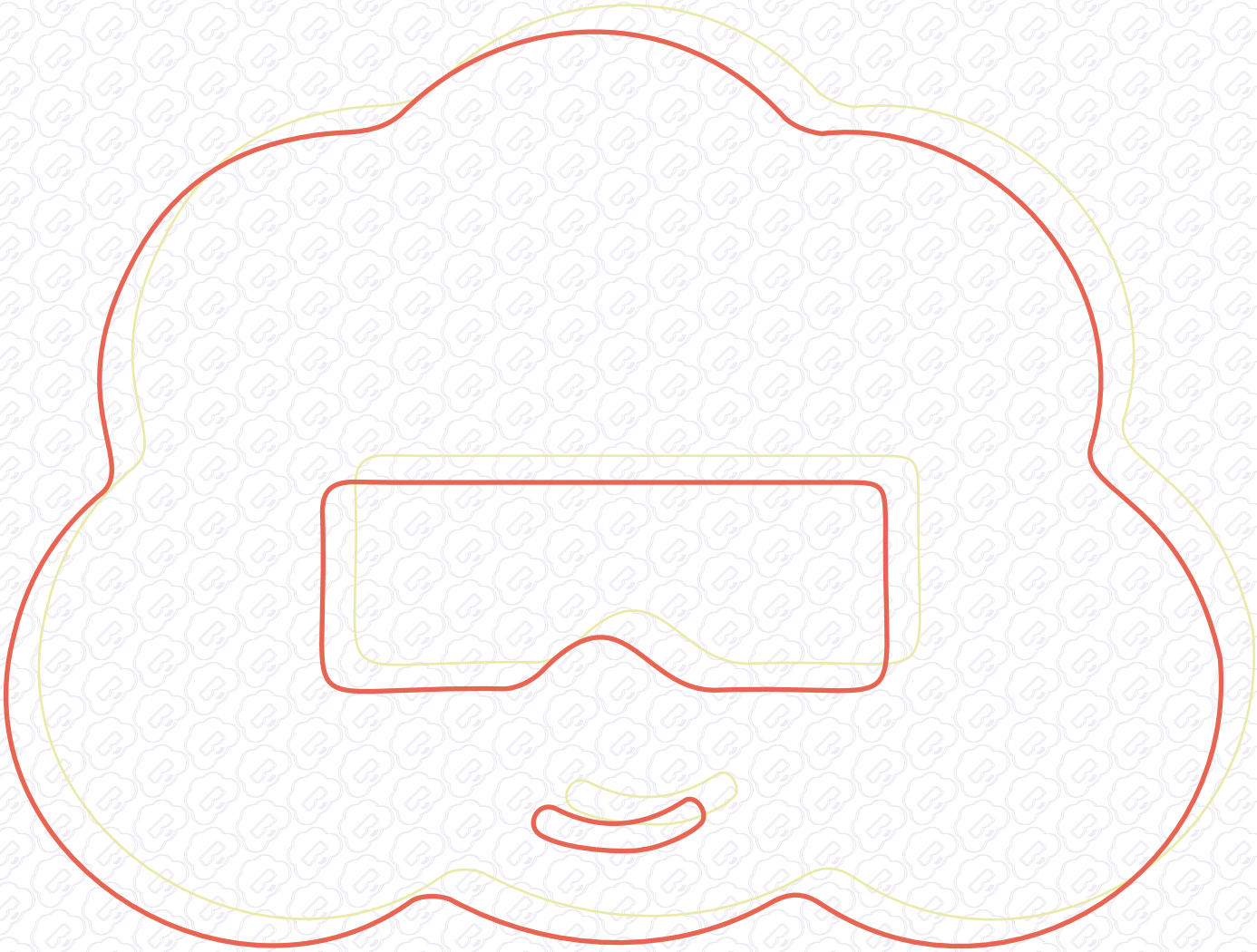

Digital Literacy:

System Thinking & Changemaking

Logan Senko | Rachel Yuen | Mount Royal University | 2022

Research Dossier

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Senko, L. & Yuen, R.

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Executive Summary

The main purpose of this research dossier is to consolidate the relevant research as a method to contextualize the problem of demonstrating the importance of digital literacy, and suggest practices which support the development of digital literacy skills. While conducting a literature review of existing academic knowledge sources, it also draws on interviews conducted with subject-matter experts and professionals to define digital literacy, providing insight, suggestions, recommendations, and guiding further academic inquiries. This research identified four established themes in the study of digital literacies which introduce strong pathways for resolution, social impact, and 'sense making' in the context of the United Nation's Sustainable Development Goals, specifically goal 4 - Education, target 6 "By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy". Those themes being, (1) digital literacy supports literacy development, (2) digital literacy supports engagement, usage, and confidence in digital spaces, (3) digital literacy informs sustainable development and inclusion, and (4) digital literacy skill requirements continue to rise in Canada and around the world.

Main Findings:

Background

The initial phase of this research focused on identifying and subsequently communicating the information security concerns about the rapidly evolving interconnectivity of the modern world, and what can only be described as a fundamental gap in both understanding and an inability to discern fact from fiction for the average user of the internet. While the issue itself is no less severe, it was discovered during the preliminary research that this approach excluded an enormous selection of the world's population by design, and in doing so missed an aspect of the problem which was so significant, it redirected nearly every aspect of this research.

That is, the notion of digital literacy and its profound impact on health and quality of life.

Positionality Statement

Before we present our findings, we would like to acknowledge our shared viewpoint as university students who have had the privilege of growing our digital literacy, as we work rather closely with different "human-centred design" aspects. While the two of us are of different age and nationality, we have been given the privilege of increasing our own digital literacy, which we believe are at a proficient level due to our privilege having grown up with the age of

technology and the internet. We spend quite a lot of time on the internet and on social media, which has allowed us to increase our own comprehension of digital literacy and of how these digital spaces works. We are fortunate to have access to technologies, and require minimal accommodations to access and fully utilize the internet.

Digital literacy supports literacy development

According to UNESCO, "literacy is the critical first step in the lifelong learning journey to improved quality of life, livelihood and work", echoing the United Nations Sustainable Development Goals (SDGs) call to improve the literacy of "at least 773 million youth and adults [who] still cannot read and write", including "250 million children'' who lack the capacity or ability to acquire "basic literacy skill" by 2030 (target 4.6)". While the connection between so-called "basic literacy skill" and digital literacy might seem counterintuitive, according to Reynal and Richter (2016), "if they add value to people's lives through improved livelihoods, communication or even entertainment, digital solutions increase the motivation to learn literacy skills in the first place.".

Digital literacy promotes engagement, usage and confidence

Accordingly, that initial engagement builds subsequent motivation, "users with mobile digital skills have the confidence to move beyond a limited set of application 'islands' to more widespread use of mobile apps and services" (GSMA, 2017). The profound social aspect of acquiring digital literacy skills as learners within their own communities cannot be understated, "teach others how to use the technology, creating a multiplier effect that drives further uptake" ... Thus, obtaining more skills presents the opportunity for increased engagement, increased literacy of users and, social impact as skills and knowledge are "translated" across disciples and disciplines, what some refer to as the social aspect of transliteracies*,* i.e. skills in digital literacy translate in practice to communities of learners acquiring numeracy and "basic literacy" skills through each other.

Digital literacy informs sustainable development and inclusion

While the gap between the societal expectations of technology and the abilities of its users, the so-called *digital divide,* is a reality for millions, these technologies offer the opportunity for inclusion. According to Schmida et al., (2017) "digital technologies have been shown to support broad development outcomes, such as contributing to improved health care, education, livelihoods and civic engagement". Moreover, the quality of information attributed to digital health literacy equates to a measurable and documented increase in health outcomes,

which is directly correlated to an individual's ability to make appropriate health decisions for themselves and their families and their communities.

Digital literacy skill requirements continue to rise in Canada

According to The Canadian Internet Use Survey, which polled from November 2020 to March 2021 found that the COVID-19 pandemic has "significantly impacted the behaviours of Canadians, particularly regarding their online activities" (StatsCan, 2021). While (75%) of Canadians over the age of 15 increased their participation in various Internet-related activities since the onset of the pandemic, with almost half (48%) of Canadians exploring this online-activity for the first time due to the pandemic. While not surprising that (90%) of Canadians from 15 to 34 years of age indicate increased internet use, as many students pursued online classes (75%) of Canadians that were attending school, the prevalence of this trend transcends to senior citizens as well, with more than half (54%) of Canadians 65 to 74 years of age indicating increased or entirely new online activities (StatsCan, 2021).

The most common online activities reported were video conferencing, using proprietary American software such as iMessage or Zoom, followed closely by online school work, which relies on a combination of American and Canadian proprietary infrastructure, such as Google, Blackboard, McGraw Hill, D2L, and Slack (StatsCan, 2021). Over one-third (36%) of employed Canadians worked from home, either entirely or primarily, as a result of the pandemic, with 12% doing so for the first time. Unsurprisingly, nearly half of Canadians (48%) reported an increase in online video content, such as Netflix, YouTube, and Disney, and gaming (StatsCan, 2021).

Initial Research Questions:

- What is the data regarding access to digital infrastructure (i.e. connectivity, tools and equipment) and digital literacy skills?
- Where does the "representation of diverse realities and viewpoints" (i.e. inclusion) intersect with digital literacy skills?
    - Does this position of privilege and access (i.e. having your own tech vs using public or shared machines) enable more opportunity for these experiences, and therefore higher digital literacy?
- Does 'Human-centred design' of user interfaces and experiences account for access, privilege and inclusion in this sense of supporting digital literacy development?
    - If not, where is the blind spot?

Subject-Matter Experts:

Dr. Richard Hayman

Associate Professor
& Digital Initiatives Librarian at Mount Royal University

Richard was influential to this research by introducing the concepts of transliteracy, numeric literacy, and social literacy, and provided insight to the notion of so-called 'digital natives', the subsequent 'digital divide', and warned of what he referred to as 'the trap of over defining' the parameters of our search. With Richard's insight, the focus of this research shifted to arming individuals with the knowledge and education they need to use digital spaces, resolving the question of 'how big of a bite do we take?' in the context of key terms and definitions in pursuit of the simplest path to understanding the abundance of connections between topics (i.e. digital literacy, digital natives, digital inclusion, digital divide).

Expanding on the concept of transliteracy, Richard's insight about the social impacts of digital literacy informed this research by contextualising who might be in the middle of our wicked problem, touching on topics such as cultural learning and learning in context, in this case learning from each other. Additionally, Richard's insight informed this research in providing a path to building literacy in the local sense. For example, the intersectional factors which affect segments of the population here in Calgary and Alberta, such as Indigenous peoples or the elderly South Asian population of the Northeast health zones.

Igor Ponomorenko

Cyber Threat Intelligence Analyst (CTIA) at ЭЙР ЛИНК (formerly ODS in Odesa, UA),
& Veteran Bellingcat contributor.

Prior to 2018, Igor worked closely with the European Union’s General Data Protection Regulation (GDPR), a regulatory body which attempts to harmonise data privacy laws throughout the EU, enhances the protection of all data generated by EU residents, and imposes legal obligations globally through their self-described “toughest privacy and security law in the world” (2022, gdpr.eu). Igor informed this research from the cybersecurity standpoint and aided in conceptualising the sheer enormity of what an immediate and serious problem a national gap in what he calls “technical skills” has become.

Igor spoke of an unnamed North American school district who contracted his firm for consultation after a ransomware infection had paralyzed their entire infrastructure and the attackers threatened to release the personal information of their entire student body. That is, of course, unless the administration paid their ransom, he said, as they demanded over $5,000,000 USD, and, as this was out of the question, their confidential records were ultimately released online and the campus suffered severe financial costs far exceeding the initial ransom.

For Igor, the rapid rate at which technology and communication platforms are evolving, and the public "lagging behind" in using those devices properly, he anticipates "things will get much, much worse before they improve". Igor is a long-time advocate for integrating digital literacy skills in the early education and elementary school curriculum.

Dr. Erika Smith

Associate Professor
& Faculty Development Consultant in the Academic Development Centre at Mount Royal University

Erika's insight provides the framework of digital literacy which informed this research by providing the backbone that tied together the many loose ends beginning to form. Erika outlined what she described as *the challenge*, wherein digital literacy skills fall into three categories: technical, sociocultural, and cognitive. For this research, the focus had been primarily on the operational and sociocultural aspects of digital literacy, without any meaningful path to incorporate acquiring these identified digital skill sets. Erika explained the parsing of information as a metacognitive learning experience, i.e. an opportunity to practise, and introduced the Australasian Journal of Technology's 'Knowledge Skill Attributes (KSAs).

Additionally, Erika explained the process of *how people become literate*, distinguishing digital literacy from information literacy and other operational aspects of digital experiences, drawing on theoretical improvements to health as they correlate to markers for information literacy and most importantly, information authenticity. In her research, Erika describes the sentiment among students surrounding the digitization and incorporation of digital spaces within post secondary education as "a real double-edged sword", citing an overwhelming experience wherein access, ability did not always equate to confidence in using these services. To apply digital literacy skill development strategies in practice, Erika advocates for what she describes as 'knowledge mobilisation and translation' for educators and instructional designers looking to enact meaningful change. Encouraging the development of digital literacy skills by

incorporating these notions of transliteracy and multidisciplinary pedagogies in practice is the most holistic approach to addressing the deficit through digital literacy.

Dasha Baiju

Research Data Associate
& Technical Information Specialist at the National Library of Medicine

Dasha spoke of her experience as technical consultant at mHealth, developing web services for all patient demographics in her health region for the COVID-19 pandemic during the early days of lockdowns. The majority of problems users experienced with the sudden shift to mandatory use of digital services were reported by the thousands of residents with low to no digital literacy skills. Dasha's experience and analysis provided unique insight which informed this research by providing the most tangible representation of *what it feels like to not understand,* and in doing so demonstrated exactly why literacy is the strongest indicator of health status.

Dasha explained the realisation that user confusion was often rooted in a complete deficit in fundamental literacy and numeracy. She spoke of a young man whose simple misunderstanding of the frequency with which his medication was prescribed nearly cost his life: "once I realised his confusion, it became evident what happened. He was using a smartphone for his appointments, he was a young person, he didn't appear confused in the recording". Unfortunately, after investigation of this case, he admitted he felt flustered and skipped ahead during the initial sign up for the app, confusing his prescription in his anxiety and missing critical information in the unfamiliarity of using the phone for his appointment.

In this case, "access does not equate to meaning". Dasha described the phenomenon of Dr. Google, wherein patients with low-literacy are exceptionally vulnerable to compounding literacy factors having severe impact on their health outcomes. According to their metrics, 50% of health related Google searches have an impact on that individual's health care, i.e. the sole influence in their decision-making process during a potential health emergency. Dasha advocates for patient advocacy to inspire confidence in technology, and hopes more designers strive for developing inclusive digital experiences.

Annotated Bibliography

Bonami, B., Nocenzi, M., & Passarelli, B. (2020). Qualitative Analysis of Digital Technology Research and Practice in the Field of Social and Human Sciences. *Journal of E-Learning & Knowledge Society, 16(3)*, 50–59. https://doi-org.libproxy.mtroyal.ca/10.20368/1971-8829/1135241

Through interviews and surveys, this study demonstrated public sentiment regarding the legitimization of knowledge, wisdom and the perception of technology as a tool which enhances it, or a hindrance which is detrimental to society. Furthermore, this study examines additional factors which intersect with the existing cultural barriers related to digital access, including socioeconomic status, literacy skills, and perceived usefulness and benefits of incorporating digital technologies in areas of the public sector, such as health and government. The paper "integrates transdisciplinary research in the interface of social sciences, digital technologies, education and sustainability", which informed this research by exploring the challenges and offering remarks about the unique social characteristics of digital technologies, thereby considering a new paradigm for educational technology and its greater impact on human communications (p.55-56).

Buchholz, B.A., DeHart, J., & Moorman, G. (2020). Digital Citizenship During a Global Pandemic: Moving Beyond Digital Literacy. *Journal of Adolescent & Adult Literacy*, 64(1), 11– 17. https://doi-org.libproxy.mtroyal.ca/10.1002/jaal.1076

Buchholz et al. (2020), informed this research through their "framework for digital citizenship". A set of "standards" which, in the context of digital literacies, includes many of the qualities encountered during this research that "are difficult to encompass as a set of skills or competencies". Instead, they propose "a set of practical steps" for educators and designers to encourage "participatory digital citizenship.

Chesser, Burke, A., Reyes, J., & Rohrberg, T. (2016). Navigating the digital divide: A systematic review of eHealth literacy in underserved populations in the United States. *Informatics for Health & Social Care, 41(1)*, 1–19. https://doi.org/10.3109/17538157.2014.948171

Chesser et al. (2016) informed this research through their strong data points, which they correlated against existing databases and statistical information sets, a technical and cumbersome task which was outside the capabilities or scope of this research project and team.

Radovanović, D. et al. (2020). Digital Literacy Key Performance Indicators for Sustainable Development. *Social Inclusion, 8(2),* 151–167. https://doi-org.libproxy.mtroyal.ca/10.17645/si.v8i2.2587

Radovanović et al. (2020) informed this research through their examination of the effectiveness of digital literacy programs specifically targeting "under-connected people in sub-Saharan Africa and India" as a means to "build knowledge and health literacy, solve societal problems and foster development". Their methodology also informed this research, wherein a combination of fieldwork and individual case studies

demonstrates “how audio and icon-based interfaces could help them overcome their limitations” in the realm of digital health literacy (pp. 151-161).

Ekaterina Tour, Maria Gindidis & Anne Newton. (2021). Learning digital literacies through experiential digital storytelling in an EAL context: an exploratory study. *Innovation in Language Learning and Teaching, 15:1,* 26-41, https://www-tandfonline-com.libproxy.mtroyal.ca/doi/full/10.1080/17501229.2019.1659278

Ekaterina et al. (2021) informed this research by offering insight to the unique challenges of engaging students in what they describe as “complex transliteracies practices in which meanings shift and change over time, space, relationships and resources”. Additionally, by demonstrating the compounding impact of literacy, digital literacy, and knowledge acquisition across diverse communities and skill sets, this research expanded our understanding of transliteracy.

Giansanti, D., & Veltro, G. (2021). The Digital Divide in the Era of COVID-19: An Investigation into an Important Obstacle to the Access to the mHealth by the Citizen. *Healthcare (Basel, Switzerland), 9(4),* 371. Retrieved from https://doi-org.libproxy.mtroyal.ca/10.3390/healthcare9040371

Giansanti & Veltro (2021) informed this research through further demonstrating the fundamental gap in knowledge and providing data to support the impact to health, quality of life, and ability to make appropriate health decisions when reliant on technology, such as so-called ‘health apps’ which became a reality for many citizens during the COVID-19 pandemic.

H.L. Vacher. (2019). The Second Decade of Numeracy: Entering the Seas of Literacy. *Numeracy : Advancing Education in Quantitative Literacy, 12(1)*. Retrieved from https://doi-org.libproxy.mtroyal.ca/10.5038/1936-4660.12.1.1

Vacher (2019) attempts to make sense of the so-called “sea of literacy” regarding the often conflicting use of both the term literacy, but also in the high potential for keyword based research queries to omit large swaths of relevant information based on nothing other than over association in academic literature (such as within this very research project). While not directly informing the data presented, its influence cannot be understated in this research.

Hays, L. & Kammer, J. (2021). Integrating Digital Literacy in the Disciplines. *Stylus Publishing, LLC, ProQuest Ebook Central*. Retrieved from https://ebookcentral.proquest.com/lib/mtroyal-ebooks/detail.action?docID=6723158.

In a broad sense, the paper itself was less influential than its included bibliographical references, which guided subsequent inquiry of this research. Specifically, it helped frame the interdisciplinary

Jaeger, Paul T., et al. (2015). Libraries, Human Rights, and Social Justice: Enabling Access and Promoting Inclusion. *Rowman & Littlefield*. Retrieved from https://ebookcentral.proquest.com/lib/mtroyal-ebooks/detail.action?docID=2056384.

Provided much needed insight from the "social justice for access" model, this demonstrates the "interrelationships between digital literacy, digital inclusion, and public policy, emphasizing the impacts of these policy decisions on the ability of individuals and communities to successfully participate in the information society", i.e. the impact of policy on health, and its implications in the context of digital exclusion.

Lake, E. (2022). The Importance of Digital Literacy and Its Impact on Understanding Health Information. [Video]. *The National Network of Libraries of Medicine.* Retrieved from https://youtu.be/GVRL1SSDkdE

Lake (2022) demonstrates the consequence of access and its profound, and often life altering, impact on the health of low-literacy citizens. Notably, the unique complications of numeracy and literacy in the context of medication schedules, which technology exacerbates by automating their initial mistake, in this case reminding them at the wrong interval to take their medication.

Lepore, SJ, Rincon, MA, Buzaglo, JS, et al. (2019). Digital literacy linked to engagement and psychological benefits among breast cancer survivors in Internet-based peer support groups. *Eur J Cancer Care*, *28*. Retrieved from https://doi-org.libproxy.mtroyal.ca/10.1111/ecc.13134

"Digital literacy may be a barrier to accessing and effectively using digitally based interventions ... Home broadband access, which is critical for efficiently browsing the Internet and downloading or streaming multimedia, also varies by socioeconomic status and race"

Onyancha. (2020). Knowledge visualization and mapping of information literacy, 1975–2018. *IFLA Journal, 46(2*), 107–123. Retrieved from http://libproxy.mtroyal.ca/login?&url=https://journals.sagepub.com/doi/pdf/10.1177/0340035220906536

Beyond its comprehensive data visualizations mapping the intersectional branches of literacy research, Onyancha (2020) informed this research through an understanding of the broad multidisciplinary brushstroke which literacy skills paint, including deep connections to education, health, knowledge acquisition and translation, culture, and metacognition regarding a variety of socioeconomic factors and industrialization. The

data from this paper helped further develop and support this notion of social health determinants, translation of digital literacy skills, and the measured increase in both health and educational outcomes.

Pandya, Jessica Zacher. (2018). Exploring Critical Digital Literacy Practices : Everyday Video in a Dual Language Context. *Routledge, an Imprint of Taylor and Francis*. Retrieved from https://www-taylorfrancis-com.libproxy.mtroyal.ca/books/mono/10.4324/9781315102672/exploring-critical-digital-literacy-practices-jessica-zacher-pandya

By "weaving together pedagogical, methodological, social, and political concerns into her examination of a real-world context", Pandya (2018) informed this research through both empirical and quantitative data of the impact critical digital literacy practices had in elementary school, and offered the perspective of how this process "affords opportunities for redistributive social justice" within these educational settings.

Potyrała, Katarzyna, and Łukasz Tomczyk. (2021). Teachers in the Lifelong Learning Process: Examples of Digital Literacy. *Journal of Education for Teaching : JET, vol. 47, no. 2, pp*. 255–273. Retrieved from https://doi-org.libproxy.mtroyal.ca/10.1080/02607476.2021.1876499.

The analysis of their study informed this research through data which demonstrates the strong relationship between information literacy, digital safety, and digital literacy skills within high-school aged education settings.

Schmida, S., Bernard, J., Zakaras, T., Lovegrove, C. and Swingle, C. (2017). Connecting the next four billion: strengthening the global response for universal internet access. *USAID, Dial Digital Impact Alliance and SSG Advisors*. Retrieved from www.usaid.gov/sites/default/files/documents/15396/Connecting_the_Next_Four_Billion-20170221_FINAL.pdf

Schmida, S. et al. (2017) informed this research in quantifying that "lifelong learning is required" to acquire and maintain a useful set of digital skills, with learners facing "barriers similar to literacy", i.e. physical access to the material is often restricted or impeded. Additionally, their study found compounding these barriers is the "increasing diversity of technologies and programs", thereby increasing the "complexity of access and use of ICT" as they become essential for many aspects of daily life (Schmida et al., 2017). Accordingly, they identified four major barriers to access of digital spaces: (1) lack of infrastructure, (2) low incomes and affordability, (3) limited user capabilities, and (4) lack of incentives to go online.

Smith, E. E., Kahlke, R. & Judd, T. (2018). Domains of digital literacy. [Diagram]. https://doi-org.libproxy.mtroyal.ca/10.6084/m9.figshare.11908425

"This diagram illustrates three interconnected domains of digital literacy (procedural and technical, cognitive, and sociocultural)."

State of Digital Literacy in Canada : A Literature Review. (2017). *Brookfield Institute for Innovation + Entrepreneurship*. Retrieved from https://canadacommons-ca.libproxy.mtroyal.ca/artifacts/1209790/the-state-of-digital-literacy-in-canada/1762900/

Comprehensive exploration of the state of digital literacy in Canada, including an extensive collection of data, such as, literacy rates, internet connectivity, along with a set of recommendations and provides a thorough analysis of existent programs, their efficacy in practice, and detailed insight into why Canada is "lagging behind" other nations in this regard.

Tsai, Shillair, R., & Cotten, S. R. (2017). Social Support and "Playing Around": An Examination of How Older Adults Acquire Digital Literacy With Tablet Computers. *Journal of Applied Gerontology, 36(1),* 29–55. https://doi.org/10.1177/0733464815609440

The "examination of how older adults learn to use a specific technology, tablet computers" study informed this research by demonstrating "the role that social support plays" in developing skills and confidence in their digital literacy. The data from this study indicates "playful" interactions with technology, in a consequence-free environment, fostered substantial improvements in the process of developing digital literacy skills among "older adults".

van Kessel, Wong, B. L. H., Clemens, T., & Brand, H. (2022). Digital health literacy as a super determinant of health: More than simply the sum of its parts. *Internet Interventions : the Application of Information Technology in Mental and Behavioural Health*, 27, 100500–100500. https://doi-org.libproxy.mtroyal.ca/10.1016/j.invent.2022.100500

This paper informed our research by further defining the connection between health and digital literacy, according to Kessel et al (2022), "health literacy is elaborately expressed through a matrix of four dimensions", that is, "access/obtain information relevant to health, understand information relevant to health, process/appraise information relevant to health, and apply/use information relevant to health" (p.2). In this case, digital literacy skills are then translated across three core aspects of general health, "healthcare, disease prevention, and health promotion", which, according to Kessel et al (2022) is further enhanced through aspects such as wearable health technology which reduce the skill requirement for users while ensuring access to the benefits of that technology (p. 3).

Vosloo, Steve. (2020). UNESCO: Guidelines for Designing Inclusive Digital Solutions and Developing Digital Skills. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000265537

UNESCO's Guidelines for Designing Inclusive Digital Solutions and Developing Digital Skills informed this research by framing the problem in a tangible way, speaking to the root of the problem by demonstrating the critical impact of digital literacy skills, and identifying three key reasons for focusing on a low-skilled and low-literate demographic when designing digital spaces. This provided a core aspect which developed into the framework required to translate the initial focus of this research from cybersecurity and online hygiene, to what it now considers a matter of empowering individuals with the ability to improve their health and well-being through the acquisition of digital literacy skills.

Withers, E. M. (2021). The Digital Divide and Health: Examining Digital Access as a Social Determinant of Health. *Available from ProQuest Dissertations & Theses Global*. Retrieved from http://libproxy.mtroyal.ca/login?url=https://www.proquest.com/dissertations-theses/digital-divide-health-examining-access-as-social/docview/2559448794/se-2

Withers (2021) informed this research by demonstrating the unique challenges of digital access, introduced "social determinants of health", a framework which seeks to correlate "the conditions in which we live, which also shape our health", and contextualized "the role the digital field plays as a point of access to many important social determinants of health" (p.9). Then, exploring the "consequences of limited access" including "mobile dependent users, i.e. users who are reliant solely on their tablet or smartphone", and the relationship between digital access and health, "[which] suggest that digital access is an emerging social determinant of health" (p.11). According to Withers (2022), "while digital divide scholars have certainly focused much attention on the effects of digital access on economic stability, social support, and education, research has rarely been in terms of the relationship to health outcomes." (pg. 10).

Fieldwork:

Intention

Fieldwork was conducted to explore the emotions, experiences and sentiment different individuals felt towards technology in society, but also drill beneath the surface to uncover the qualitative data of /how people feel when using technology/. 10 participants were chosen based on their differences from the researcher, albeit from a different demographic or

background, and asked to answer 15 questions anonymously using a Google form. The questions consist of five word associations, five short answer opinion-based inquiries exploring sentiment, and five questions exploring their confidence level, skill set and one specifically to investigate their perception of their own skills in the context of teaching that skill to another person (i.e. the social aspect of digital literacy).

Results

The first set of questions explored emotions in response to the words: (1) password, (2) technology, (3) online, (4) social media, and (5) two-factor authentication. Top associations with (1) "password" include the obvious terms, such as, secure, secret, forgotten, hacked, safe, lock, private. Next, the associations made with the terms (2) "technology" and (3) "online" demonstrated a more diverse scope of backgrounds and interpretations of digital spaces, for example: friends, discord, better, devices, science, math, advanced, money, doom, porn, and addiction. As expected, associations with terms (4) "social media" were largely negative, top connections include: too much, addictive, waste, news, scrolling, porn, trap, too easy, like, follow, and endless. Finally, the most common associations made with (5) "two-factor authentication" included: indifference, confused, frustration, annoying, as roughly half the participants made negative associations. In contrast, other participants indicated less-negative and in some cases positive sentiment, using terms such as: secure, enhanced, better, improved, flaw, peace of mind, and bank.

The second style of questioning explored sentiment regarding their own relationship with technology, its position in the greater context of society, and what they imagine for the future of technology. Overall, the sentiment was positive, with a clear association to growth, convenient, finances, and new, while terms like privacy and law resolve in to a more neutral sentiment. However, there was also a clear negative sentiment found in associations to terms such as: Facebook, forced, give up, harder, tired, profit, worse, and trust.

The third set of questions explored participants level of confidence in using technology, their perception of their own skills, and how they learned to navigate digital spaces in the context of knowledge acquisition, authenticity, and the ability to teach that skill to another individual. The results demonstrate a clear correlation between familiarity with technology, confidence in using it, and overall time spent practising using it. For example, over half of the participants felt confident enough to teach another individual based on their own experience of learning these skills, with multiple responses clarifying they were "not an expert".

The results were split between moderately confident and absolutely no confidence, perhaps suggesting that once an individual attains moderate confidence in navigating digital spaces, that ability is something they value and see value for others.

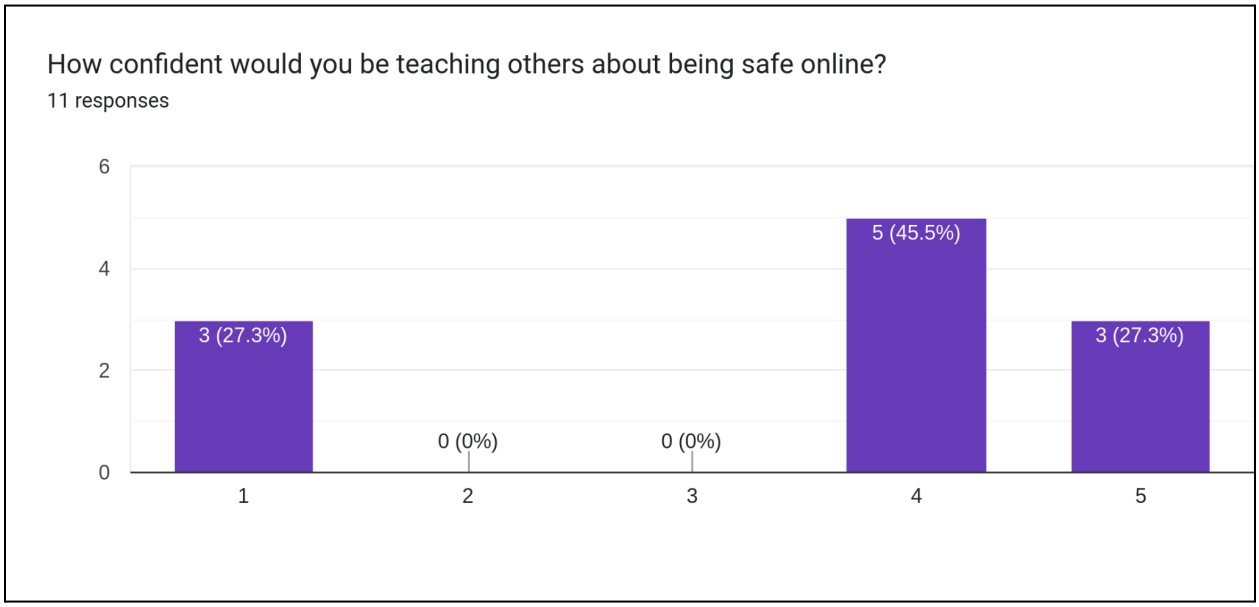

Fig 2. Perceived confidence in ability to teach others, where 1 is not confident and 5 is very confident.

Another characteristic which emerged from these responses was a clear trend of "just knowing" in the context of their ability to discern the authenticity of information found online, a critical aspect in navigating digital health spaces as identified in the literature review of this research.

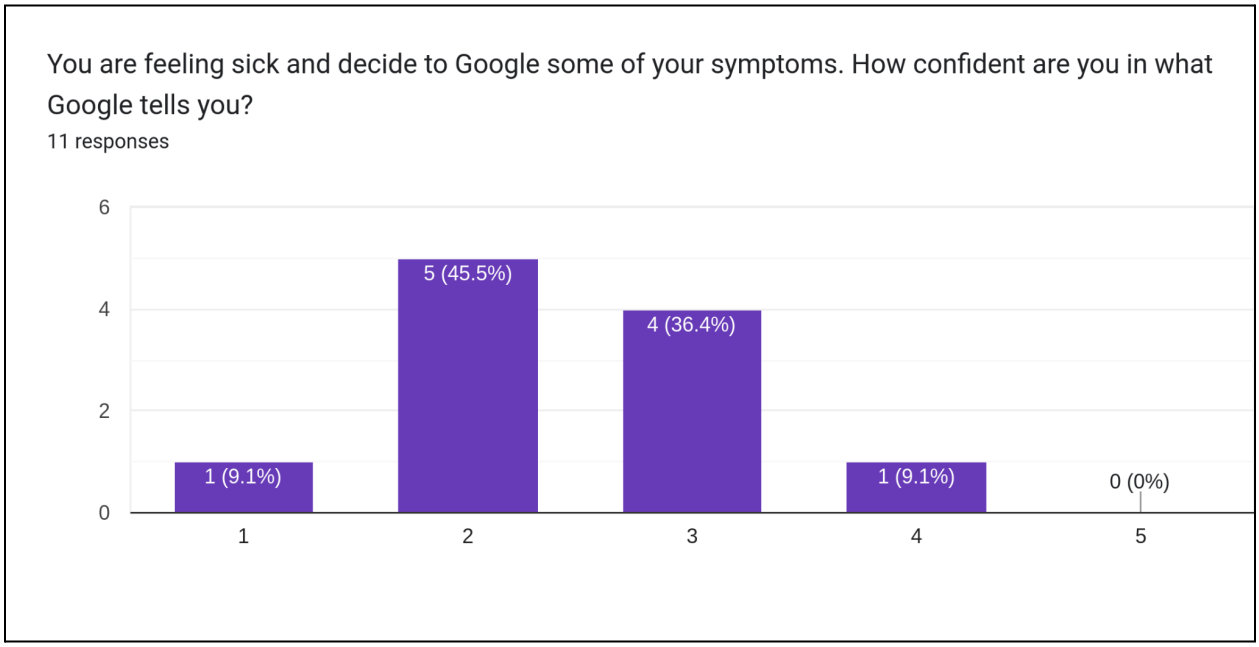

Fig 2. Information authenticity & online confidence, where 1 is not confident and 5 is very confident.

Considerations

It appears the perceived gap in knowledge continues to grow between so-called digital natives and those who feel they did not grow up with digital spaces and modern technology. However, much of that appears rooted in self-doubt, lack of practice, and discouragement from an inability to acquire these skills in the organic way which others have acquired them. The profound translation of knowledge across technology as a general tool of modern society cannot be understood. In a sense, the intuition one acquires from basic digital literacy appears unattainable and tremendously intimidating to those without, and thereby hinders their ability to perceive value from the experience.

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