

Empowering Digital Learners to Create a Brighter Future:

A New Brunswick Digital Literacy Framework

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EMPOWERING DIGITAL LEARNERS TO CREATE A BRIGHTER FUTURE

The mission for public schools in New Brunswick (NB) is that “each student will develop the attributes needed to be a lifelong learner, to achieve personal fulfillment, and to contribute to a productive, just, and democratic society” (EECD, n.d.). Achieving this mission requires us to teach learners a different set of skills in today’s increasingly technologically mediated, information-rich, fast-paced, and rapidly changing digital society. The world has become what McLuhan (1964) forecasted: an interconnected global village. Digital technologies play a significant role in shaping society’s structures, values, and practices. The networked technologies that allow us to breach the otherwise limited boundaries of time and space are now the lifeline that keeps us connected to cyberspace from our homes, schools, offices, restaurants, cars, pockets, and watches. Emerging digital technologies, such as cloud computing, blockchain, robotic process automation, artificial intelligence and machine learning, extended reality, the Internet of Things, edge and quantum computing, cybersecurity, datafication, and of course, the metaverse are changing how we perceive ourselves and how we interact with one another and the world (McGuire, 2022). As businesses, services, employment opportunities, civic engagement, and social activities continue to migrate to digital environments, so must learners call upon digital literacy skills to effectively move with them. As McLuhan and Leonard (1967) predicted, our learners’ place of learning has gone from the little red schoolhouse to the little round schoolhouse offering access to “a worldwide network of computers that [make] all of [human]kind’s factual knowledge available to students everywhere in a matter of minutes or seconds” (p. 24). But digital technologies are *double-edged digital devices* (McGuire, 2022) that create both services and disservices. While they can connect us to new people, cultures and ideas, open innovative and creative pathways that allow us to learn and grow, express ourselves, reach our goals, and address complex challenges, they also can create digital disparities through perpetuated inequities, embedded stereotypes and conflict, inherent biases, pervasive distractions, increased digital waste, and misrepresentations of information and reality. Indeed, young people today face a unique set of exciting opportunities and complex challenges. Digital literacy education can help learners harness the power of digital technologies as critical consumers, innovative creators, and social justice advocates while helping them recognize and avoid their potential pitfalls.

In the Portrait of a Learner (EECD, n.d.), it states, “to thrive in these increasingly interdependent and complex times, young people will need to understand and experience how to take meaningful and thoughtful action to address complex social, environmental, and economic issues, both local and global, and to invest in socially cohesive communities that value the inclusion of diverse peoples and ideas. They will need to establish strong relationships with others, connect to nature, and take action to be mentally and physically well in order to manage and balance a world of rapid change. New Brunswick learners must be ready to develop new competencies throughout their life, to find ways to be personally fulfilled, and to productively contribute to a just and democratic society.” (p. 15). Although the responsibility to educate youth in how to be digitally literate in today’s connected world belongs to many societal members and organizations, our school system and educators are certainly among those who are considered the most important. A digital literacy framework for the Province of New Brunswick can provide a beginning roadmap for teachers and learners to better access, understand, use, avoid, redesign, or create digital technologies that can create a better life for all in a highly digitized society.



WHAT IS DIGITAL LITERACY?

What exactly is digital literacy? That is a difficult question. Setting one's sites on digital education requires hitting the mark of a fast-moving target, and the term digital literacy is not easily defined or understood. If you ask someone in education, the tech industry, non-profit organizations, and the business world to define digital literacy, you'll likely receive a variety of different answers. Digital literacy is difficult to define because it encompasses a wide range of technological proficiencies, intellectual competencies, creative capacities, social-emotional considerations, and ethical practices that play a significant role in our daily lives. Before we determine how we can develop a digital literacy program in NB schools, we must first determine what digital literacy means to us.

The traditional term *literacy* refers to the ability to read and write, but the scope of knowledge and skills required to be literate in today's world are no longer confined to traditional methods of print. The accelerating growth and role of digital technologies have shaped our societies with new rules, structures, codes, and conventions that influence and shape our thoughts, feelings, behaviours, and values (McGuire, 2022). Today, literacy has taken on a broader meaning and refers to one's knowledge and competence in a particular area. This broad view of literacy is commonly seen in areas like financial literacy, climate literacy, energy literacy and digital literacy.

Defining digital literacy for the province of NB has been challenging. Despite a vast and ever-growing assortment of literature and digital literacy frameworks, neither a standardized definition of digital literacy nor a universal lexicon of digital skills and competencies exists in education (Huynh & Do, 2018). A variety of digital literacy definitions have contributed to our understanding of digital literacy (See Appendix A). Hoehsmann & DeWaard (2015) attribute this to "a wide range of capacities, competencies, and components that come into play when working, learning, communicating, consuming goods, accessing services, seeking data, [and] just playing around" (p. 8). Digital literacy encompasses a holistic range of ethical, social, and reflective practices that influence the way we work, learn, and play (Media Smarts, n.d.). It embeds a wide range of interrelated skills such as media literacy, technology literacy, information literacy, visual literacy, communication literacy, and social literacy (Martin, 2006; Bawden, 2008).

The first scholar to define digital literacy as it is perceived today was Glister (1997), who summed it up as, "the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers" (as cited in Ala-Mutka, 2011, p. 28). Glister's emphasis on the critical analysis of digital content as "the ability to make informed judgments about what you find on-line" (as cited in Ala-Mutka, p. 28) is still relevant today but it no longer encompasses a comprehensive view of digital literacy education as it is only concerned only with the *consumption* of digital information.

Thoman & Jolls (2003) extend Glister's mantra, defining digital literacy as "... the ability to access, analyze, evaluate, and create media in a variety of forms" (as cited in Ala-Mutka, 2011, p. 27). Martin & Grudziecki (2006) then added emotional, psychological, and



communicative components to digital literacy, emphasizing “the awareness, attitude, and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze, and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process” (p. 255). As these definitions exemplify, digital literacy is more than learning how to use the tools of technology. Lankshear & Knoble (2008) help distinguish between the concepts and operations of digital literacy. The conceptual approaches include the cognitive, social, and emotional aspects of interacting in digital environments while the operational competencies are broken down into skills, tasks, and performances (as cited in Ala-Mutka, 2011, p. 19).

Over time, frameworks for digital literacy began to take shape, opening this term to larger, more comprehensive definitions. Media Smarts, a Canadian non-profit organization that focuses on digital and media literacy programs and resources, compartmentalizes the definition of digital literacy into three adjoining parts: “the skills and ability to **use** digital tools and applications; the capacity to critically **understand** digital media tools and content; and the knowledge and expertise to **create** and communicate with digital technology” (Hoechsmann & DeWaard, p. 4).

The New Brunswick Digital Literacy Framework defines digital literacy as

the harmony of digital skills, attitudes, and behaviours that help learners achieve their goals and become thoughtful and able citizens that contribute to the betterment of society and the common good.



HOW THE FRAMEWORK WAS DEVELOPED

The development of the NB Digital Literacy Framework was structured over three phases: research and development; presentations, outreach and consultation; and revision. In phase one, I reviewed a number of digital literacy frameworks from various countries and educational jurisdictions, as well as academic articles, education publications, and organizational websites and programs. The purpose of this inventory was somewhat like a literature review, in that themes, categories, and areas of focus within each framework were identified and reflected upon in the context of the NB education landscape. Scholarly literature was reviewed to corroborate findings and identify gaps.

Research informs us that “several stakeholder groups should be consulted in order to detect needs for change that have been developed through the social practices of different groups of people” (Ala-Mutka, 2011, p. 22). It was imperative that those with interests, experiences, skills, and expertise be given the opportunity to contribute to the creation, refinement, and implementation of this effort. The researcher sought out feedback through a number of oral, written, and digital methods, from focus groups and meetings with those interested in creating a resource that teachers and learners could effectively use to improve their level of digital literacy. I presented the draft of the framework at various conferences and symposiums, shared the document with policymakers, scholars in faculties of Education and Computer Science, experts and instructors at community colleges, instructional designers and curriculum developers, non-profit organizations, industry folk, public citizens, educators, and those who expressed interest in the work. Consultation was approached through a variety of means including online surveys, face-to-face and virtual meetings, email correspondences, and other interactions.

Once the consultation phase was complete, the document was revised based on the important shared feedback from all stakeholders. The final stage of the development of the NB Digital Literacy Framework was to determine how to appropriately organize content, develop relevant and practical resources, provide education and training to teachers and administrators, and implement into the NB education system. This phase was a two-pronged approach. First, a group of technology leaders from a local school district piloted the creation of a website that developed lesson plans and resources based on and linked to specific areas of the framework. The website was promoted to teachers and administrators within the school district, and feedback was once again welcomed, received, and considered in the refinement of the framework. Then, the finalized framework was presented at an educational technology conference. Teachers and other attendees provided feedback with regards to the content, organization, and form of the framework. They commented on the effectiveness of the resources currently available to them and they identified resources that were needed to teach digital literacy, and they offered suggestions for effectively implementing and approaching the framework within NB classrooms with the goal of ensuring all learners receive equitable access to high-quality digital literacy education.



USE, UNDERSTAND, CREATE

This framework defines digital literacy as **the harmony of digital skills, attitudes, and behaviours that help learners achieve their goals and become thoughtful and able citizens that contribute to the betterment of society and the common good.**

The New Brunswick Digital Literacy Framework is organized around Media Smarts' compartmentalization of digital literacy into three adjoining parts: "the skills and ability to **use** digital tools and applications; the capacity to critically **understand** digital media tools and content; and the knowledge and expertise to **create** and communicate with digital technology."

(Hoechsmann & DeWaard, 2015, p. 4)

Use



Learners can use digital technologies to reach their goals, solve problems, and address issues and challenges that affect them, their communities, and the world.

Understand



Learners can critically assess, make meaning of, and discuss the content and forms of the digital technologies they use, avoid, and create.

Create



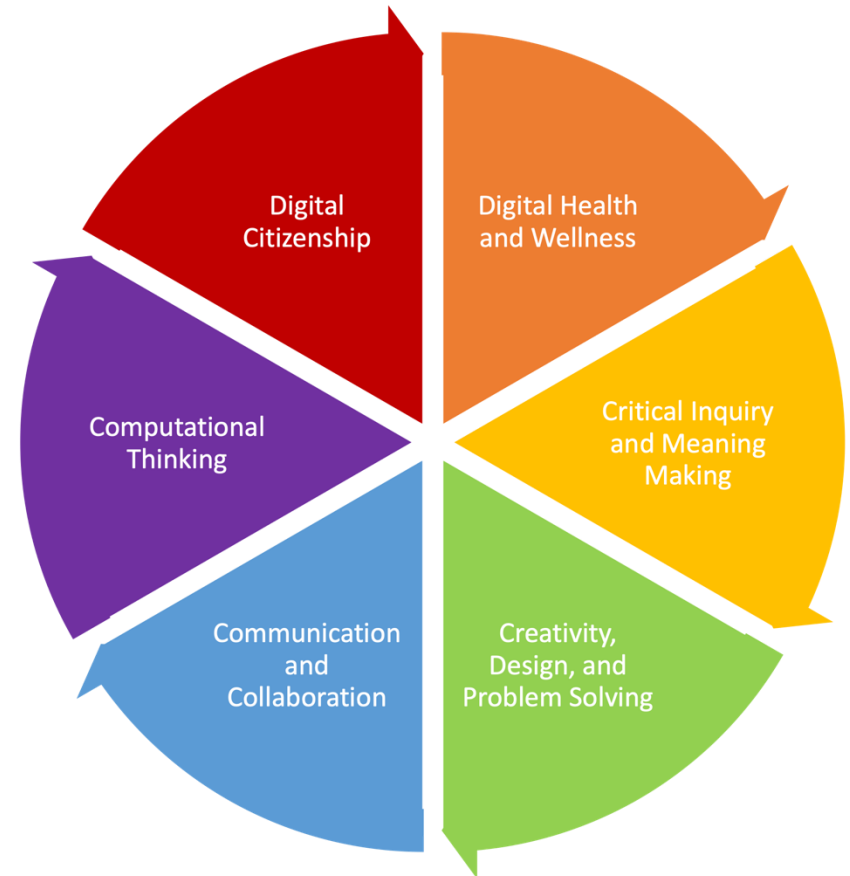
Learners explore, tinker with, design, test, improve, and create digital technologies that help them achieve their goals, solve problems, and contribute to their learning, their communities, and the common good.



THE NEW BRUNSWICK DIGITAL LITERACY FRAMEWORK

The New Brunswick Digital Literacy Framework is comprised of six components that are not to be viewed, explored, or approached in isolation, nor is one component more important than the others. Rather, the framework can be perceived as an interconnected and interdependent system of components that work together as a holistic approach to digital literacy education. In no particular order, these include:

- ⇒ Digital Citizenship
- ⇒ Digital Health and Wellness
- ⇒ Critical Thinking and Meaning Making
- ⇒ Creativity, Design, and Problem Solving
- ⇒ Communication and Collaboration
- ⇒ Computational Thinking



THE SIX COMPONENTS OF DIGITAL LITERACY EDUCATION IN NB



Digital Citizenship: Learners recognize the rights, responsibilities, and opportunities of living, learning, and working in an interconnected digital world, and they act and model in ways that build the common good.



Creativity, Design, and Problem Solving: Learners explore a variety of digital technologies to develop and enhance ideas, products, or processes through creative expression and innovative design to solve issues that affect them, their community, and the world.



Digital Health and Wellness: Learners understand the elements of physical, emotional, and psychological well-being in a digital world and are able to govern themselves accordingly when using digital technologies.



Communication and Collaboration: Learners communicate and collaborate with others in digital environments, working effectively in local and global teams to develop empathy and broaden perspectives, achieve common goals, solve problems, share values, and advocate for positive social change.



Critical Inquiry and Meaning Making: Learners use and create digital technologies to locate information appropriate to the task by seeking a variety of sources, collect information representing diverse perspectives, systematically question and assess the validity and accuracy of information, organize data by priority, topic, or other systematic schema, interpret information gathered, and draw conclusions based on critical analysis and prior knowledge and experience.



Computational Thinking: Learners break down problems into individual components, create abstract and relevant representations, look for patterns, and develop algorithms to better understand, manage, and solve complex problems in a variety of educational contexts, as well as everyday life.



THE FRAMEWORK AT A GLANCE

The New Brunswick Digital Literacy Framework is organized under six components with corresponding layers of competencies and look-fors. The six components were determined by reviewing several digital literacy frameworks, curriculum documents, related scholarly work, and various resources, and through consultation with various stakeholders and groups. As a result of this research, themes were established and gaps were identified, and these were organized into the six components of the framework. These themes and gaps also contributed to the competencies and look-fors within each component of digital literacy. It is imperative to note that these competencies and look-fors serve as ideas and suggestions for developing learners' digital literacy, but they should not be viewed as an all-encompassing set of standards or a complete package of learning outcomes, especially given that the digital environments technologies create are ever-changing. While these competencies and look-fors are categorized under the six components of the framework, they are meant to be seamlessly and appropriately integrated into authentic learning opportunities based on learners' needs, interests, goals, and values. They can assist teachers in providing learners with ownership of their own learning by offering opportunities for choice, exploration, discovery, growth, and play. They are meant to help foster a sense of belonging, hope, and competency. And they are grounded in the idea that digital literacy education can empower youth to use digital technologies to understand the world and create a brighter future for all.

Competency

These competencies describe general skills, attitudes and behaviours within the corresponding component.



Creativity, Design and Problem Solving

Students explore a variety of digital technologies to develop and enhance ideas, products or processes through creative expression and innovative design to solve issues that affect them, their community, and the world.

Component

This is one of the six components of the framework.

4a Students learn the basic elements of design thinking to brainstorm ideas, develop prototypes, test theories and designs, perform iterations and create innovative products and processes that bridge knowledge gaps and produce innovative solutions to real-life dilemmas.

Students:

1. Conduct user-centric research to gain empathetic understanding of the needs, issues and problems people and communities face.
2. Use digital technologies in tangent with other resources and strategies to identify, articulate, and understand authentic problems, develop significant questions for investigation, challenge assumptions and create ideas and solutions.
3. Create knowledge representations, complex models and/or simulations (e.g., mind maps, diagrams, virtual environments) to understand, articulate, and attend to authentic needs and problems in all domains of life such as school, home, work, people, local and global communities and the environment.
4. Select, use and develop digital tools to plan and manage innovative design processes to solve different kinds of problems of individual or collective interest, while considering design constraints, accessibility issues, user experience and intuitiveness and potential risks and rewards.
5. Communicate and collaborate with others to design, create, publish and employ digital technologies that evenly distribute benefits and eliminate barriers to people in ethical and practical ways.
6. Showcase the ability to develop, test and refine prototypes as part of a cyclical design process.
7. Exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended questions and problems.

4b Students use digital technologies to express themselves creatively, generate novel ideas, showcase their learning, push boundaries and challenge assumptions for a wide range of audiences.

Students:

1. Explore the ways in which digital technologies have provided artists with new ways to express themselves and pushed art in different directions for broader audiences.
2. Consider how meaning is produced through multimedia (text, images, audio, video, animation) and how culture is produced through various digital technologies.
3. Are able to formulate insightful questions, opinions and insights to generate novel ideas through creative design elements using various digital technologies.

Look-fors

These are specific skills, attitudes and behaviours teachers and students can use to assess and showcase learning within a particular competency.

Digital Citizenship



Learners recognize the rights, responsibilities, and opportunities of living, learning, and working in an interconnected digital world, and they act and model in ways that build the common good.

1a Learners engage in informed, open-minded, and analytical discussion toward the benefits and shortcomings of digital technologies, online society, and human relationships.

Learners:

1. Critically examine the benefits and shortcomings associated with digital technologies and develop personal attitudes, opinions, and beliefs that govern their use.
2. Reflect on and identify appropriate times digital technologies can be used to access information, enhance learning, and create knowledge and products that are useful to society and remove communication roadblocks.
3. Analyze how digital technologies impact the way people think, act, feel, and make sense of the world, for better or worse.
4. Examine the role and use of digital technologies as both enablers and inhibitors of choice and action.
5. Explore the ways digital technologies can serve human beings to have a better life, as well as the ways they might unfavourably impact society.
6. Engage in discussion around the various intentions of and methods used by some companies to design platforms for their own interests and profit, and in what ways products, services, and ideas are promoted on and through these platforms.
7. Recognize that every digital citizen has freedom to speak, hear what others have to say, and access ideas and information without control from others.
8. Can assess the credibility of political and civics texts from a variety of sources and media and are encouraged to respond to and help shape public policy and institutions.
9. Are able to identify the roles and responsibilities of leaders and use digital technologies to influence their decisions for the common good.
10. Assess the social and psychological effects of digital technologies on various peoples, including women, visible minorities, those with disabilities, and Indigenous peoples.

1b Learners are aware of the permanence and effects of their actions in the world, and with each mediated interaction with others, make a positive contribution to society and their own digital legacy.

Learners:

1. Self-reflect before they self-reveal and consider how the content they share online can impact themselves and others.



2. Understand that everything they say and do using any networked device will live somewhere in cyberspace, even if they delete the material.
3. Are aware that their navigation and shared content can be searched, accessed, copied, and passed on to others in online environments.
4. Understand that everything they or anyone else posts about them online becomes part of a public online presence known as a digital footprint or digital tattoo.

1c Learners engage in and reflect on safe and ethical behaviour when using digital technologies, including social interactions online or when using networked devices.

Learners:

1. Understand they can stay safer online by choosing websites that are good for them to visit and avoiding sites that appear inappropriate.
2. Know how to safely and effectively handle situations or online behaviour that make them feel uncomfortable.
3. Think critically about the risks and responsibilities of developing relationships with people online and that people may not be what or whom they say or appear to be.
4. Can identify online networks that foster positive, safe, and ethical environments, reflecting on and acting in ways that contribute to and strengthen these communities.
5. Recognize discrimination and cyber-mistreatment and determine how best to deal with it.
6. Appreciate that cruelty can escalate quickly online because people are often anonymous, and posts can spread quickly throughout both online and offline communities.
7. Promote others to engage in safe, responsible, and ethical behaviors.

1d Learners are aware of and understand the broader context of digital technology use and can leverage these into the activities of everyday life if they so choose.

Learners:

1. Reflect on the role of digital technology in everyday life, in social life, at school, and at work.
2. Are free to exercise their right to abstain from or use digital technologies for learning purposes or civic engagement.
3. Are aware of the general trends within new media even if they do not use them.
4. Are able to use digital technologies to access a variety of sources and employ strategies to critically evaluate their bias and legitimacy, reflecting on the connections to and impact on their own lives and the lives of others.
5. Effectively use digital technologies to conduct or refrain from online transactions.
6. Use digital technologies as tools to engage in personal and civic duties such as addressing issues of social justice and equity, critiquing society, and attempting to effect positive change.



7. Understand the wider context of digital technologies in a 'digital age' characterized by globalization and networks.
8. Examine and respond to the ecologic, economic, and social forces, their interconnectedness, and how they affect individuals, communities, societies, nations, and the environment.

1e Learners manage their personal data to maintain digital privacy and security, respect the privacy of others, and understand how data-collection technology is used to track their digital and physical activity, who owns this data, and where it is stored.

Learners:

1. Are aware that many websites ask for personal and private information and know how to adequately handle such requests.
2. Understand the potential consequences of revealing private information to a person or organization online.
3. Create and maintain secure passwords to protect their private information and online accounts.
4. Know what spam is, the forms it can take, and how to identify strategies for dealing with it.
5. Know how to identify secure sites by looking for their privacy policies and seals of approval.
6. Develop strategies for guarding against identity theft, fraud, malware, viruses, and scams that try to access private information through digital technologies, and take an active role in improving online policies.
7. Know how to control the settings on digital technologies to safeguard security and privacy.
8. Can control the settings on smart devices and computers that allow for the use of GPS to identify and share their location and other personal information with others.
9. Are aware of the ways websites and companies collect data online and utilize it to personalize content for their users, as well as consider companies' motives in doing so.
10. Understand the security implications of computer networks and client servers.
11. Examine the potential benefits and consequences of virtual assistants and smart speakers that *listen* and *communicate*.
12. Appraise both provincial and national data governance laws and Indigenous data governance agreements.
13. Know and advocate for their own data rights, as well as the rights of others.
14. Seek out ways data governance and privacy laws can be improved and advocate for positive change.
15. Create digital products and services that respect the privacy and security of people and groups.



Digital Health and Wellness



Learners understand the elements of physical, emotional, and psychological well-being in a digital world and are able to govern themselves accordingly when using digital technologies.

2a Learners understand the nature of self-image and identity online and cultivate, manage, and reflect on their digital lives.

Learners:

1. Consider how they and others represent themselves online and the relationship between online and offline selves.
2. Understand how perceptions of self and others, along with social values may be manipulated and interpreted.
3. Investigate the benefits and risks of presenting themselves through different personas and the effects on their sense of self, reputation, and relationships.
4. Are aware that photographic images and video can be digitally manipulated for positive purposes, to mislead people, or distort perceptions of reality.
5. Consider how various media can play a powerful role in shaping our ideas.
6. Create digital products and processes that promote and enable positive self-image, identity, and digital life for all.

2b Learners understand and avoid the potential physical and psychological benefits and health risks associated with the use of digital technologies and develop strategies, techniques, and technologies for improving their own and others' physical and mental health and wellbeing.

Learners:

1. Can access and interpret basic health information and services, keeping in mind that any person or organization can make claims on health and wellness.
2. Reflect on ways technology can be used to enhance and threaten health.
3. Explore the ways digital technologies such as the Internet, smart devices, apps, and video games can be addictive, and how design features such as push notifications contribute to these addictive traits.
4. Are able to use digital services and tools without being completely dependent on or helpless without them.
5. Limit the amount of time using networked devices and prioritize other responsibilities.
6. Know how to adjust settings on smart devices and computers to help manage, maintain, and promote healthy and responsible use.
7. Explore the ways in which digital devices, apps, and online sources, in tangent with other strategies of personal development, might help manage their physical and mental health.
8. Explore, design, and create ways to best establish, monitor, and improve personal, family, and societal health practices.



9. Investigate national and international public health and safety issues involving digital technologies and advocate for improved practices.
10. Explore the ways digital technologies change our physical postures and behaviours and develop healthy ergonomic practices when using digital technologies, refraining from repetitive motion and prolonged use to avoid injuries.
11. Develop strategies, products, and processes that help manage and improve their own and others' physical, emotional, spiritual, and mental health and well-being.

2c Learners examine and identify the appropriate and inappropriate times to access and use digital technologies and self-govern accordingly.

Learners:

1. Are aware of their habits and the array of digital technologies they use on a weekly basis and reflect on the role of digital technologies in their life.
2. Avoid accessing digital technologies in inappropriate social settings such as face-to-face conversations, social and formal gatherings, mealtimes, while operating motorized vehicles, before bedtime, and in relationship settings, as well as other environments they determine inappropriate.
3. Reflect on the importance of building, maintaining, and growing healthy relationships through face-to-face human interaction.
4. Consider their role in advocating for a process of human self-reflection toward digital technology use through the designating and designing of sacred spaces.
5. Employ regular digital technology time-outs to engage in empathetic human interactions.
6. Reflect on and determine their own level of importance of enjoying moments and making meaningful memories without feeling the need to document and share everything through digital technologies.
7. Discuss the importance of establishing technology rules with their family, friends, and community members, considering the value of developing an internal digital wellness compass as a means to navigate through various technology-related situations.
8. Can focus deeply on tasks without the distraction of non-contributing digital technologies.
9. Consider the reasons for having limited or supervised usage to digital activities.
10. Design and create digital products and processes that help promote and improve healthy choices and practices around digital technology use.



Critical Inquiry and Meaning Making



Learners use and create digital technologies to locate information appropriate to the task by seeking a variety of sources, collect information representing diverse perspectives, systematically question and assess the validity and accuracy of information, organize data by priority, topic, or other systematic schema, interpret information gathered, and draw conclusions based on critical analysis and prior knowledge and experience.

3a Learners demonstrate the ability to critically choose from, use, or avoid digital technologies, and are able to transfer their knowledge, experience, and skills to explore and create emerging technologies.

Learners:

1. Identify a developer's, as well as their own rationale or purpose for creating a particular digital technology.
2. Consider their own physical devices (mind, body) before or in conjunction with digital technologies to achieve learning goals.
3. Are aware of the choices surrounding digital technologies and that there can be more suitable and appropriate options for accessing, using, understanding, and creating information, products, and processes.
4. Explore the interactions between humans and computers by reflecting on, choosing, and creating tasks best performed by computers and humans.
5. Explore and reflect on past, current, and emerging technologies and how these have shaped society and human thought, perception, and practice.
6. Can critically use and create new digital technologies to better understand and improve the design and extent of their functions.
7. Can identify, assess, and create digital technologies that support the completion of tasks or attainment of goals, as well as disregard those that do not aid in this process, and critically reflect on their functions, strengths, and weaknesses.

3b Learners use and create digital technologies to improve their ability to search, gather, organize, process, evaluate, share, and store digital information.

Learners:

1. Recognize the affordances and limitations of digital technologies with regards to enhancing their understanding of the world.
2. Recognize that anyone can publish on the Web, so not all sites are equally trustworthy.
3. Understand that keywords can be used to conduct effective and efficient online searches and develop strategies to improve their ability to produce the best search results by making inferences about the effectiveness of the strategies.
4. Can use and perhaps design a variety of technologies to effectively search, gather, organize, and store relevant digital information.
5. Seek, accept, and respond to feedback using digital technologies for personal and academic growth.



3c Learners evaluate the accuracy, perspective, credibility, and relevance of information, media, data, or other resources.

Learners:

1. Look for, evaluate, and design website attributes such as domain name, publication dates, frequency of site updating, functioning links, and quality of writing that support the accuracy and validity of information.
2. Can effectively determine the authority of digital authors and consider whether tone, mission, and intended audience are contributors to potential bias.
3. Consider the ways in which different digital technologies act as content or messages.
4. Investigate to what extent search results are influenced by algorithms and other digital technologies, and the companies that operate them.
5. Determine criteria for rating, evaluating, and creating information for accuracy, validity, social and cultural context, and appropriateness based on specific tasks. Reflect on the content and its relevance to the topic being explored and contribution to the goal of the work.
6. Look for, check, and create citations and credible sources to support information.
7. Compare, contrast, and synthesize information from diverse sources (triangulation).
8. Consider how individuals interpret messages differently, how values and points of view are included or excluded, and how digital technologies can influence beliefs, values, and behaviours.

3d Learners critically curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.

Learners:

1. Effectively locate, analyze, and evaluate information while considering evidence, arguments, claims, and beliefs from a variety of sources and media before data is used in a meaning-making process.
2. Interpret information gathered and draw conclusions based on the critical analysis of digital resources.
3. Organize, synthesize, and ethically present multimodal content in ways that are coherent, accurate, and shareable.
4. Explore ways to best communicate and share curated content to intended and unintended audiences.
5. Can structure, classify, and organize digital information and content according to a certain classification scheme or genre.
6. Reflect critically on learning experiences and processes, and can see patterns, make connections, and transfer what they have learned from one situation to another, in virtual and real-world applications.



3e Learners investigate the ways digital technologies influence people, culture, and consciousness.

Learners:

1. Reflect on the ways human inventions and innovations influence and shape the way people think, act, feel, and make sense of the world.
2. Investigate potential benefits and consequences of using, designing, and creating certain digital technologies and make informed decisions around their use and development.
3. Consider the ways digital technologies provide advantages to some and disadvantages to others, and how these are distributed in society.
4. Explore the ways new digital technologies challenge and compete with current digital technologies, seeking to understand not only what new digital technologies allow people to do, but also what they limit them from doing.
5. Chart the evolution of digital technologies and the impact they have had on various societies.
6. Examine potential social assumptions that might be embedded in new technological designs.
7. Predict the ways digital technologies might change the way people learn, live, work, and play in the future.



Creativity, Design, and Problem Solving



Learners explore a variety of digital technologies to develop and enhance ideas, products, or processes through creative expression and innovative designs to solve issues that affect them, their communities, and the world.

4a Learners learn the basic elements of design thinking to brainstorm ideas, develop prototypes, test theories and designs, perform iterations, and create innovative products and processes that bridge knowledge gaps and produce innovative solutions to real-life dilemmas.

Learners:

1. Identify a need, issue, or problem people and communities face in all domains of life such as school, home, work, people, local and global communities, and the environment.
2. Conduct user-centric research to gain empathetic understanding of the needs, issues, and problems people and communities face.
3. Use digital technologies in tangent with other resources and strategies to articulate and better understand authentic problems, generate significant questions for investigation, challenge assumptions, and develop innovative ideas to explore as potential solutions.
4. Brainstorm, design, and develop a variety of complex models, knowledge representations, artifacts, prototypes, and/or simulations to attend to authentic needs and potentially solve problems.
5. Look for and identify design constraints, accessibility issues, user experience and intuitiveness, and potential risks and rewards.
6. Select, develop, test, and refine prototypes as part of a cyclical design process.
7. Communicate and collaborate with others to finalize designs, create, publish, share, and employ digital products and processes that bridge knowledge gaps and attend to the needs, issues, or problems people and communities face.
8. Use digital technologies to evenly distribute benefits and eliminate barriers to people in ethical and practical ways.
9. Demonstrate a tolerance for ambiguity, perseverance, and a capacity to work with open-ended questions and problems.

4b Learners use, design, and create a variety of digital technologies to express themselves creatively, generate novel ideas, showcase their learning, push boundaries, and challenge assumptions.

Learners:

1. Explore how digital technologies have provided artists with new ways to express themselves and push art in different directions for a broad range of audiences.
2. Consider how meaning is produced through multimedia (text, images, audio, video, animation) and how culture is produced through various digital technologies.



3. Can formulate insightful questions, opinions, and insights to generate novel ideas through creative design elements using various digital technologies.
4. Explore, design, and create digital products, platforms, and processes as a means of personal or group expression.
5. Are able to examine, use, and create digital technologies to identify and illustrate societal trends and forecast possibilities.
6. Can responsibly and ethically repurpose or remix different existing digital content into new creations that illustrate learning and contribute to society in positive ways.
7. Are given opportunities to assess and change the features of current technologies in order to solve problems, make mistakes, reach goals, and improve the lives of humans and the planet.
8. Describe the choices they or their group considered and made when developing digital projects while identifying opportunities and limitations that influenced their considerations and decisions.
9. Demonstrate leadership, initiative, imagination, creativity, spontaneity, and ingenuity through a range of creative processes.

4c Learners demonstrate an understanding of and respect for the rights and obligations of using, creating, and sharing intellectual property.

Learners:

1. Understand and appreciate the concept of having ownership over creative work.
2. Examine the concept of plagiarism and when and how it is okay to use the work of others.
3. Research copyright and license rules, fair use, and the rights they have as a creator.
4. Explore and discuss the legal and ethical dimensions of respecting creative work.
5. Acknowledge authorship and demonstrate respect for the intellectual property of others while including elements in personal-knowledge products and processes that allow others to credit content appropriately.
6. Distinguish between taking inspiration from the creative work of others and appropriating that work without permission.
7. Explore the various ways of licensing intellectual property production and investigate the differences between using copyright, public domain, “Copyleft”, and/or creative commons licenses.

4d Learners determine how digital technologies can be used, designed, and created to monitor, promote, and improve environmental sustainability.

1. Investigate the natural resources that are required to produce a variety of digital hardware and software.
2. Recognize and enact environmentally safe and responsible ways for creating, reusing, recycling, or disposing of digital devices.
3. Explain the environmental impacts of producing computers, software, and other digital technologies (e.g., waste management, climate, natural resources, etc.).
4. Explore various ways digital technologies can be used, designed, and created to monitor, promote, and improve environmental sustainability.



5. Brainstorm and develop ways to improve, eliminate, and reverse the environmental impacts of past, current, and future digital technologies.



Communication and Collaboration

Learners communicate and collaborate with others in digital environments, working effectively in local and global teams to develop empathy and broaden perspectives, achieve common goals and solve problems, share values, and advocate for positive social change.

5a Learners communicate effectively by using, designing, and creating a variety of digital communications technologies.

Learners:

1. Engage in discussions concerning when it is appropriate to speak and listen in digital environments.
2. Conduct themselves in a respectable and professional manner in digital settings, but also know when it is appropriate to speak out against injustices and how to advocate for things they believe in.
3. Listen and observe effectively to decipher meaning, including knowledge, values, attitudes, and intentions in digital spaces.
4. Consider, analyze, and evaluate alternative points of views in digital settings.
5. Communicate effectively using oral, written, and nonverbal digital communication skills for a range of purposes in a variety of forms and contexts.
6. Take into account the purposes and audiences of their digital messages and the tones they want to convey.
7. Understand that digital technologies are not always the best tool to communicate with and that face-to-face conversations are often considered best practice for empathetic conversations.

5b Learners choose, design, and create digital technologies that most appropriately and effectively communicate, present, or publish content for intended and unknown audiences.

Learners:

1. Are able to choose from or create a variety of digital technologies that best represent their messages and help them advocate for positive social change.
2. Present information, products, and ideas effectively to a variety of known and unknown audiences using a variety of digital technologies.
3. Know how to effectively use social media and social networks, if they so choose, to promote their work.
4. Make valuable contributions to the public knowledge domain via digital means.



5. Can interact, collaborate, co-construct content and products, and publish with peers, experts, or others through a variety of digital environments and media.
6. Locate and participate in online networks that foster positive communities.
7. Discuss the different pressures teens face when it comes to creating, editing, posting, and commenting on digital content.

5c Learners analyze, use, design, and create digital technologies to connect with people from a variety of backgrounds and cultures, engaging with them in ways that foster community through mutual understanding and learning.

Learners:

1. Use, design, and create digital tools and platforms that allow them to effectively communicate with people within their school, family, and both local and global communities.
2. Examine and reflect on the ways digital communications tools can potentially unite or disembody communities.
3. Can use digital resources to safely and effectively broaden their knowledge by connecting with others.
4. Demonstrate empathy, respect, and appreciation for differences when communicating with people from a range of social and cultural backgrounds and identities.
5. Respond open-mindedly to different ideas, perceptions, beliefs, and values in all digital spaces.
6. Are able to effectively convey appropriate expressions and responses in diverse, multi-cultural environments.
7. Promote equality, fairness, non-violence, acceptance, and affirmation of the unconditional value of all peoples, where people are free to grow, thrive, and express their individual identities in all digital spaces.
8. Assess how digital tools can be used to promote inclusive and exclusionary communities.
9. Use, design, and create digital technologies that promote and honour the diversity and inclusionary practices and beliefs of all peoples.

5d Learners use, design, and create collaborative technologies to work with others, including peers, experts, or community members, to examine, address, and solve issues and problems from multiple viewpoints.

Learners:

1. Develop skills using digital tools to engage in collaborative teamwork with classroom and global peers.
2. Can use digital tools as a way to collaborate and co-construct meaning with peers through distance learning.
3. Enhance cultural and social understanding and global awareness by engaging with learners of other cultures and identities.
4. Demonstrate an ability to work effectively and respectfully with diverse teams to accomplish common goals.
5. Assume shared responsibility for collaborative work and value the individual contributions made by each team member.
6. Demonstrate an ability to leverage social and cultural differences to create new ideas, products, and processes that improve the quality of work, play, and life in digital and non-digital environments.
7. Explore local and global issues and use collaborative digital technologies to work with diverse teams to investigate solutions.



Computational Thinking



Learners break down problems into individual components, create abstract and relevant representations, look for patterns, and develop algorithms to better understand, manage, and solve complex problems in a variety of educational contexts, as well as everyday life.

6a Learners deconstruct problems into individual components in order to understand, manage, and solve complex problems.

Learners:

1. Explore the ways complex information, problems, or processes can be broken down into more manageable and individual components.
2. Can create and articulate a precise and thorough description of a problem designed to facilitate its solution, including conditions and constraints that must be taken into account.
3. Are able to identify and collect vital information relevant to a decision to be made or problem to be solved.

6b Learners create abstract and relevant representations to better understand a problem in order to design and facilitate possible solutions.

Learners:

1. Consider and determine to what extent individual components relate to one another in order to solve an overall problem.
2. Examine and create a variety of representations, including flow charts, graphs, mind maps, words, images, and other media to better understand and visualize the relationships between the components and their sequencing.
3. Develop a variety of solutions to each deconstructed component with the goal of assembling them and determining the appropriate sequence to solve the original, larger problem.
4. Think of how these solutions can be generalized in order to be applied to the current, as well as other contexts, and used to solve other problems, or as a component to solve other problems.

6c Learners look for patterns within the deconstructed components, as well as the abstractions and representations of their previous solutions (steps in 6b and 6c might be cyclical and in need of revisiting and refining).

Learners:

1. Analyze various problems with the goal of recognizing commonalities or patterns within or between components that provide insight into the original, larger problem, or that can be applied to new and different problems.
2. Recognize exceptionalities that do not fit the patterns but play a part in the process of solving problems.



6d Learners develop an algorithm based on the refinement and successful culmination of the previous outcomes.

Learners:

1. Understand that an algorithm is a step-by-step process or a sequence of statements (i.e., instructions) used to complete a task and can apply to many situations in daily life (and not only computing contexts).
2. Can develop and write algorithms to solve problems or complete tasks.
3. Recognize that a single algorithm might be reused to solve other problems or as a component to solving larger problems.
4. Predict and anticipate unforeseen outcomes in order to revise or reconstruct an algorithm.
5. Test algorithms by executing them in a step-by-step process using a variety of inputs or conditions.
6. Test the intuitiveness of an algorithm by asking others to engage with it, assessing its effectiveness to complete a task.
7. Understand that improving an algorithm will likely require revisiting previous outcomes.

6e Learners critically reflect on the limitations, affordances, and appropriateness of the functionalities and uses of algorithms.

1. Reflect on the benefits and limitations of using algorithms to solve problems and complete tasks.
2. Discuss the various ways humans write, interpret, and implement algorithms, and how these can potentially produce different outcomes.
3. Explore the ways algorithms may create, reinforce, or exacerbate social and intellectual biases that may result in stereotypes against people and minority groups.
4. Explore ways algorithms can be written and used to improve the common good.



APPENDIX A: HISTORICAL DEFINITIONS OF DIGITAL LITERACY

Organization	Year	Definition
Glister	1997	The ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers.
Thoman & Jolls	2003	The ability to access, analyze, evaluate and create media in a variety of forms.
Martin & Grudziecki	2006	The awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process.
OECD	2012	Using digital technology, communication tools, and networks to acquire and evaluate information, communicate with others, and perform practical tasks.
American Library Association	2013	The ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.
Government of British Columbia	2015	The interest, attitude and ability of individuals to use digital technology and communication tools appropriately to access, manage, integrate, analyze and evaluate information, construct new knowledge, and create and communicate with others.
European Commission	2016	The confident and critical use of information technology for work, leisure, learning and communication. It is underpinned by basic skills in ICT [information and communication technologies]. This includes the use of computers to retrieve, access, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the internet.
Media Smarts	2016	The skills and ability to use digital tools and applications; the capacity to critically understand digital media tools and content; and the knowledge and expertise to create and communicate with digital technology.
Brookfield Institute	2018	The ability to use technological tools to solve problems, underpinned by the ability to critically understand digital content and tools. This can include the more advanced ability to create new technological tools, products, and services.
New Brunswick Digital Literacy Framework	2022	The harmony of digital skills, attitudes, and behaviours that help students achieve their goals and become thoughtful and able citizens that contribute to the betterment of society and the common good.



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