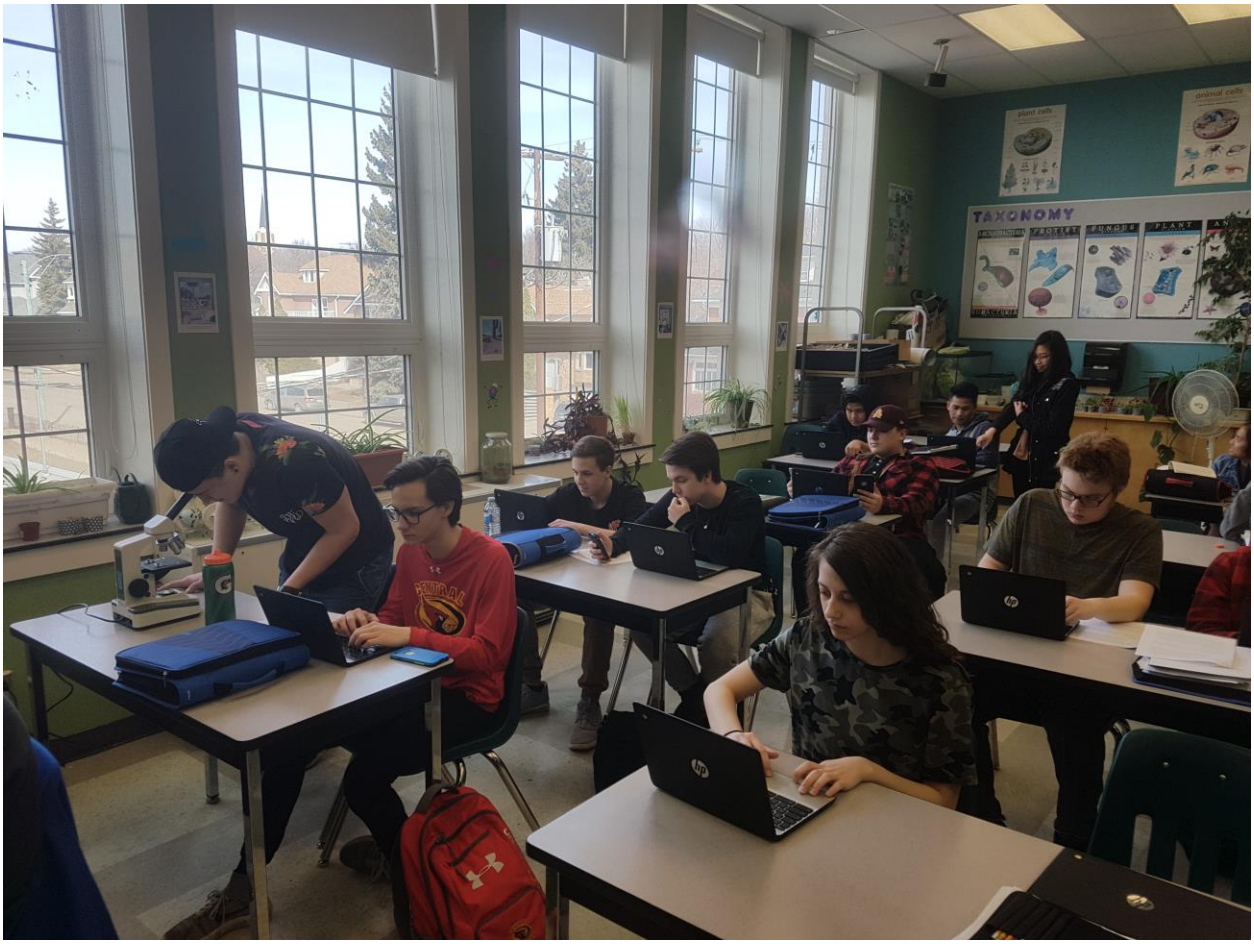
Digital Literacy in Saskatchewan Science: A Curriculum Guide



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Preface

This document was developed as an addition to the Saskatchewan Science Curriculum. Any individuals planning on using this document are strongly recommended to familiarize themselves with the aims and goals, cross-curricular competencies, broad areas of learning, and elements of "an effective science education program" found in the curriculum. The resources tend towards senior science courses.

Additionally, this document was made in association with the Digital Citizenship Education in Saskatchewan Schools policy planning guide and it is strongly recommended that individuals familiarize themselves with its content as many connections and references will be made to that document throughout this resource.

Science and Digital Citizenship in Saskatchewan Guide

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Rationale

Scientific Literacy

Scientific literacy is the goal of K-12 science education in Saskatchewan, this is evidenced in the "Aims and Goals" section from the Environmental Science 20 curriculum below.

Aims and Goals

The aim of K-12 science education is to enable all Saskatchewan students to develop scientific literacy. Scientific literacy today embraces Euro-Canadian and Indigenous heritages, both of which have developed an empirical and rational knowledge of nature. A Euro-Canadian way of knowing about the natural and constructed world is called science, while First Nations and Métis ways of knowing nature are found within the broader category of Indigenous knowledge.

Diverse learning experiences based on the outcomes in this curriculum provide students with many opportunities to explore, analyze, evaluate, synthesize, appreciate and understand the interrelationships among science, technology, society and the environment (STSE) that will affect their personal lives, their careers and their future.

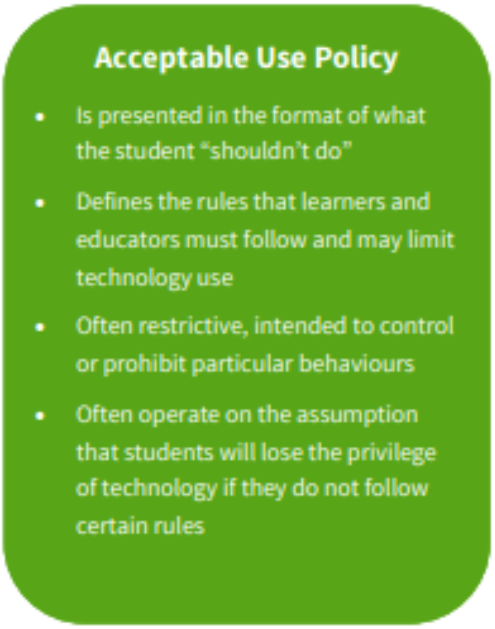
Digital Citizenship: Digital Literacy

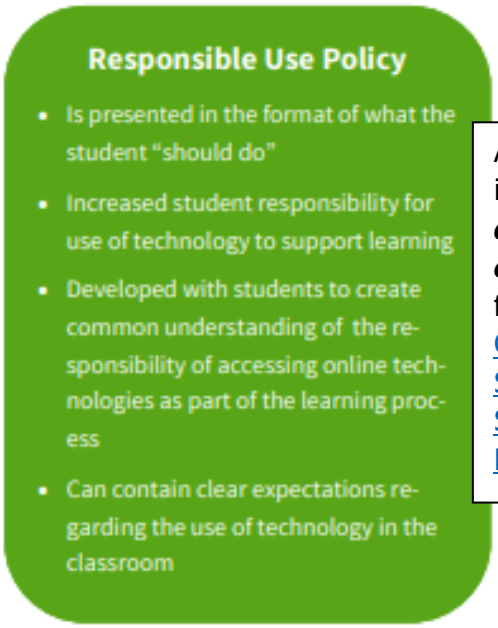
Digital Literacy, Access, Communication, Etiquette, Law, Rights & Responsibilities, Health & Wellness, and Security all are applicable to the utilization of digital citizenship practices in a science classroom. Each of these connect to certain aspects of the foundations of scientific literacy (this is covered later in this document), however digital literacy most accurately depicts the range of applications of digital citizenship to a science classroom.

Digital literacy involves the "process of teaching and learning about technology and the use of technology" and is one of Ribble's Nine Elements of Digital Citizenship most specifically associated with scientific literacy.

Digital literacy represents an essential component of scientific literacy in a digitally connected world. Much of the information available related to science in the 21st century is widely available online, however the means in which it is made available to citizens is through media outlets and websites that may possess subjective bias or is not available without paid access.

Digital literacy connects to the broad areas of learning in the Saskatchewan curriculum that seeks to establish lifelong learners and engaged citizens who have a sense of self, community, and place. Scientifically literate students can utilize elements of digital citizenship to continue learning and respond to a changing socio-political world climate to make decisions that are inclusive of the connected community online.





Additional information on ***digital citizenship education*** can be found in [The Digital Citizenship in Saskatchewan Schools Policy Planning Guide].

This document highlights the role of schools, educators, and other invested parties to embrace and integrate digital technologies to pursue *"responsible use policies"* as opposed to *"acceptable use policies"* (see above) towards digital citizenship in classrooms.

How to use this Resource

This guide…

- Is best-used as a resource or tool to provide science educators and learners with information on organically including digital citizenship into their science classrooms based on the Saskatchewan science curriculum.
- Provides connections to curriculum, explanation of what exactly digital citizenship explanation is, suggestions of philosophies and lessons to incorporate in senior science classrooms.
- Is not a policy or guideline for all educators to practice in their classrooms – it is merely a suggestion given the interpretation of the Saskatchewan Curriculum and the Digital Citizenship Education in Saskatchewan Schools document.

Science Connections

Indigenous Knowledge, Place-Based Narratives and Science Education

Indigenous knowledge involves knowledge systems that are a part of cultures. Extending our availability to different cultures, place, and settings is a means to achieve this.

Different settings require diverse styles of instruction and means to engage students. Educators should provide a variety of perspectives on topics related to digital citizenship in their science classrooms. This includes incorporating Ways of Knowing and varied assessment strategies that allow for students to best-represent their understanding of content covered in the courses. This can be made possible through the utilization of social media to evaluate and consider multiple perspectives beyond a students' particular place and may serve to overcome divisional financial barriers in achieving this (through making connections online rather than requesting funding to physically have individuals present). Storytelling and the value of narratives to scientific literacy increase in availability when using digital resources responsibly.

The Truth and Reconciliation Commission Calls to Action calls for "improving education attainment levels and success rates", "parental involvement" and "culturally appropriate curricula" both of which may be accomplished through digital citizenship education with scientific literacy. This can serve to improve First Nation student learning sense of place by improved networking with educators or other students involved in indigenous education (such as language education).

Recommended Online Cree Language Educator: Bill Cook (Website, YouTube)

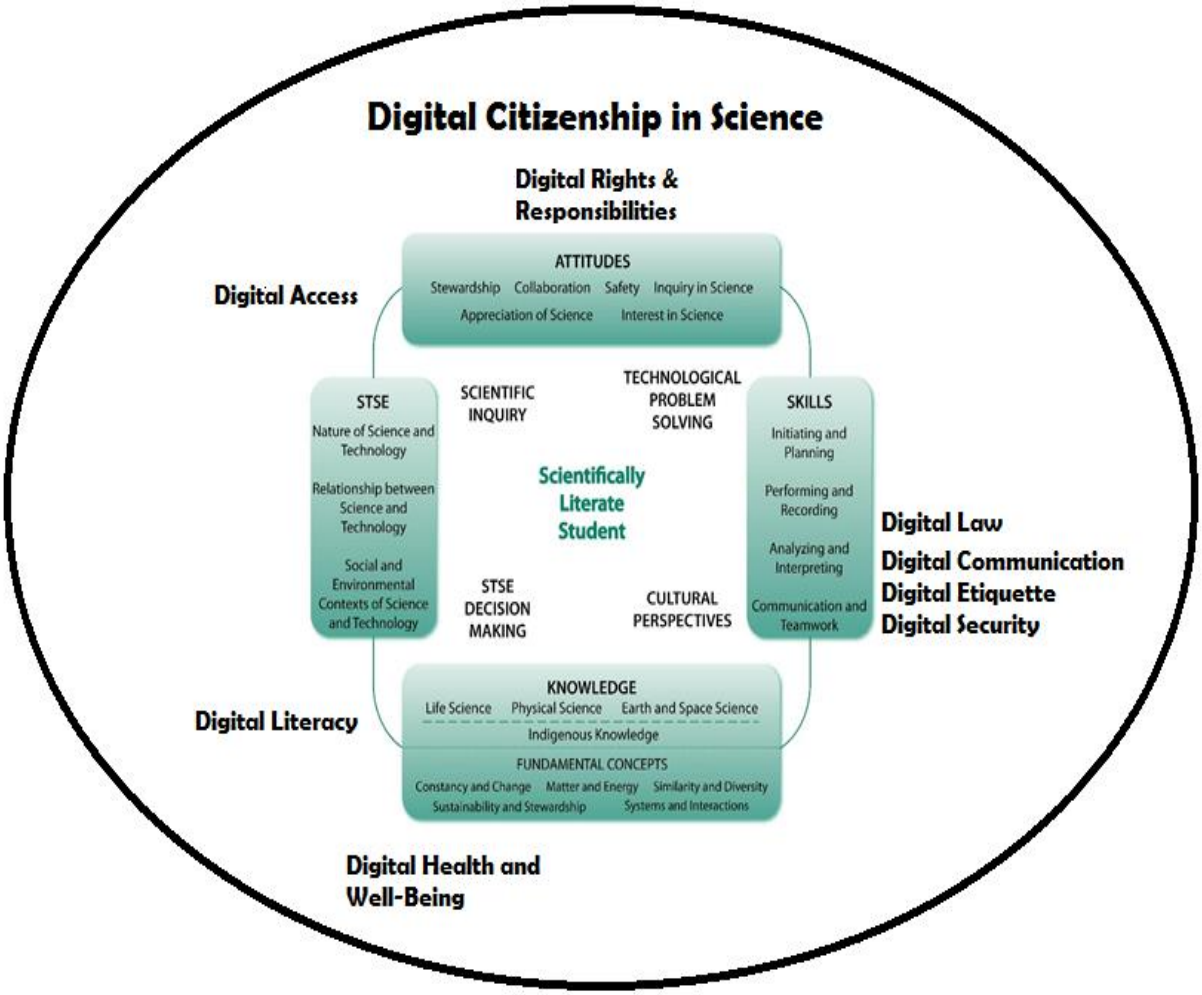
Connections to Science Curriculum

The Saskatchewan Science Curriculum calls upon educators to foster the development of "Scientifically Literate Students" through achieving growth in the foundational areas of scientific literacy. All of foundations are realizable through the practice and utilization of digital citizenship in a science classroom. These foundations and their connections are listed below.

a. ***Attitudes*** – appreciation, interest, inquiry, collaboration, safety and stewardship all are enhanced through the utilization of digital citizenship principles when allowing students to pursue content that relates to the course but is more relevant to their context. They can connect and learn with others using social media and search engines.

b. ***STSE Interrelationships*** – staying up to date on relationships between digital technology and their relationship to science is an ongoing process. Additional, utilization of social media allows for constant analysis on the social and environmental contexts in which science occurs in our world.
c. ***Scientific Skills and Processes*** – planning, recording, analyzing, and communication are all essential aspects of practicing science that can be achieved through the establishment of online learning communities using learning management systems (LMS) such as Google Classroom.
d. ***Scientific Knowledge*** – students are able to pursue knowledge pertaining to course content online potentially using peer-reviewed texts or other reputable sources to further their understandings.

A scientifically literate student can achieve all aspects of this through responsible utilization of the digital world. Many of the elements of digital citizenship fit into certain areas of the "scientifically literate student" visual as evidenced below with their location on the visual based on strongest affiliation with each of the foundations of scientific literacy.



Educator Philosophies & Practices

Educators are encouraged to adopt certain approaches in their classroom that may be explored with students that extend beyond the scope of the Saskatchewan Curriculum (Attitudes and STSE) to create scientifically literate students.

Science Educator Philosophy Blogs and Recommended Readings

- One of an Infinite Means to Approach Science, Education, and the Universe – Logan Petlak
- Towards a Posthumanist Education – Snaza et. Al

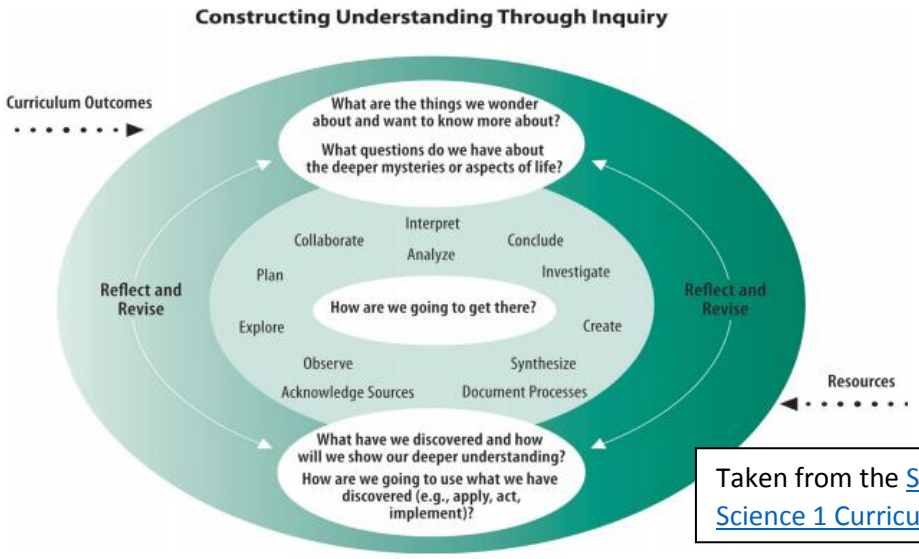
This includes:

- Incorporating elements of open education using free-to-use, copyright-free resources with support from websites like Creative Commons, or through the utilization of free resources (and textbooks) such as OpenStax, ECampus Ontario, OpenTextBC. This views knowledge and learning as a natural part of science and the universe that should be available to all individuals interested in learning.
- Development of a personal learning network using contemporary resources specifically in following contemporary figures in STSE-related social media circles.
- Questioning and deconstruction of society through the lens of critical theory to recognize influences on an individual, community and species capacity to interpret perspectives and sources of information.
- Create opportunities for out-of-classroom digital citizenship learning through BYOD (bring-your-own-device) policies, providing regular WiFi access or device-recycling programs that can make devices available to all students.

Challenges of Scientific and Digital Literacy

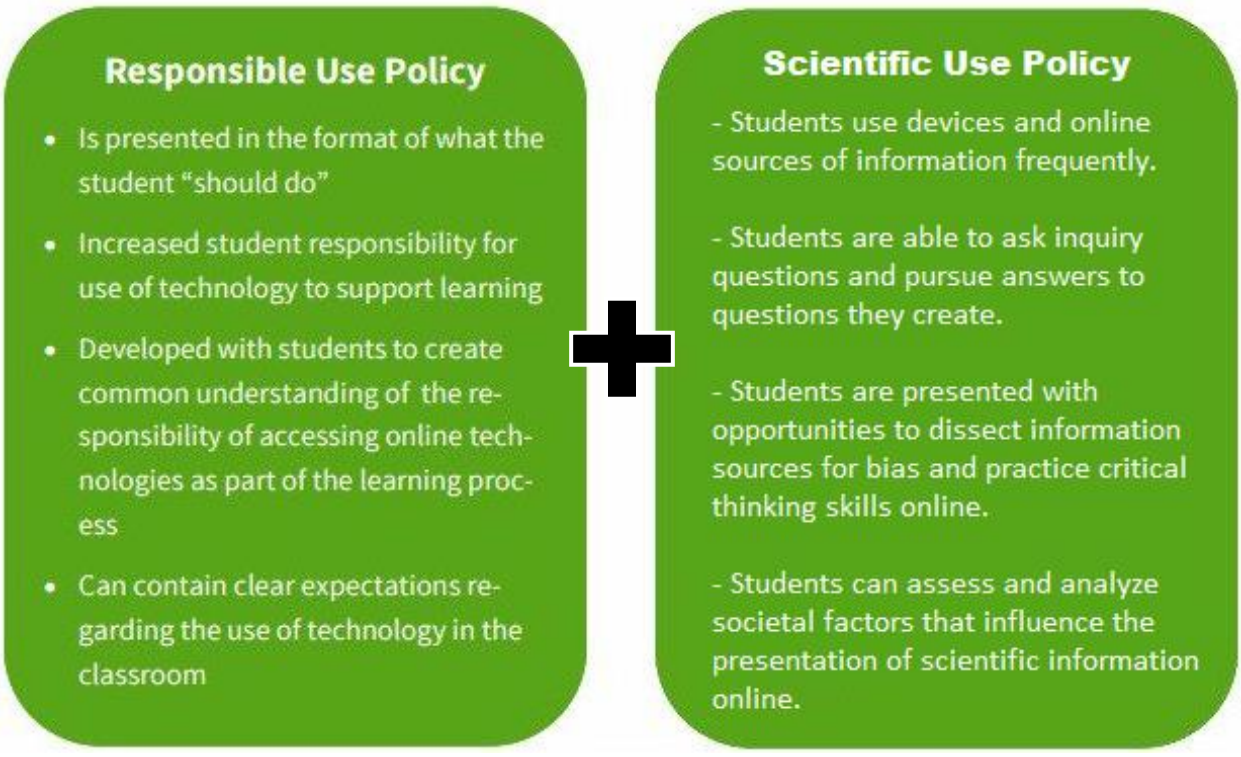
In a growing "Fake News" world in which misinformation is deliberately shared online, certain misconceptions and principles of scientific knowledge are often misrepresented in online consumption.

Students, in appreciating the value in multiple perspectives and worldviews, need to be prepared to analyze and dissect a variety of posts from different media outlets and the objective thinking associated with scientific literacy would benefit them in this process. A large part of this may be realized using inquiry-based learning with the specific use of digital learning tools. These tools can help realize the achievement of reflections and revision associated with inquiry-based learning as well as promoting goals of questioning, analysis, creation, investigation, observation, planning and others (as observed in the visual below).



Taken from the Saskatchewan Science 1 Curriculum (2011).

These digital learning tools build on "*responsible use policies"* to incorporate "*scientific use policies*" and can further extend to goals related to the use of social media for evidence-backed activism.



Educators are encouraged to make resources available to students that will allow them to be critical consumers and be inherently skeptical of all content they are exposed to online.

Digital Citizenship & Science Resources

a. **Digital Citizenship Continuum for Courses –** this document provides guidelines for different grades indicating skills and understandings students should possess as it relates to digital citizenship.
b. **LoganPetlak.ca –** Science educator and digital citizenship blogger.
c. **Snopes –** fact-checking website.
d. **Digital Citizenship** – the home page for digital citizenship and Ribble's Nine Elements of Digital Citizenship.
e. **Assorted YouTube Science Channels:** Crash Course, PBS Space Time, Veritasium, It's Okay to Be Smart
f. **Saskatchewan Curriculum**
g. **OpenStax –** free online textbook for all senior science courses.
h. **OpenTextBC** – free online textbook database for a variety of courses.
i. **Edutopia: Digital Citizenship Resources** – an ongoing page that is updated with different tools for teaching digital citizenship in your classrooms.
j. **Twitter** – follow Alec Couros, George Couros, Katia Hildebrandt

Course-Specific Lessons

Health Science 20 – Curriculum

- **Lesson Name:** "What the Health?" – Digital Citizenship and Dissecting Visual Media
  Outcome: HS20-NU2 - Analyze dietary choices based on personal and cultural beliefs and scientific understanding of nutrition. ([SI, CP])
  Lesson Summary: Students critically dissect a Netflix documentary for fact and opinion using digital citizenship skills.
  Lesson Plan Outline: **What the Health DigCit Lesson Template.docx**

Environmental Science 20 – Curriculum

- **Lesson Name:** Climate Change in the Media
  Outcome: ES20-AH2 - Analyze the production, reliability and uses of geoscience data to investigate the effects of a changing climate on society and the environment. ([CP, DM, SI])
  Lesson Summary: Students critically dissect climate change articles for fact and opinion using digital citizenship skills.
  Lesson Plan Outline: **Climate Change DigCit Lesson Template.docx**

Biology 30 – Curriculum

- **Lesson Name:** Evolution
  Outcome: BI30-LE2 - Examine the significance of evolution as a key unifying theme in biology through the principles, processes and patterns of biological evolution. ([SI, DM])
  Lesson Summary: Students find YouTube videos or Social Media posts that are against evolution and formulate respectful responses to help debunk some claims made about evolution while respecting perspectives.
  Lesson Plan Outline: **Evolution DigCit Lesson Template.docx**

Acknowledgements

I'd like to thank Alec Couros courses and information regarding educational technology and digital citizenship. I strongly recommend taking courses (ECI 830-ECI 834) at the University of Regina pertaining to open education, social media, digital citizenship, distance learning and contemporary issues in educational technology to enhance your understanding of the content. In these courses were many students who all contributed to learning about digital citizenship and extended personal learning networks for anyone involved.