# Technology Education 7 & 8

*Curriculum Guide*

NOVA SCOTIA
NOUVELLE-ÉCOSSE

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# Course Outline

Technology education is a hands-on design problem-solving course. Technology education is designed for all learners in grades 7 and 8. Since the technology education facilities and resources vary throughout the province, the course is designed to offer some selection to schools as to the modules of study. By the end of Technology Education 8, learners will be expected to be able to use a range of technological tools, processes, and applications; integrate technology education with other academic disciplines; design and create devices and objects that solve technological problems; and explain the consequences of technology and how it affects society.

Technology education is not a computer course, but rather a course in which computers and other equipment play a part in solving problems related to design. Learners need access to a multi-activity technology education laboratory, or an innovations technology environment, which is a lab that is outfitted with a variety of problem-solving tools and equipment. The labs in which this course is taught need to be flexible to allow for a variety of activities to take place in addition to computing, such as photography, video studio setup, sign printing, drafting and manufacturing, and screen printing.

## Learning through the lens of Competencies and Skills

In 2015 the Council of Atlantic Ministers of Education and Training (CAMET) released their findings to a review of the Atlantic Canada Essential Graduation Learnings which had been developed in 1995 as a framework for curriculum development. The review questioned whether the existing model responded to the changing demands of work and life in the 21st century. This review resulted in an updated document, the Essential Graduation Competencies, placed emphasis on the importance of articulating clear statements of what learners are expected to know, be able to do, and reflect on by the time they graduate from high school. These competencies describe expectations, not in terms of individual curricular areas but in terms of attitudes, skills, and knowledge developed throughout the curricula.



## What are competencies?

Competencies are an interrelated set of attitudes, skills and knowledge that is drawn upon and applied in a particular context for learning and living. Competencies are developed over time through engagement in learning experiences and a supportive learning environment.

### Citizenship (CZ)

Learners are expected to contribute to the quality and sustainability of their environment, communities, and society. They analyse cultural, economic, environmental, and social issues, make decisions, judgment, solve problems, and act as stewards in a local, national, and global context.

### Personal-Career Development (PCD)

Learners are expected to become self-aware and self-directed individuals who set and pursue goals. They understand and appreciate how culture contributes to work and personal life roles. They make thoughtful decisions regarding health and wellness, and career pathways.

## Communication (COM)
Learners are expected to interpret and express themselves effectively through a variety of media. They participate in critical dialogue, listen, read, view, and create for information, enrichment, and enjoyment.

## Creativity and Innovation (CI)
Learners are expected to demonstrate openness to new experiences, engage in creative processes, to make unexpected connections, and to generate new and dynamic ideas, techniques, and products. They value aesthetic expression and appreciate the creative and innovative work of others.

## Critical Thinking (CT)
Learners are expected to analyse and evaluate evidence, arguments, and ideas using various types of reasoning and systems thinking to inquire, make decisions, and solve problems. They reflect critically on thinking processes.

## Technological Fluency (TF)
Learners are expected to use and apply technology to collaborate, communicate, create, innovate, and solve problems. They use technology in a legal, safe, and ethically responsible manner to support and enhance learning.

The renewed curriculum outcomes are comprised of skills, concepts, and opportunities for engagement with the competencies. Each outcome has suggested indicators to assist in developing those concepts and skills to demonstrate achievement. The design reflects an opportunity for a natural cross curricular approach.

- Indicators have been identified for each outcome; the indicators are aligned with competencies and are suggested ways to scaffold skill development through conceptual exploration in order to provide a depth of understanding in relation to the outcome.
- Concepts are the key ideas, information, and theories that learners come to know through the aligned skill. Guiding questions are offered as possible ways to approach learning associated with the skill and concept.

Competencies are listed at the end of each indicator. These are closely aligned with the combination of skill and concept that are found in the indicator. The competencies can be used by teachers to frame learning experiences. This framing provides opportunities for learners to engage with and develop the related competency.

## Course Delivery

Learning will be enhanced through an inquiry-based approach. Inquiry-based learning requires learners to meaningfully engage in the experience/activity while reflecting upon the learning and the competencies and skills they are developing.

By delivering the curriculum through an integrated approach, higher level thinking and active participation are encouraged. This approach supports learners in a deeper understanding of content and offers expanded opportunities for achievement of outcomes in a meaningful way.

**Inquiry Based Learning**

Inquiry-based learning is an approach that promotes inquiry, the creation of ideas, and observation. The process typically involves investigations, aimed at answering a big question or solving a problem. These investigations require that students learn how to develop questions, look for information, and to identify possible solutions or conclusions.

**Project Based Learning**

Using "big ideas" as a starting point, students learn through practical projects that require them to acquire a thorough understanding of the subject that they can apply in the real world. This approach engages students in formulating questions, investigating for answers, building new understandings, communicating their learning to others, while developing critical thinking skills, collaboration, communication, reasoning, synthesis skills, and resilience. Project Based Learning typically is concluded with a final product that is presented to a school and/or a community-based audience.

How inquiry based learning benefits learners:
- Makes learning relatable and relevant for learners
- Provides motivation through contextual learning
- Helps learners integrate and practice concepts and theories learned in the classroom
- Creates opportunities for development of skills and success in learning

## What could it look like in the classroom?
Learners will:
- Seek and pursue opportunities for innovation
- Introduce and test ideas
- Assess opportunities
- Set goals and action plans
- Demonstrate self-awareness
- Engage in ongoing reflection
- Take risks

## How do I know it's working?
Learners are developing as:
- Flexible collaborators
- Reflective leaders
- Calculated risk takers
- Adaptive and resilient problem solvers
- Effective communicators
- Self-aware learner

## How to Use This Guide

**Outcome: Learners will analyse particle theory in relation [to] environments**

> Curriculum outcomes are statements of what a learner is expected to know and is able to do. Outcomes provide context for skill development in relation to the learning of concepts.

### Environmental Action

### Rationale

Particle theory is essential to understanding how substances in the enviro[nment] well as how we can separate pollutants from natural systems. Exploration of solubility and concentration will help learners analyse ways to determine environmental health. Inquiry into particle theory provides the foundation for future studies in chemistry. In grade 8, concepts related to particle theory will be further refined as students explore heat and the kinetic molecular theory through the theme of climate change.

> The rationale provides a context for learning in relation to the concepts and skills learners will explore in this outcome.

### Competencies

- Citizenship (CZ)
- Communication (COM)
- Creativity and Innovation (CI)
- Critical Thinking (CT)
- Personal Career Development (PCD)
- Technological Fluency (TF)

> These are the competencies that relate to this outcome.

### Indicators

- Investigate pure substances and mixtures in relation to particle th[eory]
- Investigate methods of separation in solutions and mixtures (COM/CI/CT)
- Analyse the factors that affect solubility and concentration (COM/CT/TF)
- Measure the indicators of health of a local waterway with pro[per]
- Analyse the health of a local waterway(CZ/COM/CI/CT)
- Investigate methods of water purification and pollution cleanup

> The indicators support the development of skills and concepts, and provide evidence of student learning. Teachers have flexibility in how the indicators are selected, used and, combined in order to respond to their learners.

> The competencies noted at the end of indicator statements identify the types of learning experiences that best support the outcome.

### Concepts (and Guiding Questions)

**Particle Theory**
- How does the Particle Theory of Matter relate to mixtures and so[lutions]
- How does the particle theory of matter relate to the dissolution o[f]

**Pure substances vs. Mixtures**
- How do pure substances and mixtures compare?
- How do various mixtures and solutions compare?

**Separation of Mixtures**
- How can various mixtures be separated?
- How can pollutants be separated from our drinking water?

**Solubility and Concentration**
- How do solubility and concentration impact the effect of pollutants in the environment?
- How do different variables affect solubility and concentration?

> The concepts provide the context for skill development. Concepts may progress across grade levels as the degree of complexity increases and may be developed across curriculum areas.

> The guiding questions can provide starting points for inquiry and guide the development of skills and competencies.

## Determining Environmental Health

- How can the health of an environment be determined?
- How can water be kept clean for drinking and as a habitat?
- How does pollution enter the environment?

## Skills

### Analyse

Gather and select appropriate information; determine accuracy, validity, and relevance of the information; identify perspectives; communicate findings.

> The first skill defined is the outcome skill and the others are the skills found in the indicators.

### Investigate

Ask and revise questions; locate several relevant and dependable details to support an answer; organize and compare details; identify relationships, recognize represented perspectives, and communicate findings.

### Measure

## Background Knowledge

The following chart provides an alignment of related concepts between grade levels:

| Grade 4 | Grade 5 | Grade 7 | Grade 8 |
|---|---|---|---|
| Learners will have investigated a variety of local natural habitats. Concepts included habitat components and characteristics, survival needs of organisms, how habitats can change over seasons and with time. | Learners will have tested how physical and chemical changes affect the properties of matter. Concepts included physical and chemical properties of matter, physical and chemical changes as well as conservation of mass. | Learners will analyse particle theory in relation to substances in environments. Learners will explore the following concepts: particle theory, pure substances vs. mixtures, separation of mixtures, solubility and concentration, determining environmental health. | will investigate heat in relation to particle theory. |

> Some courses include a table that describes the scope and sequence of the skills and concepts for this outcome.

Pollution provides the context for learning about particle theory in this outcome. Learners will explore the impact of various concentrations of substances in the environment. concept of pollution and an understanding of particle theory will support scientific knowledge that underpins the concept of pollution. An understa learners make decisions about what is safe or harmful for the environment.

> The background knowledge provides an overview of the learners' experiences in relation to the skills and concepts of the outcome.

Data logging sensors (probeware) can be used to collect data from local environments. This provides opportunities to connect with the mathematics curriculum as well as careers in environmental management. Using probeware allows for the collection of a lot of data in a short period of time so the effort can be placed in designing controlled experiments and analyzing the data for real-life implications. Learners have had probeware available to them as early as grade 4.

## Learning Experiences

The suggested indicators are organized in a way to scaffold learning. The exploration of skills and concepts for this outcome can be done in any or based on the progression of learning. The experience described below is the other indicators that support the outcome, however, in practice multiple indicators can be addressed simultaneously. For example, learners may *analyse the factors* concentration when *measuring the indicators of health of a local water*

> For each outcome you will find one sample learning experience relating to the skills, concepts, and competencies for a specific indicator.

> Guiding questions and learning experiences can be used to launch inquiry into the concept.

## Indicators

- Investigate pure substances and mixtures in relation to particle theory (COM/PCD/CI/TF)
- Investigate methods of separation in solutions and mixtures (COM/CI/CT)
- **Analyse the factors that affect solubility and concentration** (COM/CT/TF)
- Measure the indicators of health of a local waterway with probeware (CZ/CI/TF)
- Analyse the health of a local waterway(CZ/COM/CI/CT)
- Investigate methods of water purification and pollution cleanup (CZ/COM/PCD/CI/CT)

## Overview

The teacher presents learners with the task of designing an experiment solubility and/or concentration. Depending on where learners are in may provide questions in the form of a design challenge: How do you dis of water? What is the fastest method to dissolve a sugar cube?

> This provides a quick description of the learning experience outlined in detail below.

## Evidence of Learning for the indicator:

*Analyse the factors that affect solubility and concentration*

Evidence of learning can be gathered as learners design and conduct an information about factors that affect solubility and concentration. Furth through conversations about the validity and reliability of the data learn

> This section provides an overview of how assessment is embedded within the learning experience. The evidence of learning corresponds to the acquisition of skills and the understanding of concepts related to the outcome.

*The evidence found through the learning experience for this indicator are suggestions of what teachers can look for in relation to skills and concepts. Regardless of the methods used, it is necessary for teachers to be intentional about collecting evidence of student learning to inform next steps for teaching.*

## Description of learning experience for the indica

*Analyse the factors that affect solubility and concentration*

> This section details the steps for the sample learning experience and identifies the indicator in focus.

### Potential Guiding Questions

- How do different variables affect solubility and concentration

> Guiding questions that relate to the concepts of the sample learning experience are listed here to help launch student inquiry.

*The learning experience below is **one possibility** to engage learners with **this indicator**. It will be necessary to modify this experience to engage learners in a culturally and linguistically responsive way.*

## Gather and select appropriate information

Learners can carry out their experiments and gather data. This may be done in small groups or pairs. Alternatively, learners may be placed into groups to discuss the various experimental designs and one design can be chosen to be conducted. Another option is to refine the experimental designs as a group to include elements from several members of the group into one design. This refined design can then be carried out. A discussion or mini lesson on how to effectively record data might help learners organize the experimental information that they will be gathering.

The teacher should provide feedback with respect to lab safety, throughout the experiment.

**Essential Graduation Competencies**

**Technological Fluency**
This provides learners the opportunity to use technology in a re... and

### 🔍 Evidence of Learning (Observations)

While students are collecting experimental data, the teacher can p... gathering information for analysis.

## Determining importance of information and Communicate Findings

Learners can share their findings by exploring the following questions:

- How do the results of different experiments compare?
- What do the results mean in relation to pollutants in the environment?
- How is the factor that you inquired about important for pollution management?

**Essential Graduation Competencies**

**Communication**
This provides learners the opportunity to listen and interact purposefully and respectfully in formal and informal contexts.

### 🔍 Evidence of Learning (Conversations)

Learners **communicate** and discuss the **importance of the findings.**

### 🔍 Evidence of Learning (Products)

Learners **communicate their findings** on the factors that affect solubility and concentration.

## Moving Forward
How are the variables you investigated relevant to substances in the

**Callout annotations:**

> Along with the steps for the learning experience, competencies have been identified that best align with the steps as described.

> A description of the competency that could be developed through this learning experience.

> Evidence of learning is gathered throughout the learning experience. Suggested opportunities are found in these boxes.

> The next steps are scaffolded towards learner independence and application of the skill as it relates to the outcome

**Outcome: Learners will implement the design process in relation to the concept of Netukulimk**

**Design process**

## Rationale

In Technology Education, learners will solve increasingly complex problems and develop a more in depth understanding of the consequences of their possible solutions. Mastering the Design Process in relation to Netukulimk allows learners to break down large problems into smaller pieces through a logical and flexible process while striving to maintain harmony in nature.

As the design process is overarching to problem solving in any Technology Education context, this outcome is to be incorporated when addressing any of the other outcomes listed below.

## Competencies

- Citizenship (CZ)
- Communication (COM)
- Critical Thinking (CT)
- Creativity and Innovation (CI)

## Indicators

- Analyse the environmental footprint of materials (CZ/COM/CT)
- Investigate how life cycle analysis aligns with the teachings of Netukulimk (CZ/COM/CI/CT)
- Evaluate sustainable practices in relation to the concept of Netukulimk (CZ/COM)
- Apply the design process to a project (CZ/CT)
- Investigate how the design process is used to draft and improve a solution to a problem (CI/CT)

## Concepts (and Guiding Questions)

**Life cycle analysis**

- What is the life cycle for a given product?
- How can I balance environmental and economic impact?
- How long will the product last?

**Environmental Footprint**

- What is meant by environmental footprint?
- What methods can be used to determine environmental footprint?
- Why is knowing the environmental footprint important?

**Design Process**

- What is the design process?
- Why are sketches and technical drawings necessary for the design process?
- How do I modify the design?
- What do I move from idea generation to application?
- How can the audience impact the design solution?

- How can we respond to the needs of an audience?

## Repurposing/Upcycling
- How can I make use of leftover materials?
- What tools and materials can I use to minimize the environmental impact of a given product?

## Netukulimk
- How does Netukulimk inform the design process?
- What is my responsibility regarding disposal of product?
- What is the final impact of the product?

# Skills

## Implement

Select - Locate several relevant and dependable details to support an answer

Plan – Formulate: Identify a topic of interest; brainstorm ideas; choose, prioritize, and refine ideas; evaluate choices.
Devise a process to solve the problem. Execute the steps, modifying as necessary.

Evaluate - Review processes and results from an inquiry; consider and communicate varying perspectives and alternative solutions; identify potential new problems and/or issues; justify decisions and/or findings.

Apply - Carry out, use or complete a procedure/ technique.

## Analyse

Gather and select appropriate information; determine accuracy, validity, and relevance of the information; identify perspectives; communicate findings.

## Investigate

Ask and revise questions; locate several relevant and dependable details to support an answer; organize and compare details; identify relationships, recognize represented perspectives, and communicate findings.

## Evaluate

Review processes and results from an inquiry; Consider and communicate varying perspectives and alternative solutions; Identify potential new problems and/or issues; Justify decisions and/or findings.

## Apply

Carry out, use or complete a procedure/ technique.

# Background Knowledge
Netukulimk is an ancient and essential concept for Mi'kmaw people as to how a person should live their life on earth where Spirit guides the heart, mind and actions. Netukulimk is recognizing the relationship we have with one another and with the environment through our actions, beliefs, and behaviours. It uses the living knowledge of the principles of sustainability, interconnectiveness, spirituality, and stewardship in connection with Msit No'kmaq; the belief that all living things are related.

By following the design process learners begin with a problem to solve or a question to answer. Learners then explore potential solutions, researching and developing ideas. Ideas may come from the research, or from the learners themselves. As learners move from idea generation to product development, they must first consider the lifecycle of their design. This consideration of the materials used as well as the end of life of the product should align with the concept of Netukulimk, recognizing the impact of their decisions on the wider world. Throughout the design process, learners must evaluate their decisions and modify as necessary.

This logical model from ideation to realization seems linear however, in reality it is an iterative process where learners are constantly moving between stages using modification and reflection to perfect their design leading eventually to a solution to the initial problem.

The design process is not solely a model for problem solving in technology education, it can be used in all inquiry based learning, regardless of the context. Furthermore, learners will be able to transfer the skills of responding to audience and purpose from writing in English Language arts, to designing in Technology Education.

## Learning Experiences

The suggested indicators are organized in a way to scaffold learning in support of the outcome. The exploration of skills and concepts for this outcome can be done in any order, concurrently, or selectively based on the progression of learning. The experience described below is presented independently from the other indicators that support the outcome, however, in practice multiple indicators can be addressed simultaneously. For example, learners may *investigate the design process* while they are *analysing the environmental footprint of a possible solution*.

## Indicators

- Analyse the environmental footprint of materials (CZ/COM/CT)
- Investigate how life cycle analysis aligns with the teachings of Netukulimk (CZ/COM/CI/CT)
- Evaluate sustainable practices in relation to the concept of Netukulimk (CZ/COM)
- Apply the design process to a project (CZ/CT)
- **Investigate how the design process is used to draft and improve a solution to a problem (CI/CT)**

### Overview

Learners will solve a problem using the Design Process as a guide while investigating the concept of Netukulimk and its core values. It is important to consider how the Design Process and Netukulimk are connected in the desire to work towards a purposeful, balanced, and interconnective outcome.

## Evidence of Learning for the indicator:

*Investigate how the design process is used to draft and improve a solution to a problem*

Evidence of learning can be gathered as learners ask questions and locate details in relation to existing designs. Further evidence can be gathered as they organize and compare details, identify relationships, and communicate their findings.

*The evidence found through the learning experience for this indicator are suggestions of what teachers can look for in relation to skills and concepts. Regardless of the methods used, it is necessary for teachers to be intentional about collecting evidence of student learning to inform next steps for instruction.*

## Description of learning experience for the indicator
*Investigate how the design process is used to draft and improve a solution to a problem*

### Potential Guiding Questions
- What is the design process[1]?

> *The learning experience below is **one possibility** to engage learners with **this indicator**. It will be necessary to modify this experience to engage learners in a culturally and linguistically responsive way.*

### Introduction:

The teacher can facilitate a discussion about design using the following guiding question:
- What makes a product successful?
- How do people create a new product?
- What steps can someone take when designing a product?
- How can someone modify a product?

The teacher can provide learners the key concepts of the design process and ask them to work in pairs to create a sketch, graphic, visual, or explanation about how they might fit together, be ordered, or relate. These key concepts are: Modify, Problem, Evaluate, Design, Ideas, Research, Life Cycle Analysis.

Learners will be asked to keep a list of questions they want to explore further as they consider the design process concepts.

**Essential Graduation Competencies**

**Critical Thinking**
This provides learners an opportunity to ask critical and purposeful questions

### Evidence of Learning (Observations/Conversations)

Evidence of learning can be gathered as learners **ask and revise questions** about the design process.

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[1] See Appendix for further information

The teacher will offer learners either an example problem to solve, or an actual problem to solve in relation to a new or ongoing project or activity in the Technology Education class. This can be anything that the learners are interested in, or a problem they have with an existing product. Learners should draft some possible designs or modifications to be explored later in the learning experience.

Learners will work individually, in pairs, or small groups in order to brainstorm possible solutions to their problem. The teacher can facilitate discussion with the following questions:
- What do I need to consider when designing a solution?
- How do I modify my solution?

In order to aid in identifying ways to modify a product, the teacher will introduce and discuss the concept of Netukulimk[2]. This will be helpful to students to use as guidelines for modifying existing products to be in alignment with these teachings.

Learners will focus on the four core values of Netukulimk: Respect, Responsibility, Relationship, and Reciprocity as they locate examples of these values within a variety of existing products. This may be in the design, creation, use, Life cycle analysis, philosophy, etc., of a product.
Learners can consider the following question as they located details:
- How do I see these values expressed?

**Essential Graduation Competencies**

**Creativity and Innovation**
This provides learners an opportunity to reflect on creative and innovative works and processes

## Evidence of Learning (Observations/Conversations/Products)

Evidence of learning can be gathered as learners **locate several relevant details** about how the core values of Netukulimk are expressed in the design of a variety of products.

Using the details that they have located, learners will now group together in order to discuss, organize, and compare what they have found.
They will want to consider:
- How do I see these values expressed?
- How do my peers see these values expressed?

**Essential Graduation Competencies**

**Critical Thinking**

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[2] See Appendix for further information

- How could these values be expressed through modifications to other products?
- What aspects need to be considered during the design phase?
- What aspects need to be considered during the evaluate and modify phases?

In their groups Learners will then select product examples that express each of the core values to share with the class as they discuss what they have found.

This provides learners an opportunity to reflect on personal ideas and opinions relative to the ideas and contributions of others

## Evidence of Learning (Observations/Conversations)

Evidence of learning can be gathered as learners **organize and compare details, and identify relationships** in relation to the expression of the core values of Netukulimk.

Learners will offer initial design parameters as well as modifications that can be made to the example problem or real problem/product from the beginning of the learning experience. They will discuss or share their modifications to the original designs taking into account the core values of Netukulimk.

**Essential Graduation Competencies**

**Creativity and Innovation**
This provides learners an opportunity to use creation techniques to invent and innovate

## Evidence of Learning (Observations/Conversations)

Evidence of learning can be gathered as learners **communicate their findings** of how the expression of the core values of Netukulimk can be used to establish design parameters and/or modifications to new or existing products.

**Communications and Multimedia**

## Rationale

Examples of good design can be found all around us in art, a building appearance and functionality, how a product looks or works, or even a commercial for a product. The elements and principles of design are fundamental building blocks that learners can use to help plan and construct successful projects. Good design is most often a result of design with intention and an understanding of these elements and principles will support learners in their ability to design effectively.

## Competencies

- Communication (COM)
- Critical Thinking (CT)
- Creativity and Innovation (CI)

## Indicators

- Investigate how the principles of design are used in media (COM/CI/CT)
- Compare the purposes of the principles and elements of design (COM/CI/CT)
- Analyse how audience and purpose inform the design of various media (COM/CI/CT)

## Concepts (and Guiding Questions)

**Demands of audience**

- How can I identify my audience?
- How can my project meet the needs of the given audience?
- How can the audience influence my design?
- How do I evaluate the effectiveness of my design on a given audience?

**Elements and principles of design**

- What are the elements and principles of design?
- What principles are most effective for given medium and demands?
- What are the pros and cons of a given principle?
- How do the principles of design impact your proposed solution?
- What is the relationship between the principles of design and the target audience?

## Skills

**Evaluate**

Review processes and results from an inquiry; Consider and communicate varying perspectives and alternative solutions; Identify potential new problems and/or issues; Justify decisions and/or findings

**Investigate**

Ask and revise questions; locate several relevant and dependable details to support an answer; organize and compare details; identify relationships, recognize represented perspectives, and communicate findings.

## Compare
Make observations; identify similarities and differences; identify relationships and offer an interpretation; communicate the findings.

## Analyse
Gather and select appropriate information; determine accuracy, validity, and relevance of the information; identify perspectives; communicate findings.

# Background Knowledge
Learners may not have had a formal introduction to the elements and principles of design, but they have experienced both good and bad design throughout their lives. Learners may have experienced the principles and elements of design in the gaming controller used to play their favourite video game, the graphics on the packaging it came in, or the poster at the store advertising the game. Nature produces great examples for inspiration in design with things like beehives, butterfly wings, sand dunes etc.

Exploring and experiencing the elements and principles of design at the conscious level will help learners understand the emotion that design causes.  Art holds obvious connections to design as does physical education in the ergonomic design of sports equipment. The design industry provides many employment opportunities including interior designer, architect, painter, costume maker, jewelry maker and graphic artist to name a few. MyBlueprint can be used to help learners explore post secondary opportunities as well as employment options.

No matter the type of project undertaken by the learners, the principles of design will impact the decision-making process. In order to properly incorporate the principles of design in their solution, learners will need to evaluate these principles in relation to audience and purpose to best communicate the intended message. Engaging in collaborative decision making will enable learners to further develop these communication skills.

# Learning Experiences

The suggested indicators are organized in a way to scaffold learning in support of the outcome. The exploration of skills and concepts for this outcome can be done in any order, concurrently, or selectively based on the progression of learning. The experience described below is presented independently from the other indicators that support the outcome, however, in practice multiple indicators can be addressed simultaneously. For example, learners may *investigate how the principles of design are used in media* and *compare the purposes of the principles and elements of design*.

# Indicators
- **Investigate how the principles of design are used in media (COM/CI/CT)**
- Compare the purposes of the principles and elements of design (COM/CI/CT)
- Analyse how audience and purpose inform the design of various media (COM/CI/CT)

## Overview
Learners will be introduced to the elements and principles of design by exploring what they are and finding examples of them in existing media forms.

# Evidence of Learning for the indicator:
*Investigate how the principles of design are used in media*

Evidence of learning can be gathered as learners ask questions about the use of the elements and principles of design. Further evidence can be gathered as they locate, organize and compare details that they are finding in various sources.

*The evidence found through the learning experience for this indicator are suggestions of what teachers can look for in relation to skills and concepts. Regardless of the methods used, it is necessary for teachers to be intentional about collecting evidence of student learning to inform next steps for instruction.*

# Description of learning experience for the indicator
*Investigate how the principles of design are used in media*

## Potential Guiding Questions
- What are the elements and principles of design?
- What principles are most effective for given medium and demands?
- What are the pros and cons of a given principle?

> *The learning experience below is **one possibility** to engage learners with **this indicator**. It will be necessary to modify this experience to engage learners in a culturally and linguistically responsive way.*

## Introduction
This learning experience can be done as a possible introduction as learners investigate how the elements and principles of design are used. However, this can be easily modified to include their own works in the Technology Education classroom and provide opportunities to engage in peer to peer feedback.

The teacher will facilitate a discussion about the elements and principles of design. This may include having learners explore videos or images of examples that showcase a variety of elements or principles. In groups, or as a class, learners will ask questions about what they are viewing. This might include questions relating to:
- What elements/principles are present?
- How has the design been created?
- How does the design convey meaning?

Learners may want to ask questions that could be used to help them address the identification, use, and intent of design features.

**Essential Graduation Competencies**

**Critical Thinking**
This provides learners an opportunity to analyse information and evidence, suspending judgement and accepting ambiguity

## Evidence of Learning (Conversations)

Evidence of learning can be gathered as learners **ask and revise questions** about the elements and principles of design.

Learners can be asked to identify and collect details from examples of the elements and principles of design as they may appear across various media. For example, learners may identify a particular element of interest like texture, value, scale, etc., and select examples of the use of this element from a variety of sources like posters, videos, infographics, advertisements, etc. Or they may choose to identify an element from a variety of examples within one media type. They may want to consider the following as they locate details about how the elements are used:
- How are the elements used?
- What is the intended effect of the use of the element and/or principle of design?

**Essential Graduation Competencies**

**Creativity and Innovation**
This provides learners an opportunity to reflect on creative and innovative works and processes

## Evidence of Learning (Observations/Conversations)

Evidence of learning can be gathered as learners **locate several examples of designs in action** and to **select relevant details** about how the designs are used.

Learners can work in pairs or small groups to organize and compare their sources, and the details they have selected. They will want to consider:
- How do the designs appear?
- How is meaning conveyed in the same and different sources?
- How do the designs benefit from more than one element and principle of design?
- Who created this source and what was the purpose?

**Essential Graduation Competencies**

**Communication**
This provides learners an opportunity to express and respond to ideas, information,

- What modifications could be made to their sources to enhance or diminish the meaning being conveyed?

Learners can share their findings and discussions with the class. This can be done in a variety of ways including: presentations, discussions, video synopsis, or through an ongoing project/activity in technology education.

learnings, perceptions, and feelings appropriate to audience and purpose through multiple media forms.

## Evidence of Learning (Observations/Conversations)

Evidence of learning can be gathered as learners **organize and compare details**, and **identify relationships**. Further evidence can be gathered as they **communicate their findings.**

## Outcome: Learners will implement a possible solution for communications technology need

**Communications and Multimedia**

## Rationale

Being able to communicate effectively is one of the most important life skills to learn. Communication can be done verbally, written media, visually and non-verbally. We communicate for many reasons some of which include to educate, inform, entertain, persuade or control. Developing strong communication skills in various mediums will aid learners in all aspects of life.

## Competencies

- Citizenship (CZ)
- Communication (COM)
- Critical Thinking (CT)
- Creativity and Innovation (CI)
- Technological Fluency (TF)

## Indicators

- Compare the impact of various communication media in relation to audience (CT/CZ/TF)
- Select a communication medium in relation to audience and purpose (CT)
- Formulate possible designs for a communication technology need. (CT/CI)
- Evaluate ways that solutions can be modified for the needs of an audience (CI/CT)
- Apply the elements and principles of design in relation to a communications technology demand (COM/CI/CT/TF)
- Plan ways to share responses with an audience. (COM/TF)

## Concepts (and Guiding Questions)

**Communications technology**

- What do I need to know about the equipment I am using?
- What are some types of communication?
- Why is avoidance of bias important?
- What careers might be involved in the implementation of the media solution?

**Design problem**

- Which available medium is the most effective?
- How do I verify that my given audience was reached?

**Elements and principles of design**

- How can the elements and principles of design influence my media solution?
- How do I use the elements and principles of design?

**Responses**

- How does modern media include or exclude certain audiences?

- How can I collect evidence from an intended audience?

## Modifications
- What data can be used to evaluate the effectiveness of my solution?
- How can modifications be used to improve my results?

# Skills

## Implement

Select - Locate several relevant and dependable details to support an answer

Plan – Formulate: Identify a topic of interest; brainstorm ideas; choose, prioritize, and refine ideas; evaluate choices. Devise a process to solve the problem. Execute the steps, modifying as necessary.

Evaluate - Review processes and results from an inquiry; consider and communicate varying perspectives and alternative solutions; identify potential new problems and/or issues; justify decisions and/or findings.

Apply - Carry out, use or complete a procedure/ technique.

## Compare

Make observations; identify similarities and differences; identify relationships and offer an interpretation; communicate the findings.

## Select

Locate several relevant and dependable details to support an answer

## Formulate

Identify a topic of interest; brainstorm ideas; choose, prioritize, and refine ideas; evaluate choices.

## Evaluate

Review processes and results from an inquiry; Consider and communicate varying perspectives and alternative solutions; Identify potential new problems and/or issues; Justify decisions and/or findings.

## Apply

Carry out, use or complete a procedure/ technique.

## Plan

Formulate-Identify a topic of interest; brainstorm ideas; choose, prioritize, and refine ideas; evaluate choices.
Devise a process to solve the problem. Execute the steps, modifying as necessary

# Background Knowledge

Methods of communication, like language itself, are constantly evolving and young people today communicate in many different ways which include social media, print media, television and radio etc. Having the ability to effectively communicate is becoming increasingly important in today's complex and ever changing world. Learners have been taught communication skills from birth and the school system has supported this the entire journey.

# Learning Experiences

The suggested indicators are organized in a way to scaffold learning in support of the outcome. The exploration of skills and concepts for this outcome can be done in any order, concurrently, or selectively based on the progression of learning. The experience described below is presented independently from the other indicators that support the outcome, however, in practice multiple indicators can be addressed simultaneously. For example, learners may a*pply the elements and principles of design in relation to a communications technology demand* as they *formulate possible designs for a communication technology need*.

# Indicators
- Compare the impact of various communication media in relation to audience (CT/CZ/TF)
- Select a communication medium in relation to audience and purpose (CT)
- **Formulate possible designs for a communication technology need. (CT/CI)**
- Evaluate ways that solutions can be modified for the needs of an audience (CI/CT)
- Apply the elements and principles of design in relation to a communications technology demand (COM/CI/CT/TF)
- Plan ways to share responses with an audience. (COM/TF)

## Overview
Learners will formulate designs for an awareness campaign for a topic of personal interest and explore the type of media available and potential effectiveness to reach the intended audience.

## Possible Cross Curricular Link

This learning experience provides opportunities to align with skills, concepts, and guiding questions from Social Studies, Science, Health Education, and English Language Arts.

# Evidence of Learning for the indicator:
*Formulate possible designs for a communication technology need*

Evidence of learning can be gathered as learners identity topics of interest and brainstorm possible ideas of communicating chosen information. Further evidence can be gathered as learners choose, prioritize, and refine their ideas, and evaluate their choices.

*The evidence found through the learning experience for this indicator are suggestions of what teachers can look for in relation to skills and concepts. Regardless of the methods used, it is necessary for teachers to be intentional about collecting evidence of student learning to inform next steps for instruction.*

# Description of learning experience for the indicator
*Formulate possible designs for a communication technology need*

## Potential Guiding Questions
- What are some types of communication?
- Why is avoidance of bias important?
- What careers might be involved in the implementation of the media solution?

- How can the elements and principles of design influence my media solution?

> *The learning experience below is **one possibility** to engage learners with **this indicator**. It will be necessary to modify this experience to engage learners in a culturally and linguistically responsive way.*

## Introduction:

The objective of this learning experience is to help prepare learners to create an awareness campaign for a social justice topic of their choosing.

**Possible Cross Curricular Link**
This learning experience provides opportunities to align with skills, concepts, and guiding questions from Social Studies, Science, Health Education, and English Language Arts.

The teacher can begin by facilitating a discussion with learners about ongoing concepts of interest that could be communicated for example through an awareness campaign. Though one concept may be chosen as a class to engage with, the topics and ideas being conveyed through communication technology can easily vary.

Learners can work individually, in partners, or small groups in order to identify a topic of interest, and brainstorm possible ideas that could be done to communicate information or ideas relating to that topic (for example through posters, buttons, podcast, radio spot, video, website, app, etc.)

- What aspects of this issue, topic, or idea are of interest to me?
- What are ways that this topic could be communicated?
- What media can be used to convey the message?
- What design elements should be considered to enhance the communication of intended messaging?

The learners can share their topic and possible ideas with the class. This is an opportunity for more feedback and modifications prior to an idea being chosen.

**Essential Graduation Competencies**

**Critical Thinking**
This provides learners an opportunity to work individually, cooperatively, and collaboratively in problem solving.

## Evidence of Learning (Observations/Conversations)

Evidence of learning can be gathered as learners **identify a topic of interest**, and **brainstorm possible** ways to communicate that topic

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In groups or as a class, learners can share their possible ways to communicate. The teacher can use offered examples to model how to consider and use audience, media choice, budget, time frame, physical limitation, etc., to help choose, and refine possible ideas.

Learners can then choose an idea, prioritize what goals and intentions they have, and refine an idea to move forward.

**Essential Graduation Competencies**

**Creativity and Innovation**
This provides learners an opportunity to use constructive feedback, reflect, and learn from trial and error.

## Evidence of Learning (Observations/Conversations)

Evidence of learning can be gathered as learners **choose and refine** their ideas.

The teacher can facilitate a class discussion on evaluating the choices made. Some possible questions that can be used to guide this discussion may be:
- How would my project meet the needs of the given audience?
- How is the chosen medium the most effective?
- What do I need to know about the equipment I am using?
- How do I verify that my given audience was reached?

**Essential Graduation Competencies**

**Critical Thinking**
This provides learners an opportunity to communicate ideas, conclusions, decisions, and solutions appropriate to audience and purpose.

## Evidence of Learning (Observations/Conversations)

Evidence of learning can be gathered as learners **evaluate** their choices.

## Moving Forward:

Learners can put their choices into action as they implement their design solutions.

**Energy, Engineering, and Innovation**

## Rationale

With societies ever increasing reliability on mechanical and electrical devices it is important to have a basic understanding of functionality and efficiencies to help choose which products or services best meet our needs. Energy is required to move all objects from a standing position to a moving one and changing the direction of an object already in motion or the velocity of that object also requires an input of energy. Making these changes efficiently is important not only from an energy consumption perspective but also a durability perspective. Often the difference in the efficiency of devices is determined by the method used to put something into motion and how the direction of that motion is controlled and changed. Taking apart and examining a machine is a fun and practical way to gain meaningful understanding of the physical mechanics of a device.

Practicing safe work habits while examining these devices as well as exploring related careers in the manufacturing, distribution, use, repair and disposal of these devices will help learners better appreciate the value of the research and development that goes into every product design.

## Competencies

- Communication (COM)
- Critical Thinking (CT)
- Creativity and Innovation (CI)
- Technological Fluency (TF)

## Indicators

- Question how mechanical and electrical devices can be used to solve problems (COM/CT)
- Investigate how mechanical advantage is used in simple machines (COM/CT/TF)
- Compare devices that create or change motion (COM/CT/TF)
- Investigate the generation, storage, and uses of energy (COM/CI/CT/TF)
- Analyse the efficiency of control systems in a device (COM/CI/CT/TF)

## Concepts (and Guiding Questions)

### Mechanical advantage

- What is mechanical advantage?
- How is mechanical advantage used?

### Simple machine

- What are simple machines?
- What forces are exerted by a device?
- How can a device be improved reverse engineering?

### Motion

- How do devices change motion?
- What forces act upon a device?

**Energy**
- How is energy generated and transformed?
- How is energy used in a particular device?

**Control systems**
- What is a control system?
- How can a device be improved reverse engineering?
- What alternative control systems are available?

## Skills

**Analyse**
Gather and select appropriate information; determine accuracy, validity, and relevance of the information; identify perspectives; communicate findings.

**Question**
Generate questions in response to increasingly complex problems and/or issues; Choose and develop a specific inquiry question to investigate.

**Investigate**
Ask and revise questions; locate several relevant and dependable details to support an answer; organize and compare details; identify relationships, recognize represented perspectives, and communicate findings.

**Compare**
Make observations; identify similarities and differences; identify relationships and offer an interpretation; communicate the findings

## Background Knowledge

With societies ever increasing reliability on mechanical and electrical devices it is important to have a basic understanding of functionality and efficiencies to help choose which products or services best meet our needs. Energy is required to move all objects from a standing position to a moving one and changing the direction of an object already in motion or the velocity of that object also requires an input of energy. Making these changes efficiently is important not only from an energy consumption perspective but also a durability perspective. Often the difference in the efficiency of devices is determined by the method used to put something into motion and how the direction of that motion is controlled and changed. Taking apart and examining a machine is a fun and practical way to gain meaningful understanding of the physical mechanics of a device.

Practicing safe work habits while examining these devices as well as exploring related careers in the manufacturing, distribution, use, repair and disposal of these devices will help learners better appreciate the value of the research and development that goes into every product design.

## Learning Experiences

The suggested indicators are organized in a way to scaffold learning in support of the outcome. The exploration of skills and concepts for this outcome can be done in any order, concurrently, or selectively

based on the progression of learning. The experience described below is presented independently from the other indicators that support the outcome, however, in practice multiple indicators can be addressed simultaneously. For example, learners may *question how mechanical and electrical devices can be used to solve problems* while they *compare devices that create or change motion*.

## Indicators

- Question how mechanical and electrical devices can be used to solve problems (COM/CT)
- Investigate how mechanical advantage is used in simple machines (COM/CT/TF)
- Compare devices that create or change motion (COM/CT/TF)
- Investigate the generation, storage, and uses of energy (COM/CI/CT/TF)
- Analyse the efficiency of control systems in a device (COM/CI/CT/TF)

### Overview
Learners will disassemble mechanical devices in order to compare how motion is created and controlled in each device.

## Evidence of Learning for the indicator:
*Compare devices that create or change motion*

Evidence of learning can be gathered as learners observe the components of two mechanical devices in order to communicate the similarities, differences and relationships between how these devices create or change motion.

*The evidence found through the learning experience for this indicator are suggestions of what teachers can look for in relation to skills and concepts. Regardless of the methods used, it is necessary for teachers to be intentional about collecting evidence of student learning to inform next steps for instruction.*

## Description of learning experience for the indicator
*Compare devices that create or change motion*

### Potential Guiding Questions
- *How do devices change motion?*

*The learning experience below is **one possibility** to engage learners with **this indicator**. It will be necessary to modify this experience to engage learners in a culturally and linguistically responsive way.*

**NOTE**: Student safety is a concern when disassembling appliances or devices. The teacher will lead learners in the co-construction of safety rules after which the learners will create safety posters and checklists. The teacher will ensure that all personal protective equipment (PPE) is available and demonstrate its proper use.

## Introduction

The teacher will lead a class discussion on the concept of motion including types, creation, control, speed, force, direction, friction/resistance, and kinetic energy to engage learners' prior knowledge. Based on the prior knowledge, it may be necessary for learners to conduct introductory research on different types of motion.

The teacher will guide the learners in a discussion about comparisons, by choosing objects to model making observations as a think aloud. This can be done with any objects that create or change motion found in the classroom or school. The class can offer their own observations along with the teacher as they consider a variety of objects.

Learners will then consider some of the types of motion that were discussed earlier in order to determine criteria that could be used for comparing devices. They may also choose to co-construct a graphic organizer to support the comparison.

**Essential Graduation Competencies**

**Critical Thinking**
This provides learners an opportunity to analyse information and evidence, suspending judgement and accepting ambiguity

Note: the teacher should consider the learners prior experience with mechanical devices when deciding on the complexity of the devices to disassemble. Furthermore, to create an opportunity for cross-curricular learning with Science or Visual Arts teachers may provide traditional devices that were/are used in industry.

In small groups the learners will then disassemble two devices provided by the teacher. Each step of the disassembly process will be recorded photographically and and point-form to ensure that the student can reassemble the device correctly.

**Essential Graduation Competencies**

**Technological Fluency**
This provides learners an opportunity to use technology in a responsible manner to create and represent new

As they disassemble the devices, learners will also note their observations of the devices and their component parts in a journal or graphic organizer.

| knowledge |
| --- |

If this learning experience takes place over multiple days, it may be necessary that the devices be reassembled before leaving the classroom.

## Evidence of Learning (Conversations)

As learners disassemble the devices, they discuss their **observations** with the teacher

## Evidence of Learning (Observations)

Learners **identify relationships** between the component parts and types of motion.

Next, learners examine the component parts of the device in order to compare how each device works regarding motion generation and control.

### Essential Graduation Competencies

**Critical Thinking:**
This provides learners an opportunity to develop curiosity, inquisitiveness and creativity, flexibility, and persistence, open and fair mindedness.

By looking at the disassembled parts (or photographs), learners will identify similarities and differences between devices. They may refer to the co-constructed criteria from before, or new criteria based on their observations.

## Evidence of Learning (Observations)

Learners **identify similarities and differences** between how devices create/change motion.
Learners **identify relationships and offer an interpretation** of how the component parts create/change motion.

The groups will use their observations, comparisons and photographs to create a notated photo-collage that shows how motion is created or changed in each device, as well as indicating the similarities and differences in the use of motion.

**Essential Graduation Competencies**

**Communication**
This provides learners an opportunity to express and respond to ideas, information, learnings, perceptions, and feelings appropriate to audience and purpose through multiple media forms.

## Evidence of Learning (Products)

Evidence of learning can be gathered as learners **communicate their findings** of how motion is used by the devices.

## Moving Forward
Learners could begin the design and construction of a device to change a type of motion (i.e. construct a cam to change rotary motion to reciprocal motion, etc.)

Alternately, learners could identify different control systems in a variety of devices in order to learn how to analyse the efficiency of each system.

**Energy, Engineering, and Innovation**

## Rationale

Challenging learners with meaningful problems that need solving helps transform them from passive recipients of information to active learners through the creation of a solution. Learners need to develop the ability to apply problem solving skills and the use of design challenges is a great way for learners to explore, develop and improve these skills. Technology education labs can be quite different from school to school, but the building of projects is consistent throughout all. Learners learn by doing and meaningful project-based learning is at the heart of technology education. Authentic learning can happen through the construction of a solution to a challenge regardless of the success of the final product.

## Competencies

- Communication (COM)
- Critical Thinking (CT)
- Creativity and Innovation (CI)
- Personal and Career Development (PCD)
- Technological Fluency (TF)

## Indicators

- Evaluate available materials to address a design challenge (COM/CI/CT)
- Plan a solution to a design challenge (CI/CT/PCD/TF)
- Analyse a prototype in relation to a design challenge (COM/CI/CT)
- Investigate how prototypes can be modified to address a design challenge (CI/CT)

## Concepts (and Guiding Questions)

### Design challenge

- How can the parameters of a design challenge help me to construct a solution?
- How can the needs of my community help me to identify a possible challenge and/or solution?

### Types of materials

- What materials are available?
- Can we process the material?
- What is the financial cost of the materials?
- How can the waste material be recycled?
- What is the durability of the material?

### Prototype

- What is a prototype?
- Why is a prototype important?

### Design process

- How does the design process guide the solution?
- How can setbacks be managed?

- How can the needs of your audience be met?
- What defines success?
- What modifications are necessary to your solution

## Skills

### Construct

Identify a purpose; brainstorm ideas; gather and select information to support a plan; identify and choose options within the plan; offer reasons to support choices; build a model; test and revise, modify as necessary; evaluate the results at each stage of the process; consider alternative options.

### Evaluate

Review processes and results from an inquiry; Consider and communicate varying perspectives and alternative solutions or findings; Identify potential new problems and/or issues; Justify decisions and/or findings.

### Plan

Formulate-Identify a topic of interest; brainstorm ideas; choose, prioritize, and refine ideas; evaluate choices.
Devise a process to solve the problem. Execute the steps, modifying as necessary

### Analyse

Gather and select appropriate information; determine accuracy, validity, and relevance of the information; identify perspectives; communicate findings.

### Investigate

Ask and revise questions; locate several relevant and dependable details to support an answer; organize and compare details; identify relationships, recognize represented perspectives, and communicate findings.

## Background Knowledge

Design challenges require learners to innovate and think critically about their possible solutions to the challenge. The ability to communicate within the group as well as to present their solution to the larger audience is an important skill. We are all faced with challenges every day developing strong problem solving skills affords us a better chance to arrive at an appropriate solution. Learners have been developing broad problem solving skills throughout their time in school not only in mathematics but all subject areas. Scaffolding has been happening in all subject areas to reinforce what has been learned and helps develop more advanced problem solving skills along with strengthening learner confidence.

## Learning Experiences

The suggested indicators are organized in a way to scaffold learning in support of the outcome. The exploration of skills and concepts for this outcome can be done in any order, concurrently, or selectively based on the progression of learning. The experience described below is presented independently from the other indicators that support the outcome, however, in practice multiple indicators can be addressed simultaneously. For example, learners may *investigate how prototypes can be modified to address a design challenge* by/while they *evaluate available materials to address a design challenge*.

## Indicators
- **Evaluate available materials to address a design challenge (COM/CI/CT)**
- Plan a solution to a design challenge (CI/CT/PCD/TF)
- Analyse a prototype in relation to a design challenge (COM/CI/CT)
- Investigate how prototypes can be modified to address a design challenge (CI/CT)

## Overview
This learning experience is in preparation for learners creating a solution to a Design Challenge and focuses on the materials that will be made available. Learners will present findings from an in-depth evaluation of available materials from co-constructed criteria to the class who will have opportunities to provide feedback in relation to the materials findings.

## Evidence of Learning for the indicator:
*Evaluate available materials to address a design challenge*

Evidence of learning can be gathered as learners review the results of an inquiry into material choices. Further evidence can be gathered as they consider perspectives and solutions, and justify their decisions of material choices.

*The evidence found through the learning experience for this indicator are suggestions of what teachers can look for in relation to skills and concepts. Regardless of the methods used, it is necessary for teachers to be intentional about collecting evidence of student learning to inform next steps for instruction.*

## Description of learning experience for the indicator
*Evaluate available materials to address a design challenge*

### Potential Guiding Questions
- What is the financial cost of the materials?
- How can the waste material be recycled?
- What is the durability of the material?

*The learning experience below is **one possibility** to engage learners with **this indicator**. It will be necessary to modify this experience to engage learners in a culturally and linguistically responsive way.*

## Introduction:

An example of a possible design challenge is to have learners create a frame to hold a tablet or phone while it is charging allowing the screen to fully display pictures on the device.

This design can easily be replaced with a project of interest to learners that may be ongoing or in response to the availability of materials, tools, and classroom set up. It will be important to consider the life cycle of a product as learners engage in their work.

The teacher will present learners with a list of materials that are available and that can be processed in the construction of the design challenge solution. These might include metal, cloth and wood, etc. Unit costs of materials may be provided by the teacher for planning and design purposes or learners can inquiry into and gather this information.

The teacher will introduce the design challenge and facilitate a discussion regarding purpose and co-construction of parameters. Discussions can include features such as:
- methods of attachment/joining
- size
- flexibility
- functional capabilities
- construction materials
- safety
- aesthetics
- cost
- etc.

Learners will use this discussion to help them identify possible examples of solutions. This can be done online or through the use of magazines and advertisements. Learners will want to identify options that use different materials, aesthetics, costs, etc. They can use the following question as a guide while they work:
- Why would certain materials be chosen?
- How have materials been used?
- Where might materials be sourced?
- How does the price relate to the chosen materials?
- How has the design accounted for end of life, recycling, or repurposing?

When ready, learners will compile their options and review their results.

**Essential Graduation Competencies**

**Creativity and Innovation**
This provides learners an opportunity to gather information through all senses to imagine, create, and innovate

## Evidence of Learning (Conversation)

Evidence of learning can be gathered as learners **review results** from an inquiry.

Based on the material list provided by the teacher, learners can consider additional information as they learn how to evaluate. This may include discussions or the finding of information identifying the following:
- Local material options
- Impact of collecting and using
- Durability
- In class processing options for materials
- Cost per unit
- life cycle options for materials
- Assembly options

**Essential Graduation Competencies**

**Critical Thinking**
This provides learners an opportunity to analyse and evaluate evidence, arguments, and ideas

*note: This is where learners can consider the purpose and impact of constructing an item. The focus for their discussions or explorations here can focus on ensuring life cycle awareness is taken into account before a project is underway. Learners are responsible for the items they produce during the construction process and the impacts of collecting, using, and recycling/repurposing materials.

## Evidence of Learning (Observation/Conversations/Products)

Evidence of learning can be gathered as learners **consider and communicate varying perspectives and alternative solution**s for their choice of materials.

Learners can now justify the selection of materials to use in response to their design challenge. This can be done in a variety of ways, for example, learners could create a sketch of their design solution showing physical dimensions and location of features. Along with this sketch, learners could include material cost calculations and provide a cost analysis of the design based. Learners can share their justifications for why the selected materials would be the best to use in small groups, as a class, or through the creation of a quote for service.

**Essential Graduation Competencies**

**Communication**
This provides learners an opportunity to listen and interact purposefully and respectfully in formal and informal contexts

## Evidence of Learning (Observations/Conversations)

Evidence of learning can be gathered as learners **justify their decisions** to use specific materials.

## Moving Forward

Using the design process, the learners will develop a prototype for their solution to this design challenge.

**Energy, Engineering, and Innovation**

## Rationale

The ability to critically assess a product is a valuable skill for everyone to develop to help make wise decisions that help protect and advance society. In a consumer based society, we need products to evolve and improve for economic, environmental and safety reasons and an informed consumer will drive the demand for these improvements. Product research and development provides career pathways in all economic sectors and formulating improvements to anything requires a high level of thinking and the application of logic. Having learners go through the formal process of formulating possible improvements to an existing product will help further develop and reinforce the required skills these learners will use throughout their lives.

## Competencies

- Communication (COM)
- Creativity and Innovation (CI)
- Critical Thinking (CT)
- Personal Career Development (PCD)

## Indicators

- Select a product that requires improvement (CT)
- Analyse the limitations of a product (CI/CT)
- Investigate ways to improve a product (CI/CT/COM)
- Evaluate potential improvements for a product (COM/CI/PCD)

## Concepts (and Guiding Questions)

**Limitations of a product**

- What does "limitation" mean?
- What are the pros and cons of an existing product?
- What data can be used to determine the limitations of a product?

**Improvements for a product**

- What alternatives can be suggested for improvement?
- What data can be used to evaluate modifications?

## Skills

### Formulate

Identify a topic of interest; brainstorm ideas; choose, prioritize, and refine ideas; evaluate choices.

### Select

Locate several relevant and dependable details to support an answer.

**Analyse**

Gather and select appropriate information; determine accuracy, validity, and relevance of the information; identify perspectives; communicate findings.

**Investigate**

Ask and revise questions; locate several relevant and dependable details to support an answer; organize and compare details; identify relationships, recognize represented perspectives, and communicate findings.

**Evaluate**

Review processes and results from an inquiry; Consider and communicate varying perspectives and alternative solutions; Identify potential new problems and/or issues; Justify decisions and/or findings.

# Background Knowledge

Learners are often asked to make improvements whether it is some of their own schoolwork, a concept, a device or even a plan of how to do something. The demands and expectations increase as learners move through the education and the expectation to develop critical thinking skills increases as well. When a learner is asked to make improvements to an existing product as in this case, they will rely upon past experiences and knowledge regardless of whether they have had any technology education courses in the past to help develop possible improvements.

# Learning Experiences

The suggested indicators are organized in a way to scaffold learning in support of the outcome. The exploration of skills and concepts for this outcome can be done in any order, concurrently, or selectively based on the progression of learning. The experience described below is presented independently from the other indicators that support the outcome, however, in practice multiple indicators can be addressed simultaneously. For example, learners may *analyse the limitations of a product* while *investigating ways to improve the product.*

# Indicators

- Select a product that requires improvement (CT)
- Analyse the limitations of a product (CI/CT)
- Investigate ways to improve a product (CI/CT/COM)
- Evaluate potential improvements for a product (COM/CI/PCD)

**Overview**

Learners select a product and determine its limitations based on co-constructed criteria and the collection of accurate, valid, and relevant data to support their position. They also consider varying perspectives of groups related to the product.

# Evidence of Learning for the indicator:

*Analyse the limitations of a product*

Evidence of learning can be gathered through conversations about the accuracy, validity and relevance of sources when gathering data about product limitations. Further evidence can be collected as learners identify how product limitations might be perceived from varying perspectives.

*The evidence found through the learning experience for this indicator are suggestions of what teachers can look for in relation to skills and concepts. Regardless of the methods used, it is necessary for teachers to be intentional about collecting evidence of student learning to inform next steps for instruction.*

## Description of learning experience for the indicator
*Analyse the limitations of a product*

### Potential Guiding Questions
- *What does "limitation" mean?*
- *What data can be used to determine the limitations of a product?*

*The learning experience below is **one possibility** to engage learners with **this indicator**. It will be necessary to modify this experience to engage learners in a culturally and linguistically responsive way.*

### Introduction:
Through discussion and presentation of examples the teacher will show products that have been improved over time - an example might be the car tire. Consideration should be given to the fact that not all attempts at product improvement are positive as well as what it really means for a product to have limitations.

| | |
|---|---|
| The teacher can initiate a discussion about what it means for a product to have limitations. Through this conversation, learners brainstorm a list of criteria to consider when assessing a product. Some possible suggestions might be life cycle, cost, durability, ergonomics, etc. | **Essential Graduation Competencies**<br><br>**Creativity and Innovation:**<br>This provides learners an opportunity to recognize how creative processes are vital to innovation |
| In small groups or individually, learners select a product of interest. Using the guiding question "*What data can be used to determine the limitations of a product?*" groups discuss the information they would need to assess their specific product. | **Essential Graduation Competencies** |

Some questions to consider:
- *How will I measure the durability of the product?*
- *Where can I find information about the cost? Has the cost changed over time?*
- *Which criteria will I consider? Which are the most appropriate?*

Based on the answers to their questions, learners conduct research to gather necessary data to determine the limitations of their specific products. It may be necessary to provide suggestions about possible ways to find product information (online reviews, personal experience, manufacturer specifications, etc.)

## Evidence of Learning (Observations)

Learners **gather and select information** about the limitations of their product. Further evidence can be gathered as learners discuss which criteria are most **appropriate** to consider for their product.

After conducting the research, groups will share how/where they gathered data on the limitations of their product. The teacher will lead a discussion on how to verify the accuracy and validity of the information they've collected. This examination of validity and bias could also serve as an opportunity for cross curricular study with English language arts. While the conversation should be based around the sources used by the learners some possible topics to discussion are:
- product information from the manufacturer vs consumer reviews
- self-interest and bias
- fake reviews
- comparing and cross-referencing different sources about the same product etc.

Similar to the first discussion, learners generate a list of ways to validate product information. They then apply the list to the information collected in their research in order to determine the accuracy, validity and relevance.

Should any of the sources from the initial research be invalidated, learners should gather further data about the limitations of their product.

### 🔍 Evidence of Learning (Conversations)

Learners discuss ways to **determine the accuracy, validity and relevance** of data.

### 🔍 Evidence of Learning (Observations)

Learners **determine the accuracy, validity and relevance** of their data using the co-constructed criteria. Where necessary, learners **gather and select information** about the limitations of their product.

The teacher can lead a discussion about identifying possible pros and cons of limitations to a product. It may seem odd to suggest there are positive sides to a limitation so it will be important for the teacher to focus the conversation on perspective: who has deemed this aspect a limitation? A high price is a benefit to the manufacturer, but a limitation to the consumer.

Still working with their specific product, groups will consider the varying perspectives related to the product. (Ex. consumer, manufacturer, environmentalist, share holder, competition, etc.). They will re-examine the identified limitations and identify for each perspective which limitations are more important and whether each limitation would be considered positive or negative.

**Essential Graduation Competencies**

**Critical Thinking**
This provides learners an opportunity to recognize that experiences shape points of view (perspectives)

### 🔍 Evidence of Learning (Conversations)

While discussing in small groups, learners communicate the positive or negative impact of the product limitations based on **identified perspectives**.

To consolidate what they have come to understand about product limitations, learners will pitch their product to the class with respect to why this limitation merits improvements. This can be done digitally or in person but should include a description of the limitation(s), the relevant data to support their position and the perspective from which they are presenting.

**Essential Graduation Competencies**

**Critical Thinking**
This provides learners an opportunity to communicate

🔍 **Evidence of Learning (Conversations)**

Using the co-constructed list (or their own criteria) learners **communicate** the limitations of their selected product.

## Moving Forward
To scaffold learning with/between indicators
- Learners will investigate ways their product has been improved over time and create a timeline. The improvements identified in the timeline should be matched to the limitation that the improvement addressed.

To scaffold towards the outcome:
- Using the design process, and considering the analysis of the identified limitations, learners will formulate possible improvements for the product they explored in this experience.

**Production Technology**

## Rationale

One of the fundamental elements of technology education is the combination of head and hands on learning through design and problem solving. Throughout many homes in Nova Scotia, many technology education projects are proudly displayed and hold fond memories of learning and school. Construction of school projects happens in many curriculum areas and is certainly not limited technology education. To construct is not simply assembling but rather requires designing, planning, evaluating, selecting, justifying, testing, etc. There are often many different solutions that can satisfy the prescribed requirements of a project and knowing one's audience increases the chances of developing the most successful solution.

## Competencies

- Citizenship (CZ)
- Communication (COM)
- Creativity and Innovation (CI)
- Critical Thinking (CT)
- Personal Career Development (PCD)
- Technological Fluency (TF)

## Indicators

- Analyse the needs of an audience (CZ/COM/CT)
- Formulate a design in relation to audience need (CZ/COM/CT)
- Evaluate possible modifications to the design throughout the process (CI/CT)
- Analyse steps to eliminate unsafe practices in construction (PCD/COM/CT)
- Apply safe practices for all applicable tools, machines and locations (CT/TF/PCD)

## Concepts (and Guiding Questions)

### Audience need

- How does my project meet the needs of the audience?
- How does my project meet the needs of the audience?

### Project plan

- What resources are available?
- What are the constraints for constructing my project?
- How can the available resources be best used?
- How does the design process guide product development?

### Safe practices/Safety-Net

- Why is safety important?
- How can I plan for safety?
- What is Safety-Net?

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- How do I implement Safety-Net protocols?

## Design process
- How does my project meet the needs of the audience?
- What resources are available?
- What are the constraints for constructing my project?
- How can the available resources be best used?
- How does the design process guide product development?

# Skills

## Construct

Identify a purpose; brainstorm ideas; gather and select information to support a plan; identify and choose options within the plan; offer reasons to support choices; build a model; test and revise, modify as necessary; evaluate the results at each stage of the process; consider alternative options.

## Analyse

Gather and select appropriate information; determine accuracy, validity, and relevance of the information; identify perspectives; communicate findings.

## Formulate

Identify a topic of interest; brainstorm ideas; choose, prioritize, and refine ideas; evaluate choices.

## Evaluate

Review processes and results from an inquiry; Consider and communicate varying perspectives and alternative solutions; Identify potential new problems and/or issues; Justify decisions and/or findings.

## Apply

Carry out, use or complete a procedure/ technique.

# Background Knowledge

Learners like to build things whether it is a physical project, a virtual project or even a theoretical model or concept. In technology education the use of different tools varies greatly from school to school and module selection is often based on the physical labs that are available within the schools. One of the distinguishing factors in technology education is the production lab and this module is intended to utilize these labs.  Physical skill development in the sense of hand and tool use is important for all students as it helps build safety sense and confidence through experiences that foster a better appreciation for our built world.

# Learning Experiences

The suggested indicators are organized in a way to scaffold learning in support of the outcome. The exploration of skills and concepts for this outcome can be done in any order, concurrently, or selectively based on the progression of learning. The experience described below is presented independently from the other indicators that support the outcome, however, in practice multiple indicators can be addressed simultaneously. For example, learners may *analyse steps to eliminate unsafe practices in construction* as they *apply safe practices for all applicable tools, machines and locations*.

## Indicators
- Analyse the needs of an audience (CZ/COM/CT)
- Formulate a design in relation to audience need (CZ/COM/CT)
- Evaluate possible modifications to the design throughout the process (CI/CT)
- **Analyse steps to eliminate unsafe practices in construction (PCD/COM/CT)**
- Apply safe practices for all applicable tools, machines and locations (CT/TF/PCD)

## Overview
The requirement for safe use of tools and equipment in technology education cannot be overstated. This learning experience is designed to prepare students to work safely prior to constructing a project in a lab setting. The learners are coming to know how to perform a safety audit and will generate and follow a safety plan.

## Evidence of Learning for the indicator:
*Analyse steps to eliminate unsafe practices in construction*

Evidence of learning can be gathered as learners gather and select information about steps to take to eliminate unsafe practices, considering accuracy and validity. Further evidence can be gathered as they identify perspectives and communicate their findings.

*The evidence found through the learning experience for this indicator are suggestions of what teachers can look for in relation to skills and concepts. Regardless of the methods used, it is necessary for teachers to be intentional about collecting evidence of student learning to inform next steps for instruction.*

## Description of learning experience for the indicator
*Analyse steps to eliminate unsafe practices in construction*

### Potential Guiding Questions
- Why is safety important?
- How can I plan for safety?

*The learning experience below is **one possibility** to engage learners with **this indicator**. It will be necessary to modify this experience to engage learners in a culturally and linguistically responsive way.*

## Introduction:

Learners will be learning how to construct a project using tools and equipment and as a result safety will be an important focus throughout. Establishing safe practices to reduce risks will be required.

The teacher will facilitate a class discussion on the steps that can be taken to identify and address safety concerns. Learners will discuss and develop possible steps to take to eliminate unsafe practices in an example scenario. This may be the classroom, technology education lab, etc., After sharing their idea webs, the teacher will broaden the discussion to include the incorporation of the following topics/areas:

- in the community
- at work
- on the job site
- in industry
- in production facilities
- online safety
- etc.

Learners can work together to develop a standard form, procedure, or practice that could be used in a variety of scenarios to identify and then eliminate unsafe practices.

**Essential Graduation Competencies**

**Critical Thinking**
This provides learners an opportunity to work individually, cooperatively, and collaboratively in problem solving

Safety limitations, expense and enforcement should be discussed as well as PPE or personal protective equipment.

## Evidence of Learning (Observations/Conversations/Products)

Evidence of learning can be gathered as learners gather and select information about safety practices.

In order to determine the accuracy and validity of their procedures, learners can make a connection to a standard safety audit. The teacher can facilitate a demonstration of how to perform a safety audit and what might be included in a safety audit on a work site. Referencing the joint occupational health and safety committee within the school site and the legal

**Essential Graduation Competencies**

requirements for such a committee is encouraged to be explored. Learners will be introduced to the lab and asked to perform a safety audit and record their findings. The audit will include observed potential safety risks and safety features that are present in the lab. Learners can consider how the procedures in the safety audit relate to the ones they have previously developed.

**Personal and Career Development**
This provides learners an opportunity to develop skills and practices to learn and work in diverse, evolving environments

## Evidence of Learning (Conversations)

Evidence of learning can be gathered as learners consider the **accuracy and validity of the information** that they have gathered.

The teacher can lead a discussion about identifying possible pros and cons of limitations to a product. It may seem odd to suggest there are positive sides to a limitation so it will be important for the teacher to focus the conversation on perspective: who has deemed this aspect a limitation? A high price is a benefit to the manufacturer, but a limitation to the consumer.

Following the safety audit, the class can discuss potential solutions and make recommendations to improve the lab's physical safety. They will want to consider how a variety of people view safety and what practices are deemed to be safe or unsafe. They may want to consider the following questions as they communicate their findings:

- What is a safe practice? (from a learner perspective)
- What is a safe practice? (from a teacher perspective)
- What is a safe practice? (from a parent perspective)

- What is a safe practice? (from a young child perspective)
- How do I know if I can identify safe or unsafe conditions?
- What types of safety practices are there to consider beyond physical safety?
- How can becoming more comfortable in the lab or workspace impact an overall feeling of safety?
- Why might people have a variety of opinions on what makes a 'safe' lab or workspace?

**Essential Graduation Competencies**

**Critical Thinking**
This provides learners an opportunity to recognize that experiences shape points of view (perspectives)

## Evidence of Learning (Conversations)

Evidence of learning can be gathered as learners **identify perspectives** and **communicate** their findings.

## Moving Forward

- The teacher will introduce the Safety-Net program with specific focus on lab orientation safety posters. Learners can gather information about other general lab safety documents that support the Safety-Net information to create a document that contains links with brief descriptions of the supporting safety content.

- The teacher can facilitate a discussion about the relevance of having a committee to look after safety while learners are in the lab. The class can create a safety committee modelled after the Joint Occupational Health and Safety Committee (JOHSC) to help eliminate unsafe practices and ensure everyone's safety while in the production lab.

# Appendix
## The Design Process
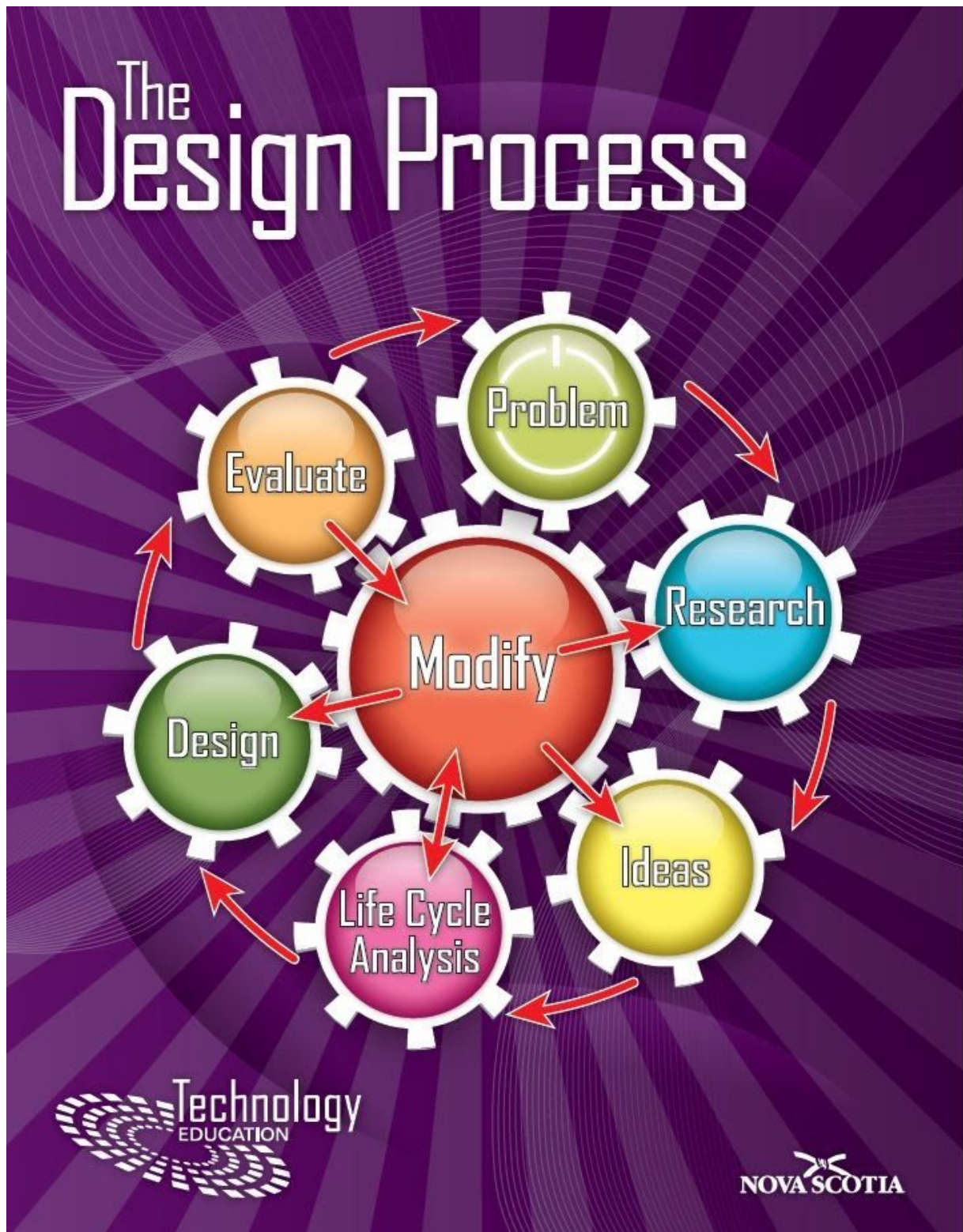
## Netukulimk

*"Netukulimk is a complex cultural concept that encompasses Mi'kmaq sovereign law ways and guides individual and collective beliefs and behaviours in resource protection, procurement, and management to ensure and honour sustainability and prosperity for the ancestor, present and future generations." (Kerry Prosper 2011)*

**What is Netukulimk?**

Netukulimk is an essential concept for Mi'kmaw people because it embeds understandings as to how a person should live their life on earth where Spirit guides the heart, mind and actions. Netukulimk governs the physical, emotional, cognitional, social and spiritual relationships a person has with everything, including the physical features of the land, the rhythms and cycles and patterns of Wskitqamu (Mother Earth), and all her living beings and nonliving things. These key understandings and their interconnectiveness are emphasized in the teachings of Lillian Marshall as seen in the poster Pemi Punqek Mi'kma'ki (Eco Calendar).

Netukulimk begins when a person learns to weave respect, responsibility, relationship, and reciprocity into every aspect of his or her life … everything they do to Wskitqamu and on Wskitqamu. It is more than a mental concept because it is a profound way of "being and knowing" that guides one's understandings of how to live within Wskitqamu and how to live in harmony.

When an individual, a community, a society weaves this way of knowing and being such that it guides actions, then people begin to live and act according to Netukulimk.

*"So this is what we truly believe. This is what reinforces our spiritualities: that no one being is greater than the next, that we are part and parcel of the whole, we are equal, and that each one of us has a responsibility to the balance of the system."* (Albert Marshall, from Tepi'ketuek / Mi'kmaw Archives, http://mikmawarchives.ca/authors/albert-marshall)

Netukulimk recognizes the Four Aspects of Humanness:
- spiritual (spirit)
- emotional (heart)
- cognitional (mind)
- physical (body).

Netukulimk incorporates the Four Levels of Interactions, of Interconnectiveness:
- self
- family
- community
- environment

Netukulimk weaves the Four Core Values:
- Respect
- Responsibility

- Relationship
- Reciprocity

**Building, Growing and Nurturing Understanding of the Four Core Values through Teachings**

⬤ **Teaching of Keptite'tekemk / Respect:**

Respect the rhythms, cycles and patterns of all living beings and non-living things that Wskitqamu sustains. Keptite'tekemk, Respect, is one the ***Seven Sacred Gifts*** in the teachings from Murdena Marshall.

⬤ **Teaching of Responsibility:**

We learn from the telling and re-telling of the Mi'kmaw Creation Story that the people were given responsibility to care for Wskitqamu. Niskam gave us all the tools and teachings to be responsible care takers.

The Mi'kmaw Creation Story begins with Niskam creating the sun, the four elements, the plants and animals, and finally humans. Kluscap is the first human to be created, then Nukumi (Kluscap's Grandmother). Netawansum, the strong hunter and provider, is the third to arrive and after a long wait comes Ni'kanaptekewi'skw (Kluscap's Mother) who brings the gifts of strength and understanding.

It is Kluscap's job to pass along the wisdom, teachings and knowledge that he learned from his family to the Mi'kmaw people.

Listen to Elder Jane Meader describing the Mi'kmaw Creation Story or read a version of it at the links below, respectively.

https://www.youtube.com/watch?v=oCVIUYlD3qs
http://www.muiniskw.org/pgCulture3a.htm

⬤ **Teaching of Relationship:**

All living things are considered relations, "Ms*i*t No'kmaq" (all my relations). For instance, the soil, lichens, trees, water, sky, stars, etc. are all viewed as kin, as relations. Mi'kmaw see everything as Ms*i*t No'kmaq which conveys the understanding that the relationship one has with family extends to the plant world, the animal world, and the four elements of earth, air, water, and fire. This creates strong interconnectiveness among all living beings and non-living things and is an understanding clearly illustrated by the word "wejisqalia'ti'k" which loosely translates to "from this earth we sprouted" revealing our deep sense of Mi'kmaw relationship with Wskitqamu.

⬤ **Teaching of Reciprocity:**

The circle is an excellent symbol or visual for representing reciprocity. It reminds us that we live within interdependent and interconnective systems. As caretakers of Wskitqamu, we honour the understanding about balancing "give and take" within our continuous and diverse interactions with the land, with other groups of living beings and non-living things, and with

ecological resources. Elders and Knowledge Keepers begin teaching the young people about only taking what you, your family, and/or your community may need while also teaching the youth to keep in mind the sustainability of the resources themselves. A good example of this is knowing how much one can harvest during times of scarcity or times of over population. When you consider this teaching, you realize there is a richer understanding within Netukulimk: you are part of a whole system and any actions you undertake must consider the health and well-being of the whole system.

**The Fluidity, Flux and Elasticity of Our Mi'kmaw Knowledge System**

Since time immemorial, Mi'kmaw Knowledge with its understandings of the rhythms, cycles, patterns, and systems has grown and changed. This fluidity and flux adds elasticity to Netukulimk enabling it to be dynamic and thus transcend time. As a result, Netukulimk continues as an essential Mi'kmaw way of being and knowing.

The dimensions within our Mi'kmaw Knowledge are, therefore: of:
1) interactions;
2) core values; and
3) fluidity, flux and elasticity.

Knowing these dimensions can help build initial understandings of Netukulimk. This way of being and knowing enriches our interactions, our relationship building and growing, and our decision making. Netukulimk embeds strong stewardship and thus can be viewed as a powerful model to mentor our youth as environmental, ecological, and kinship stewards who live and work within wholistic Mi'kmaw understandings.

Netukulimk also resonates with the traditional wholistic understandings of learning described in *Mi'kmaw Ways of Being and Knowing:* "*Mi'kmaw core values, principles and philosophy of life tend to center around our understanding of spirituality and to the connectiveness of all of creation. Knowledge was disclosed and shared with the specific purpose of teaching the individual to live in harmony with Mother Earth and how to behave as a sacred being living among other sacred beings.*" *(Elder Jane Meader).*

**Teaching of the Drum and Netukulimk**
Let's look at drum making. Fluidity, Flux and elasticity together are like the hide that stretches over a framework. When the hide is wet, it can be stretched over frames of many different sizes and shapes. The frame of the drum is akin to the Four Core Values – it is always crafted with respect, responsibility, relationship and reciprocity. These Four Values give the frame strength and structure. The string used to secure the hide to the frame and hold it in place represents the level of connections one must consider: self, family, community and environment. The string also represents the Teaching of Interconnectiveness; when you make a drum, long pieces of string are woven underneath and connected at the center. If you pull the string too much on any one side or place, it will affect all other levels and aspects.

The beauty of the drum is not in the lone task of making it but rather in the sound made when a person plays it… and this can only happen because of, and through, the relational and reciprocal actions of the drum and drummer.  This illustrates why action is essential in Netukulimk… why action must always be guided by Spirit to achieve harmony and balance. The beat of the drum also reminds us of the heartbeat, which is the first sound the child hears in the womb of her or his mother. And thus, from their earliest moments of life, the child learns that Wskitqamu is filled with sound, heartbeat, rhythm, cycles, patterns and interconnectiveness. In teaching about Netukulimk, we can continue to build, grow and nurture this early understanding.