Design a North Star Finder

Technology and the Skilled Trades — Grades 9 and 10
Lesson Plan — Reflect and Communicate

Learning Goals

- Develop a level of technological proficiency that will allow them to be critical consumers and producers of technological solutions.
- Explore the impact and development of technology, including emerging technological innovations.

Overall Expectations

A3. Analyzing and Refining
Evaluate and refine processes, products, and/or services.
B1. Fundamentals of Technological Development
Demonstrate an understanding of how various needs and underlying social, economic, and environmental factors drive the evolution of technology.

Specific Expectations

A3.1 Identify challenges they encounter in the process of developing their projects and apply critical thinking skills to address these challenges and minimize the probability of their reoccurrence.
A3.2 Identify various industry-relevant performance standards and quality control methods.
A3.3 Analyze the performance of products and/or service delivery using quality control methods.
A3.4 Communicate project-related challenges, performance analyses, and proposals for refinements for a specific audience, using appropriate formats and terminology.
B1.1 Investigate and describe interrelationships between user needs and the development of various technological solutions.
B1.2 Analyze how the development and application of technologies are impacted by legal, ethical, social, economic, and environmental considerations.
B1.3 Investigate and identify contributions to technological innovations made by Canadians, including women, and members of diverse groups and communities in Canada, including First Nations, Métis, and Inuit.
B1.4 Describe ways in which diverse communities, including First Nations, Métis, and Inuit, have applied their understandings, practices, beliefs, and experiences in their approach to technological problem solving.

Description

In this lesson, students will refine and present their North Star (Giiwedin Anang) finder designs, focusing on effective communication in the Engineering Design Process. They will create clear visual representations, articulate their design choices, and integrate Indigenous Ways of Knowing related to navigation and the night sky. The lesson emphasizes clarity, justification of design decisions, and responsiveness to constructive critique, preparing students to communicate ideas effectively in real-world engineering contexts. This culminates the TechEd series of lesson plans.

Materials

- Handout #1: How to Incorporate Indigenous Ways of Knowing
- Handout #2: Guiding Questions for Feedback
- Pens/Pencils
- Chart paper or whiteboards
- Pencil crayons/markers
- Tablets/Computers and internet access
- Prototype
- Sticky notes, guiding questions for feedback
- Space for gallery walk and/presentation

Introduction

This lesson plan is part of a series of lesson plans designed to walk your class through the engineering design process to build a project. You can start with either the Safety lesson, or this lesson. This is your final Reflection and Communication lesson — see the middle of the wheel below:

Why Communication is Important

1. Discuss the role of communication in the Engineering Design Process:
    a. Engineers and designers must explain their work clearly to stakeholders, clients, and users.
    b. Communication helps in getting feedback, securing funding, and refining designs.
    c. Clear documentation allows for replication and improvement of designs.
2. Ask students:
    a. Why is it important to communicate scientific and technological findings?
    b. What methods do engineers and designers use to communicate their work?
    c. How can we share our findings in an engaging and effective way?

3. Discuss different communication methods:
    a. Technical reports
    b. Presentations (verbal, digital, interactive)
    c. Diagrams and schematics
    d. Videos and demonstrations
    e. User guides and instructional documents

Action

Part 1: Preparing the Communication Materials
Students will choose a method to communicate their findings and experience with designing and building their North Star Finder. They can work individually or in their project groups. Students can use Handout #1 to get tips for respectfully incorporating indigenous ways of knowing into their presentation, report, or infographic.

Options

- **Option A:** Presentation (Live or Video)
- **Option B:** Technical Report or User Guide
- **Option C:** Infographic or Instructional Poster

Option A: Presentation (Live or Video)

- Create a 5-minute presentation about the design and testing process.
- Include:
    - The problem and research (Empathize and Define phase)
    - The ideation process (How Might We questions, brainstorming)
    - The final prototype and how it works
    - Challenges and improvements
    - A reflection on teamwork and problem-solving
- Use slides, posters, or physical demonstrations.
- If choosing video format, ensure the presentation is recorded and edited clearly.

Option B: Technical Report or User Guide

- Write a structured report or user guide detailing:
    - The design challenge and research findings
    - The ideation process and design choices
    - Step-by-step building instructions
    - How to use the star finder
    - Improvements and lessons learned
- Include visuals like diagrams, photos, and schematics.
- Consider adding a troubleshooting section for users.

Option C: Infographic or Instructional Poster

- Create a visual representation of the North Star Finder and how to use it.
- Use tools like Canva or Google Drawings or use hand-drawn sketches.
- Must include:
  - The problem statement
  - Key steps of the design process
  - A labeled diagram of the final product
  - Instructions for use

Part 2: Peer Review and Feedback

1. **Gallery Walk (30 minutes)**
   - Set up a classroom gallery where students display their presentations, reports, or posters.
   - Each student leaves constructive feedback on sticky notes or a digital platform (MS Word, Google Docs, Padlet, etc.).
   - Students can use Handout #2 to guide them in providing feedback.
2. **Class Discussion (15 minutes)**
   - Reflect on the strengths of different communication methods.
   - Discuss how professional engineers and scientists use multiple forms of communication.

Consolidation

Reflection Questions:

1. What was the most challenging part of communicating your project?
2. How did your chosen communication method help convey your ideas effectively?
3. If you were to present this project to a real-world audience, what would you change or improve?

Extension

- Invite guest speakers from engineering, astronomy, or Indigenous knowledge fields to discuss the importance of communication.
- Have students create a short instructional video explaining how to use their North Star Finder.
- Publish student work on a class website or social media to share with a broader audience.

Assessment and Evaluation

- Clarity & Organization: Is the project well-structured and easy to follow?

- Creativity & Engagement: Does the communication method capture interest?
- Technical Accuracy: Are the design process and final product correctly explained?
- Reflection & Analysis: Does the student reflect on their learning process and improvements?

Additional Resources

Handouts:
Guiding Questions for Feedback — see link on website
Incorporation of Indigenous Ways of Knowing — see link on website
If you are an All-Access Pass member, our asynchronous ICE (Innovation, Creativity, and Entrepreneurship) SHSM workshop is available online, and Chapter 5 talks about Strategy and how to Communicate your idea.