Design a North Star Finder	Technology and the Skilled Trades Grades 9 and 10

Lesson Plan – Reflect and Communicate

Learning Outcomes

Students will learn how to effectively communicate design ideas using visual, oral, and written methods.

Students will learn how to articulate design choices and justify decisions based on user needs, feasibility, and functionality.

Students will learn how to incorporate Indigenous Ways of Knowing in their design presentations, recognizing the importance of holistic and community-centered perspectives.

Students will learn how to receive and apply constructive feedback to improve their designs.

Specific Expectations

A1.4 communicate design ideas for various purposes and audiences, using appropriate industry terminology
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
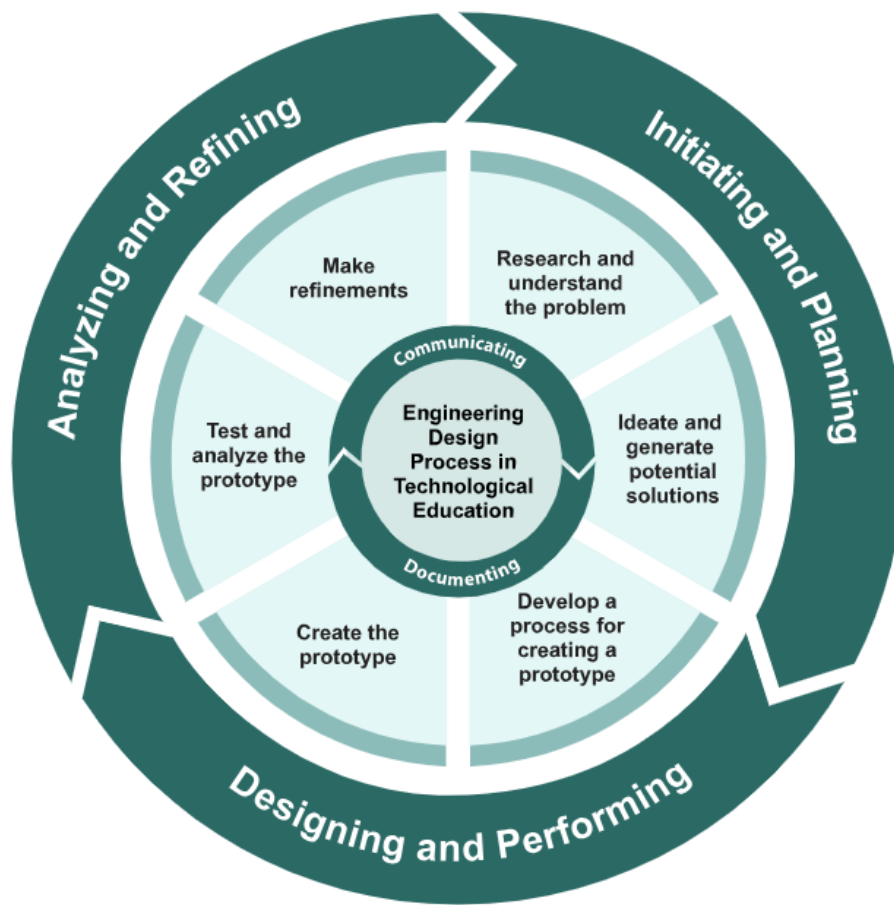
Description

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.
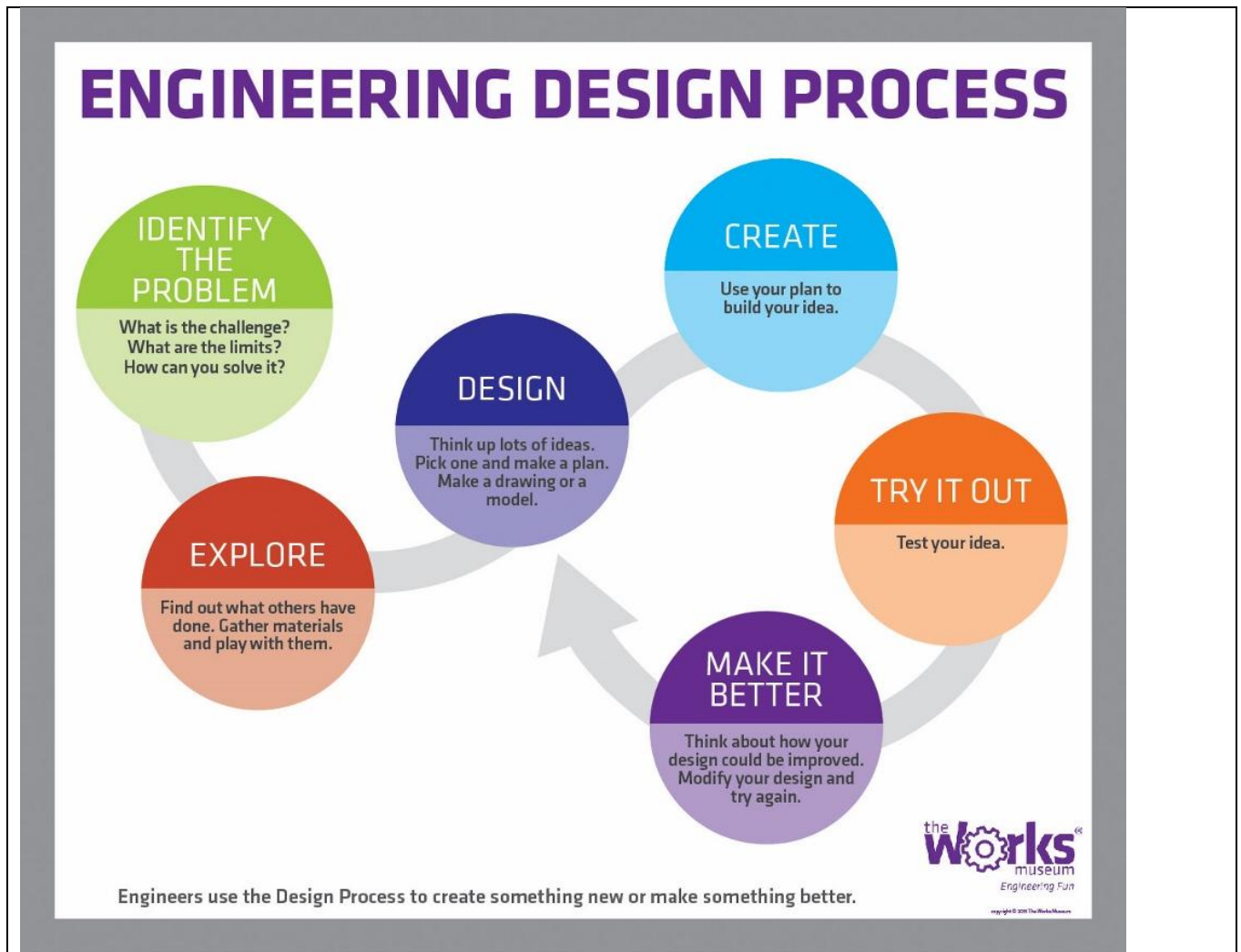
Materials

- Worksheets
- 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:

ENGINEERING DESIGN PROCESS

IDENTIFY THE PROBLEM
What is the challenge?
What are the limits?
How can you solve it?

DESIGN
Think up lots of ideas.
Pick one and make a plan.
Make a drawing or a model.

CREATE
Use your plan to build your idea.

TRY IT OUT
Test your idea.

EXPLORE
Find out what others have done. Gather materials and play with them.

MAKE IT BETTER
Think about how your design could be improved. Modify your design and try again.

the Works museum
Engineering Fun

Engineers use the Design Process to create something new or make something better.

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.

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:
    o The problem and research (Empathize and Define phase)
    o The ideation process (How Might We questions, brainstorming)
    o The final prototype and how it works
    o Challenges and improvements
    o 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:
    o The design challenge and research findings
    o The ideation process and design choices
    o Step-by-step building instructions
    o How to use the star finder
    o 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:

- o The problem statement
- o Key steps of the design process
- o A labeled diagram of the final product
- o Instructions for use

Part 2: Peer Review and Feedback
1. **Gallery Walk (30 minutes)**
   - o Set up a classroom gallery where students display their presentations, reports, or posters.
   - o Each student leaves constructive feedback on sticky notes or a digital platform (MS Word, Google Docs, Padlet, etc.).
2. **Class Discussion (15 minutes)**
   - o Reflect on the strengths of different communication methods.
   - o 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.