# Design a North Star Finder

**Technology and the Skilled Trades — Grades 9 and 10**

## Lesson Plan — Empathize and Define

## Learning Goals

- Develop creative and flexible approaches to problem solving that will help address challenges in various areas in everyday life.
- See themselves as capable and successful STEM (science, technology, engineering, and mathematics) learners and practitioners.

## Overall Expectations

**A1. Initiating and Planning**
Demonstrate an understanding of fundamental technological concepts and related skills by initiating and planning projects.

## Specific Expectations

- **A1.1** Investigate and describe fundamental technological concepts, and explain how they are relevant to developing products and/or services in a variety of broad-based technology areas.
- **A1.3** Investigate and describe design considerations, including accessibility requirements, that are relevant to developing projects involving products and/or services for a specific user or community.
- **A1.6** Investigate and describe project management skills and approaches that are relevant to developing products and/or services, and identify skills they will use in their own projects.
- **A1.7** Collect and synthesize information from a variety of sources, including people with diverse perspectives and from various communities, such as First Nations, Métis, and Inuit, to inform their projects.

## Description

In this lesson plan, students will identify a problem or a gap, research that problem, and practice understanding the perspectives, needs, and wants of people who are experiencing that problem, and who may use their solution. We will use the task of creating a North Star (Polaris or Giiwedin-anang in Anishinaabemowin) finder and programming a Micro:bit to indicate when we have located the North Star (Polaris, Giiwedin-anang) in the sky.

## Materials

- Handout #1: Star Finder Research
- Handout #2: Persona and Empathy Map
- Pens/Pencils
- Pencil crayons/markers
- Tablets/Computers and internet access

## 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 lesson should be followed by the Ideation lesson, and then the Prototyping lesson, and finally the Communication lesson, in that order.
These lessons will walk you through the Engineering Design Process.
In this first lesson, we will Identify the Problem and Explore.
We use this cycle because it helps us to design and build with intention, and to continue to build and improve on our designs.
By understanding a problem and exploring it in detail before jumping into making, we can make sure that our solution is something that doesn't already exist, and that is something that is needed and wanted.
In our set of lessons, we will be making a star-finder. The main part of the project will create a device which can point us to Polaris, the North Star, no matter the time of day. The project will involve coding, 3D printing, and construction.

## Action

### Part 1: Introduce the Problem

- Since time immemorial, Indigenous peoples of Turtle Island have used the stars to navigate. Polaris/Giiwedin-anang, the North Star, is especially helpful, because it doesn't move in the sky very much.
- Polaris/Giiwedin-anang can be used to find other stars and constellations which are nearby at different times of the day, and different times of the year.
- Navigating during the daytime means the stars aren't visible.
- Can we create a device which can help us use the stars to navigate in the daytime?

Discuss this challenge with your class. Ask who has been stargazing before, if anyone knows any stories related to the stars. Ask if your students know the names of any stars or constellations. Find out if the Indigenous communities in your areas have traditions or stories related to the stars. Ask how people navigate and find their way around on a regular basis.

## Part 2: Topic Research

Use Handout #1 to research this challenge. Students can work individually or in groups. If they work in groups, they should keep that group until all lesson plans are complete. Students will need internet access for this activity.

**Links:**

https://sdgs.un.org/goals

https://www.rcaanc-cirnac.gc.ca/eng/1524494530110/1557511412801

## Part 3: Persona

There are two approaches to empathizing with an audience: broad, and specific. The persona is very specific.

Use Handout #2 to have your students create an imaginary person who represents the average user of a star-finder.

## Part 4: Empathy Map

This activity is about the broad approach. Now that we have some understanding of what kind of person is using our design, we want to understand what people say, think, do, and want when they approach that design.

Use Handout #2 to have students complete an empathy map.

We do these exercises before we have a design in mind so that we can gear our design in future phases to the people who will be using it, not the other way around.

# Consolidation/Extension

You can have students present their findings, persona, and empathy map with the class in an informal short presentation. Since everyone is working on the same project, it can benefit them to see how others are conceiving of the problem and the people involved.

# Additional Resources

If you are an All-Access Pass member, our asynchronous ICE (Innovation, Creativity, and Entrepreneurship) SHSM workshop is available online, and the first three chapters of that workshop go into more detail on these ideas, with video content.