H AZARD
E DUCATION
A WARENESS &
R ESILIENCE
TASK FORCE

WILDFIRE ∘ FLOOD ∘ DROUGHT

Design a Resilient Future - Teacher Guide

Setting the Stage

Engineers, entrepreneurs, academics, and changemakers from around the world use the Design Thinking Process to create solutions for a variety of problems. The process requires empathy, creativity and experimentation. The Design Process can be utilized on a rapid scale and completed in a few hours or can be stretched out to last a few weeks in the classroom. The d.school out of the Hasso Plattener Institute of Design at Stanford University is a leader in design education and we use their resources for the basis of this lesson.

Photo by Jacob Lund from Noun Project

Lesson Overview

Students will work in small groups (four to six students) to develop a strategy to increase community resilience utilizing the Design Process. Students will follow a step by step process outlined in a worksheet to scaffold their success. As the facilitator of the process, the teacher can choose to give more or less time for certain steps or circle back to steps, depending on the needs of the student groups at the moment. Throughout the teaching guide, we refer to the d.School's Design Thinking Bootleg Deck, which is a set of tools and methods for design thinking, developed by educators and students.

Unlike other lessons in the HEART Force Curriculum, this lesson does not use the 5 E structure. Instead, the lesson uses the Design Process. This teacher guide gives teachers guidance for each stage of the process, which students will follow using the student worksheet. Time suggestions are given for each stage. Note that the shortest time is for a rapid design cycle, meant for limited time and quick thinking. Adjust times for the time you have available, and to give students what they need in the moment as they move through the process.

- *Introduction (4-15 minutes) Design Process Overview*
  As a class, introduce the Design Process and give an overview of what students will be doing during the next class period(s).
- *Part 1 – Empathize & Research (8-40 minutes) Interview & Research*
  Students gather information through interviewing experts and stakeholders, community members, or each other.
- *Parts 2 & 3 – Define (6-15 minutes) Capture Findings & Take a Stand*

Students define the problem they'd like to focus on.
- *Parts 4 & 5 – Ideate (15-30 minutes) Generate Solutions*
Students develop ideas, brainstorm solutions, and gather feedback on their ideas.
- *Part 6 – Focus (3-15 minutes) Choose One Solution*
Students narrow in on one idea and develop it further.
- *Parts 7 & 8 – Prototype and Test (15-60 minutes) Make the Idea Tangible*
Students create a physical prototype or something their classmates can interact with and gather more feedback on their idea.
- *Part 9 – Iterate and Launch (15-60 minutes) Share Your Idea with the World*
Students incorporate the final feedback and polish their ideas to present to the public.

Instructional Overview	
Grade Level	Middle/High School
Instructional Time	66-235 minutes
Unit Driving Question	How can we make our community more resilient to (*wildfire/flood/drought*)?
Lesson Driving Question	What action can we take now to make our community more resilient to (*wildfire/flooding/drought*)?
Building Toward	NGSS: MS-ESS3-2, HS-ESS3-1 CDE: MS3.ESS-GLE9, HS3.ESS.GLE10
Three Dimensions	Science and Engineering Practices: ● Asking Questions and Defining Problems ● Constructing Explanations and Designing Solutions Disciplinary Core Ideas: ● ESS3.B: Natural Hazards Crosscutting Concepts: ● Patterns ● Cause and effect
What Students Will Do	● Interview community experts and stakeholders to define a specific problem to address in the community to increase resilience to natural hazards. ● Design a solution for the specific problem identified.
Materials	❏ 11" x 17" copies of the Design Process Student Worksheet, one per group. ❏ Example Design Process Student Worksheet ❏ Design a Resilient Future Slides

HAZARD
EDUCATION
AWARENESS &
RESILIENCE
TASK FORCE

WILDFIRE ∘ FLOOD ∘ DROUGHT

	❏ Materials for prototyping; Cardboard, tape, plastic recyclable containers, poster board, etc.
Preparation	❏ Compile a list of community experts/contacts for students to work with throughout the lesson. If you'd like students to directly interview the experts, consider inviting experts to come to school during one class period or lunch period, or having students interview them via telephone on their own time. Note that if students interview experts on their own time, allow for extra time; you may want to do this by beginning this process at the beginning of the HEART Force unit. (See page 3 for more information). ❏ Consider inviting community experts back to the classroom to give feedback in the Prototype and Test stage.
Instructional Strategies	● Design Thinking or the Design Process is a structured framework used to identify challenges, gather information, generate potential solutions, refine ideas, and test solutions. The framework has its roots in entrepreneurial and engineering professions. For more resources, check out Design Thinking for Educators, Stanford's d.school K12 Lab network, and John Spencer's Launch Cycle. In the Expo curriculum, teachers can choose to use the Design Process in a design challenge, or choose an alternate pathway and have students communicate existing resilience plans. ● We have also included several resources throughout this guide from Earth Force's Community Action and Problem Solving Process.The process encourages youth-adult partnerships and democratic decision making.

Introduction

Design Thinking Process Overview (4-15 minutes)

Begin the lesson by dividing students into groups of four to six. Hand out one Design Process student worksheet per group.

If students are new to the Design Process, spend a moment going over the process with them, and encourage them to get their creative juices flowing. Introduce the Design Mindsets using the lesson slides.

Ideas for introducing the Design Process:
- Use another activity to familiarize students with the Design Process before you begin this less. Suggestions: 10 Design Thinking Activities to Get Your Group Creating by A.J. Juliani or The Marshmallow Problem
- Show students a picture of John Spencer and A.J. Juliani's Launch Cycle (figure on top of the main page), which gives a great accessible overview of the process. Note: This website has a lot of excellent resources for design in the K-12 classroom.

HAZARD
EDUCATION
AWARENESS &
RESILIENCE
TASK FORCE

WILDFIRE ∘ FLOOD ∘ DROUGHT

- Consider trying out an improv game to get students "loose" and in the designer's mindset. Students can play "Yes, and?" in pairs or Props to practice divergent thinking.

Part 1 (Empathize and Research)
Interview and Research (8-40 minutes)
What are vulnerabilities our community has in the case of a (*wildfire/flood/drought*)?

If you haven't already, group students into groups of four to six.

"Empathy is the foundation of human-centered design" (pp. 3-4, d.School Bootleg Deck), and is meant for students to learn as much as they can about their community by asking questions about the risks community members face. Encourage students to resist the urge to jump straight to the designing solutions stage and spend as much time as they can in the Empathize phase to address a real problem that the community faces.

Give students time to develop a set of interview questions, then have them record interview answers in the student worksheet in part 1. There are several options for students to interview experts and/or conduct research; each requires a different amount of time and/or preparation:

- Arrange for several local experts to visit your class (or lunch period if you have multiple sections of a class). Have students prepare their interview questions ahead of time.
- Assign the interview as homework. Students may need extended time to arrange and carry out an interview, so consider initiating interviews earlier in the unit.
- Ask students to interview a neighbor or family member for a community member perspective.
- If all options for external interviews are difficult to implement, students can create empathy maps to brainstorm about the challenges stakeholders may face. Use the Earth Force Empathy Mapping activity.
- Consider conducting research through a Community Environmental Inventory, with guidance from Earth Force resources.

Parts 2 & 3 (Define)
Capture Findings and Take a Stand (6-15 minutes)
What is your vision for improving resilience in your community?

In the Define stage (p. 5-6, d.School Bootleg Deck), students will focus on narrowing in on a specific problem that they would like to address to increase their community's resilience. In this stage, their goal will be to reflect on what they learned in the interview and/or research phase and create a Point of View statement that will drive the rest of the Design Process. The Point of View should communicate a vision that is based on the discoveries students made in the Empathize and Research step.

See slide 10 in the Lesson Slides for examples of Point of View statements.

Students can test if they found a good Point of View statement by checking if it meets the following criteria:

> "A spectacular Point of View...
> - Preserves emotion and the individual(s) you're designing for.
> - Includes strong language.
> - Uses sensical wording.
> - Includes a strong insight.
> - Generates lots of possibilities.
>   (d.School Bootleg Deck p.6)

Ask students to work through parts 2 and 3 in their student worksheet to complete this stage.

Parts 4 & 5 (Ideate)
Generate Solutions (15-30 minutes)
What are five radical ways to address the community's needs?

In the Ideate stage (pp. 7-8, d.School Bootleg Deck), students take what they've learned through empathizing and defining their topic and begin to create a list of ideas to address their vision, which they outlined in their Point of View statement. Encourage students to set judgments aside and move beyond the obvious solutions to come up with wild and crazy ideas. You can ask them to use words like "yes, and", instead of being critical by saying "yes, but."

Students will be working on part 4 on page 3 of the student worksheet. Set a timer for 5-15 minutes for the students to brainstorm ideas and fill out all five boxes. Once students have come up with ideas, pair each student group up with another group. Explain that one of the two student groups will have 7 minutes to share their ideas and get feedback, then the other group will share their ideas and get feedback. Have students record the feedback in part 5 on their worksheet. Here are some questions students can use during the feedback session:

- What is your point of view statement?
- What did you learn in your interview/research that made you come up with your ideas?

Have the group giving feedback tell the presenting group which of the five ideas is their favorite (most innovative, most practical, most effective), and why. They can ask these questions about their favorite idea:

- Who will your idea benefit?
- Will your idea promote resilience and help a community bounce back after a natural hazard? Is it a long-term or short-term idea?
- What kinds of resources will you need to carry out your idea?

HAZARD
EDUCATION
AWARENESS &
RESILIENCE
TASK FORCE

WILDFIRE ○ FLOOD ○ DROUGHT

● What kinds of challenges do you think you'll face?

Part 6 (Focus)
Choose One Solution (3-15 minutes)

Once students have gotten feedback from their classmates, ask each group to choose one of their five ideas to focus on and develop further. When deciding on an idea, ask them to use their Point of View statement and feedback to help them decide which idea is the best to work on. As they narrow in on an idea, ask them to consider the following questions:

● What is the scope of your idea? Is local, regional, national?
● What steps would you need to take to implement the idea?
● What resources would you need to implement the idea?
● How would your idea benefit the community?
● What challenges do you foresee?
● Once you've implemented the idea, how would you make sure it is sustainable and continues on without you?

In their student worksheet, ask students to sketch the idea and write down the details that explain their project in part 6 on page 4.

Parts 7 & 8 (Prototype and Test)
Make Your Idea Tangible (15-60 minutes)

In the Prototype stage (pp. 9-10, d.School Bootleg Deck), students will create a tangible representation of their idea to present to their classmates. It's important to make it clear to students that they don't need to build an actual object or product; instead, the point is to create a representation out of cheap, readily accessible materials to communicate the idea in a tangible manner. Students may want to spend a lot of time and resources building their prototype, but the prototype should be built roughly and rapidly. "Prototypes are most successful when people (the design team, the user, and others) can experience and interact with them" (p. 9, d.School Bootleg Deck).

For prototyping materials, provide any arts and crafts materials you have available—cardboard, tape, plastic recyclable containers, poster board, etc. Encourage students to be creative and repurpose materials. Students can create a sketch of their prototype or write down the materials they will need in their student worksheets.

After students have created their prototype, have them test their ideas (pp. 11-12, d.School Bootleg Deck) in another feedback session. Pair each group with a new group this time and give each group 7-10 minutes to present their prototype and get feedback. Ask students to fill out part 8 in their student worksheet when they get feedback about what worked, what could be improved, questions, and ideas from the other group. If you are able to bring in experts or

community members (it could be the same experts students interviewed in the Empathize stage) to give feedback during this stage, this would help students. Students can also solicit feedback as a homework assignment.

Part 9 (Iterate and Launch)
Share Your Idea With the World (15-60 minutes)

Students will get their ideas ready to launch to the public in this final stage at a Community Resilience Expo. Ask student to refine their idea using feedback from the last feedback/testing session, and consider the following questions for their presentation:

- What is the scope of your idea? Is local, regional, national?
- What steps would you need to take to implement the idea?
- What resources would you need to implement the idea?
- How would your idea benefit the community?
- What challenges do you foresee?
- Once you've implemented the idea, how would you make sure it is sustainable and continues on without you?
- How would you educate others about the value of your idea?
- What is the justification for your idea? Include anecdotes from your interview(s) to explain why the idea is important for the community.

If students would like to create a new and improved prototype, this is the time they can do so. Teachers, see the Student Presentation Guidelines in the Community Resilience Expo Overview for guidelines for student team's products.