Design a Resilient Future

Setting the Stage

Engineers, entrepreneurs, academics, and changemakers from around the world are using a Design Process to design solutions for a variety of problems. The process is human-centered, generates lots of ideas, and revolves around 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.

Students develop ideas using the Design Process.
Photo Credit: Stanford's d school.

Lesson Overview

Students will work in small groups (four to six students) to develop an idea to increase community resilience in one of the six community sectors (Community, Economic, Health and Social, Housing, Watersheds and Natural Resources, and Infrastructure), utilizing the Design Process. Student groups will follow a structured process with time limits for each step to scaffold their success. Each group will use a Design Process student handout to guide them through the process. As the facilitator of the process, the teacher can choose to give more or less time for certain stages, depending on the needs of the student groups at the moment.

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's guide gives teachers guidance for each stage of the process, which students will follow using the student handout. Time

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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.

- *Activity 1 – 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).
- *Activity 2 – Empathize (8-40 minutes) Interview and Research*
  Students gather information through interviewing experts, community members, or each other.
- *Activity 3 – Define (6-15 minutes) Capture Findings and Take a Stand*
  Students define the problem area they'd like to focus on in their sector.
- *Activity 4 – Ideate (15-30 minutes) Generate Solutions*
  Students develop ideas, brainstorm solutions, and gather feedback on their ideas.
- *Activity 5 – Focus (3-15 minutes) Choose One Solution*
  Students narrow in on one idea and develop it further.
- *Activity 6 – 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.
- *Activity 7 – 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.

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Instructional Overview	
Grade Level	Middle/High School
Instructional Time	66-235 minutes
Standards Alignment	NGSS: MS-ESS3-2, HS-ESS3-1 CDE: MS3.ESS.GLE9, HS3.ESS.GLE9
Anchoring Phenomenon	• Community members and planners are developing strategies to increase community resilience and to be able to respond to and recover from hazards more efficiently.
Driving Question	• What improvement or solution would most benefit the resilience of your sector?
Learning Goals	• Students will create a human-centered design solution for their sector to increase community resilience.
Materials	❏ 11" x 17" copies of the s*tudent handout*, one per group. ❏ Materials for prototyping; Cardboard, tape, plastic recyclable containers, poster board, etc. ❏ *Designing a Resilient Future* slide deck
Material Preparation	❏ Compile a list of community experts/contacts if you'd like students to interview a community expert. Consider looking for an expert in each sector. If you'd like students to directly interview the experts, you could either invite experts to come to school during one class period or lunch period, or have 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.
Vocabulary	Divergent thinking is a thought process used to generate creative ideas by considering many possible solutions to one problem. Convergent thinking is a thought process to evaluate ideas and decide on the "best" idea or solution.
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

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	choose to use the Design Process in a design challenge, or choose an alternate pathway and have students communicate existing resilience plans.

Activities	**Web Links for Lesson Resources** Note: all resources are downloaded as pdfs in the *Activity Resources Folder*
Activity 1	• Website: d.school at Stanford home page https://dschool.stanford.edu/ • Website: d.school K-12 resources https://dschool.stanford.edu/programs/k12-lab-network • Text: Colorado Resiliency Framework Sector information https://www.coresiliency.com/how-resiliency-creates-better-communities • Text: d.school bootcamp bootleg (referenced throughout lesson, includes all METHOD CARDS, with several ideas for design thinking implementation) https://dschool.stanford.edu/resources/the-bootcamp-bootleg • Text: Design Thinking for Educators Toolkit (referenced throughout the lesson as well, great resource) https://designthinkingforeducators.com/toolkit/
Activity 2	• Data: Design Process overview https://drive.google.com/file/d/1RGk40OhtPmSoSn_wGcRWc0SO3mFJArTL/view • Text: Launch Cycle figure http://www.spencerauthor.com/the-launch-cycle/ • Video: “Yes, And?” improv game https://www.youtube.com/watch?v=Qe2a3ppacUk • Video: “Props” improv game http://www.improvhd.com/props?rq=props • Text: Design Mindsets https://drive.google.com/file/d/1e0G5Wb8xYsIW8AwCvuE-iq8ZYeLvjrg_/view
Activity 3	• Text: Empathize METHOD CARD https://drive.google.com/file/d/1EupHBNIk_ItTl49SG6ceQA62It3VMwrq/view
Activity 4	• Text: Define METHOD CARD https://drive.google.com/drive/u/0/folders/1Vvk6aCml3HktU3YLTq3zgKyWVDtI-1Rb
Activity 5	• Text: Ideate METHOD CARD

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	https://drive.google.com/file/d/1IENblnJTrzkttTg0riu-9BVF68sdJQ7h/view • Text: Colorado Resiliency Framework Sector Goals https://drive.google.com/drive/u/0/folders/1Vvk6aCml3HktU3YLTq3zgKyWVDtI-1Rb
Activity 6	• Text: Prototype METHOD CARD https://drive.google.com/file/d/1v-C-6EJ6pahUAFIECip4YWwdE8BTMCvY/view • Text:METHOD CARD https://drive.google.com/file/d/1zWCBTD8sGuAD9jx1DjpV3_eS6pumZnXc/view

Activity 1 (Introduction)
Design Process Overview (4-15 minutes)

Begin the lesson by dividing students into groups of four to six. Assign or let each group choose the sector they will focus on. Hand out one Design Process student handout 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. Consider introducing the Design Mindsets, and/or introducing them to the ideas of divergent and convergent thinking using the Design Process overview. Divergent thinking is a stage in which individuals or groups brainstorm and think as widely and creatively as possible, whereas convergent thinking is when students will focus their ideas and evaluate different ideas to decide on the "best" solution. Students will be utilizing both divergent and convergent thinking in the Design Process.

Ideas for introducing the Design Process:

- Show students a picture of John Spencer and A.J. Julian'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.
- 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.

Activity 2 (Empathize)
Interview and Research (8-40 minutes)
What is important to experts or users in your sector?

If you haven't already, group students into groups of four to six to focus on a sector. Decide whether you would like all sectors to be represented or if it is okay if more than one group focuses on the same sector.

The Empathize stage is the "foundation of a human-centered Design Process" (d.school Empathize METHOD CARD), and is meant for students to learn as much as they can about "their" sector by observing how users interact with the sector, engaging with sector experts, and immersing themselves in user experiences. 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 create a solution to meet real needs.

There are several options for students to interview experts; each requires a different amount of time and/or preparation:

- Arrange for several sector experts to visit your class (or lunch period if you have multiple sections of a class) ahead of time. Have students prepare their interview questions ahead of time.

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- Assign the interview as homework. Students may need extended time (a week) to arrange and carry out an interview, so begin this portion of the unit before the game and/or introductory Expo lessons.
- Ask students to interview a neighbor or family member for a "user" perspective of the sector. For example: If a students' parent drives a car on a regular basis, they'll be able to speak to the infrastructure sector. If a parent owns or works at a small business, they could speak to the economic sector.
- If all options for external interviews are difficult to implement, students can interview each other. Give one student time to research the sector to be interviewed, then have the other student interview them.

Give students time to develop a set of interview questions, then have them record interview answers in the student handout.

Activity 3 (Define)
Capture Findings and Take a Stand (6-15 minutes)
What is your vision for improving resilience in your sector?

In the Define stage (see the Define METHOD CARD), students will focus on narrowing in on an area or topic in their chosen sector that they would like to address. In this stage, their goal will be to reflect on what they learned in the interview 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 stage.

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

> "As as test, a good point of view (POV) statement:
>
> - Provides focus and frames the problem
> - Inspires your team
> - Provides a reference for evaluating competing ideas
> - Empowers team members to make decisions in response to the high-level goals of the team
> - Fuels brainstorms by suggesting "how might we" statements
> - Captures the hearts and minds of people you meet
> - Saves you from the impossible task of developing solution concepts that are all things to all people
> - You revisit and reformulate as you learn by doing
> - Guides your innovation efforts."
> (d.school bootcamp bootleg p.2)

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Ask students to work through activity 2 in their student handout to complete this stage.

Activity 4 (Ideate)
Generate Solutions (15-30 minutes)
What are five radical ways to meet the community's needs?

In the Ideate stage (see the Ideate METHOD CARD), 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." If students are having a hard time getting started, have them look at their sector's Resiliency Goals. Tables that include sector goals can be found in this folder, which is broken out into documents for each sector. Have students focus on the rows in gray, which begin with Goal 1, Goal 2, etc.

Students will be working on activity 4 of the student handout. 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 in the class. Explain that one of the two student groups will have 7 minutes to share out their ideas and get feedback, then the other group will share their ideas and get feedback. Students should record the feedback they got. 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 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?
- What kinds of challenges do you think you'll face?

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Activity 5 (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 handout, ask them to sketch the idea and write down the details that explain their project.

Activity 6 (Prototype and Test)
Make Your Idea Tangible (15-60 minutes)

In the Prototype stage (see the Prototype METHOD CARD), 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" (d.school bootcamp bootleg p. 4).

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 handouts.

After students have created their prototype, have them test their ideas (see Test METHOD CARD) 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 the feedback questions in their student handout 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.

Activity 7 (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. Ask them to refine their idea using feedback from the last feedback 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.