

# Creative Problem Solving Curriculum

## Lesson 1

### Intro to Creative Problem Solving

#### Lesson Overview:

Students will begin the Creative Problem Solving Curriculum by completing the following steps: 1) screening the Intro to Creative Problem Solving video and considering creative problem solving as a necessary skillset for STEM (and life) 2) identifying and investigating creative problem solving skills they will need for a future in STEM and 3) reading a book excerpt (or listening to a podcast) about the role of resilience in science and then drawing connections between creative problem solving, resilience and success in science, STEM, and life in a short written response.

This curriculum is part of STEM U  
Sponsored by



## Creative Problem Solving

### Lesson 1 – Intro to Creative Problem Solving

#### **Lesson Overview**

During the first part of this lesson, you will guide students to consider how creative problem solving may help them, or even be a critical element, in a STEM career (and in life!). Students will also brainstorm and research information about some of the key skills necessary for successful creative problem solving.

In the second part of the lesson, students will read a book excerpt or listen to a podcast interview to learn more about the role of resilience in science. After reading/listening, students will be asked to write a short response to a prompt that asks them to draw connections between creative problem solving, resilience, and success in science, STEM and even life. An optional share out and discussion of their writing responses offers students the opportunity to extend their thinking around the topic.

#### **Time Frame:**

3 hours/class periods, students may need more time to complete independent work  
30-60 additional minutes for optional share out and discussion

#### **Core Concepts:**

- Creative problem solving skills are critical for successful lives and careers in STEM.
- Logical reasoning, systems thinking, and good judgment forms the basis of a solid creative problem solving skillset.
- Creative problem solving allows failures to be reframed as opportunities and supports resilience and success in science, STEM and life.

#### **Lesson Objectives:**

In this lesson students will:

- Consider the value of creative problem solving in STEM and in life.
- Explore the specific skills of logical reasoning, systems thinking, and good judgment as part of the creative problem solving skillset.
- Read or hear more about the role of resilience in science and make personal connections through writing to connect creative problem solving, resilience, and science/STEM/life.

#### **Materials Needed:**

- [Lesson 1 Video: How Failure Can Lead to Success](#)
- Photocopies (one per student). Choose one of the following options.

- o Copies of [this excerpt](#) from the book, *Failure: Why Science is So Successful* by Stuart Firestein
- o Copies of the transcript from a [Science Friday interview](#) with Stuart Firestein
- Computer and speakers for listening to [Science Friday interview](#) with Stuart Firestein (if choosing the interview option in Part 2)
- Pen/paper for journaling
- Poster board or chart paper for posters
- Markers for posters
- Laptops/tablets for research

---

### **Introduce the Creative Problem Solving Module**

Explain to students that creative problem solving is a key leadership skill and is relied upon by STEM professionals in a multitude of careers. Tell them that the lessons in this Module are designed to help them learn more about using creative problem solving in their own lives, how creative problem solving is critical in the STEM world, and how to develop and improve their creative problem solving skills.

Explain that as students work through each lesson in the Module, they will complete an activity such as addressing a problem in their own lives using Design Thinking. They will discuss their work with you and with each other, and will share ideas and resources related to creative problem solving.

### **Part 1: Creative Problem Solving as a Skillset for Life and STEM**

#### **Step 1: Activate Prior Knowledge**

**(10-15 minutes)**

Ask students to think about the last time they had to solve a problem. It can be any kind of problem – big or small. Have them write down a sentence to describe the problem and a brief description (bullets or an outline) of how they attempted to solve the problem. It is okay if they didn't actually succeed in finding a solution.

Have students share what they have written with a partner. In pairs, they should also create a list of skills they think would be useful for successful problem solving. They can consider what worked in their problem solving examples as well as skills that they didn't use, but could have or should have used.

**Step 2: Present the video: How Failure Can Lead to Success****(15-30 minutes)**

Facilitate a discussion after viewing the video. You may wish to solicit questions and comments from the students first. You can use these suggested discussion points to deepen the conversation and student thinking:

- The video mentioned Albert Michelson's research into luminiferous aether, the invention of Dyson vacuum cleaners, and the development of Instagram. What other examples of creative problem solving do you know about in STEM?
- How do you/could you use creative problem solving in your own life? In your STEM studies?
- Did the video give you any ideas about skills that might be important for successful creative problem solving?
- After viewing the video, would you approach the problem you wrote down at the beginning of class any differently? How, or why not?
- The video talked about logical reasoning as a skill that should be applied to creative problem solving. What do you know about logical reasoning? What are the differences between inductive reasoning and deductive reasoning?
- The video talked about using systems thinking for problem solving. What are some examples from your own life in which you stepped back to consider how the problem fit into a bigger picture in order to understand causes and effects? How did this approach help you to develop and assess possible solutions?
- The video mentioned that judgment is important for creative problem solving. What are some of the challenges to using good judgment? How do you know that you are judging a situation fairly?
- In addition to logical reasoning, systems thinking, and good judgment, what other skills may be useful for creative problem solving?

If the group discussion seems slow or dominated by a small number of students, consider posing these same questions as journaling prompts to be shared in small groups or pairs before discussing as a large group.

**Step 3: Researching and Sharing Out About the Creative Problem Solving Skillset  
(45-60 minutes – can be assigned as homework, if appropriate)**

If it did not come up in the class discussion of the video, have the class brainstorm skills they think would be useful for Creative Problem Solving. Create a list that students can see at the front of the room. Encourage discussion if there appears to be disagreement over skills that are listed. It may be helpful to distinguish between necessary and helpful skills, but only if students need this kind of distinction.

Remind the class that the video identified 3 specific skills: *logical reasoning*, *systems thinking*, or *good judgment*. Divide the class up into at least three groups and assign each group a Creative Problem Solving skill to research online. In addition to the three skills from the video, you can also assign other skills that students listed in the brainstorm, if you would like. You may wish to skip skills that will be treated in other lessons (design thinking, creativity, curiosity, etc.). Groups should prepare a poster and short presentation about the skill to share out their research. Presentations should include at least the following elements:

- A common definition or explanation of the skill. *Logical reasoning groups should include explanations and/or examples of inductive and deductive reasoning.*
- Examples of how the skill can be implemented to address problems or challenges in life. *Areas for exploration could include:*
  - *Understanding and evaluating bias*
  - *Evaluating news sources*
  - *Risk assessment*
  - *Consequences of actions*
  - *Decision-making*
  - *Moving forward after failure*
  - *Other...*
- Examples of how the skill can be implemented to address problems or challenges in the various areas of STEM.
- Ideas for how they can practice using the skill.

For presentations, have groups set up their posters around the room. Conduct a modified gallery walk in which part of each group stays with their poster to present and

part of each group walks around the room listening to presentations and asking questions. Switch the presenters and listeners once everyone has made it to all posters. It is okay for students to visit posters/presentations that cover the same skill. Encourage students to ask questions and discuss any differences in their understandings of the skills.

## **Part 2: Resilience and Creative Problem Solving in Science**

**Step 1: Students read an excerpt from *Failure: Why Science is So Successful* by Stuart Firestein or listen to a *Science Friday* interview with Firestein.**

**(25 minutes)**

Remind students of the part of the video that connected creative problem solving and resilience. Explain that they will be reading and/or listening to an excerpt/interview about the importance of failure in science. As they read/listen they should consider how creative problem solving can act as the link between failure and resilience.

Option 1: Ask students to do a close reading of this excerpt from the book, *Failure: why Science is So Successful* by Stuart Firestein. Students should annotate the text by underlining or highlighting key words and phrases and writing notes in the margins to indicate any ideas that strike them as significant, surprising, or that brings up questions.

Option 2: Listen to the *Science Friday* interview with Stuart Firestein as a class. Provide a printout of the transcript for students to read along and annotate as they listen. The transcript will be especially helpful for second language learners and to help focus all students. It will also be useful for students to reference in Step 2.

After reading/listening, allow students a few minutes to ask questions about anything that confused them or that they didn't understand in the reading/interview.

## **Step 2: Reflect and Respond**

**(20-30 minutes; if additional time in needed, students can finish as homework)**

Write the following writing prompt on the board:

*Creative problem solving allows failures to be reframed as opportunities and supports resilience and success in science, STEM and life. Agree or disagree? Explain*

*using evidence from the text as well as your own understanding of science, resilience, and creative problem solving.*

Allow students to think about the prompt for a couple of minutes before writing. They may want to jot down a couple of ideas and/or review the text and make additional annotations.

Ask students to write a response to the prompt. Give students a set of clear expectations for their written response. You may limit them to one or two paragraphs, a word count such as 200-400 words, or may want to require a full five-paragraph essay. Set the parameters based on your students' ability and the time available.

Provide written or one-on-one feedback to students in response to their work.

### **Step 3: Share and Discuss (optional) (30-60 minutes)**

Invite students to read aloud from their essays. Depending on the time available and the number of students, you may want to limit reading to just one paragraph per student, or you may want to encourage reading of their entire essays.

Wrap up with a Think-Pair-Share. Ask partners to discuss the following question:

*What new ideas have you come away with after hearing other students' responses?*

Convene the whole class and invite several pairs to share their responses. Encourage a class discussion, if time allows.