

TEACHER DIRECTED LESSON PLAN

LESSON 2: Problem Solving

LESSON OVERVIEW

In this lesson, students will understand how inventions solve problems and use this information to identify their own problems. They will apply creative approaches, critical thinking and analysis to develop solutions to solve these problems.

OBJECTIVE

Students will be able to combine techniques of creative and critical thinking to approach problems and consider possible solutions.

MATERIALS

Resources For the Teacher:

- Slide Deck: Problem Solving (*optional*)
- Script: Problem Solving (*accompanies slide deck, optional*)
- Videos: Invention Convention videos
 - <https://youtu.be/fYCOF61pJUc> (4:21)
 - <https://youtu.be/RLdUdMF2PF8> (2:29)
 - <https://youtu.be/pCVkdKXsf18> (4:54)

Kid President video

<https://youtu.be/75okexRzWMk> (4:59)

- Worksheet: The Crayon Holder (*optional, used as alternative to videos*)
- Worksheet: Problems All Around Me (*copy also found in YIP Inventor's Journal*)
- Worksheet: What's Your Problem?
- Proving Behavior Activity (materials needed will be determined by activity selected)
 - 💡 Invention in a Bag- brown paper bag with assorted objects (enough for each student or several small groups); objects such as cotton swabs, binder clips, balloons, paper clips, staple removers, erasers, cotton balls, paint brushes (enough for each student or several groups of students)
 - 💡 Gallery Walk- large sticky notes or white board space around the room, markers, various objects, such as pencil sharpener, stapler, cotton swab, biner clip, dental floss, balloon (enough for four groups of students)
- Rubric: YIP Inventor's Journal rubric (*optional*)

Materials For Students:

- Pens/pencils
- YIP Inventors' Journal
- The Crayon Holder worksheet (*optional, used as alternative to videos*)
- Problems All Around Me worksheet (*copy also found in YIP Inventor's Journal*)

INSTRUCTION & ACTIVITIES

Teacher may lead the following lesson plan with flexibility to adapt as needed to fit technology and class format:

Teacher Instruction:

1. *Teacher may use slides and script to explain Problem Solving or lead instruction and discussion on their own.*

Teacher will share Slide Deck: Problem Solving and use script as needed.

Teacher will review the definition of invention with the class and show students an example of an invention. (Teacher may choose to use the example from the slides or develop their own.)

Ask students the following questions:

- What is this?
- What does this invention do?
- What do we use it for in our classroom?
- What problem does this invention solve?
- What would happen if we did not have this invention?

2. Teacher will share videos of examples of student inventions. Suggested videos (Teacher may choose to show some or all videos. Videos included in slide deck.)

Links: Invention Convention videos

<https://youtu.be/fYCO61pJUc> (4:21)

<https://youtu.be/RLdUdMF2PF8> (2:29)

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OPTIONAL/ALTERNATIVE TO VIDEOS

Teacher may ask students to read story of Cassidy Goldstein, inventor of the Crayon Holder. (See The Crayon Holder worksheet)

Student Proving Behaviors:

Recommendations for In-Class Learning (select one of the following):

1. Invention in a Bag Activity: Teacher may have students complete activity independently or in small groups. Teacher will have each student or group select one object from a bag. Students will then think about why the object was invented, the material it is made of, and its intended use or purpose. Then, students will consider different uses for the object. Complete the activity with a group share and discussion.
2. Gallery Walk: Place large sticky notes around the room. Divide the class into four groups and give each group an object. Ask each group to think critically about why the object was invented. They

write the following on their sticky note: name of the object, material it is made of, the object's intended use or purpose, and how the object could be used differently.

3. Think-Pair-Share: In pairs, ask students to think about 3 different inventions from their house or the classroom and then talk about the possible problems that each of these inventions solves.

Ideas for Virtual Instruction:

1. Ask students walk around their house and select 3 inventions that they see and the possible problems these inventions solve.
2. Ask students to craft their own definition of "invention". They may share their ideas in a class blog or other virtual format to allow for peer-to-peer interaction and discussion.
3. Ask students to write about what makes something an invention.

Teacher Guided Discovery:

1. Teacher will lead students through a group problem solving session (included in slide deck and script). Teacher will explain that this is the "ideate" step in the Invention Process. This process will help students identify a particular problem and then begin to think creatively about how they can solve it in a new way.
 - a) Teacher will introduce the group problem: Wearing a Mask
 - b) Ask students to make a list of what problems are associated with wearing a mask. Perhaps wearing a mask is a problem because...(allow students to share.) Then, have students decide which of the listed reasons is most important to them in solving the problem.
 - c) Next, ask students to think about how they may approach the issue they have selected as most important in the previous step. Lead with "How might I..." Encourage students to think about alternative ways to approach the problem and write a list or share aloud their possible solutions.
 - d) Ask students to look at the possible solutions and examine them to determine for each:
 - Advantages
 - Limitations
 - Unique AspectsAs a group, select the solution that seems most promising.
 - e) Finally, ask students to make a list of people and things that would help them in carrying out this solution and a list of those who may make the task more difficult. How might they implement their idea?

Teacher Instruction:

Now is the time to distribute a copy of the YIP Inventor's Journal to students. Teacher should provide a hard copy of the YIP Inventor's Journal or an alternative invention logbook to each student. Teacher may also choose to use the digital YIP Inventor's Journal which allows students to record their invention journal directly into a digital format. Logbooks of some kind are required for submission to the Northern New England Invention Convention and the Invention Convention US Nationals.

1. Teacher will distribute a YIP Inventor's Journal (or alternative invention logbook) to each student. Teacher will explain what the journal is and how it is to be used. The journal is a living document

where students will record their invention process, from identifying their problem and invention solution, to research, design and testing. More details about the Inventors' Journal will be covered in later lessons, but students are encouraged to begin to use the journal now as they begin thinking about their projects. It is recommended that teachers go over any requirements and expectations they have for the journals and share the YIP Inventor's Journal rubric for evaluation if desired.

Note: Throughout the course of completing YIP and working on their own invention projects, students should complete the YIP Inventor's Journal. Teachers should train students to write in their journals whenever they are working on or even thinking about their inventions, they should be writing in their YIP Inventors' Journal (or alternative invention logbook). They can also write on lined paper/scrap paper and staple it to the journal later.

Activity: Problems All Around Me

This activity may be done in class or as a take-home assignment.

Students will need: Pencil or pen, YIP Inventor's Journal or Problems All Around Me worksheet, What's Your Problem? worksheet, and at least one other person (a peer or someone outside of class).

1. Teacher will assign students to interview one or more people in class or at home (family members, friends and/or neighbors) to complete the Problems All Around Me worksheet. (*Note: This worksheet is in the YIP Inventor's Journal and students may complete it directly in their journals.*)
2. Then, ask students to complete the What's Your Problem? worksheet to select the problem they feel is most important to them and identify possible solutions to this problem.
3. Finally, students will choose the problem they wish to solve. Teacher may require students to submit their decisions (*optional*).

Ideas for Virtual Instruction:

1. *Create a sharing space for students to share their possible problems to solve and to work together to narrow down ideas and possible solutions.*
2. *Host a Teacher "office hours" for students to meet with teacher to discuss their ideas and how they may create an invention project to solve their identified problem.*

CHECK FOR UNDERSTANDING

Teacher may wish to do one of the following to check for understanding:

1. In the format of the teacher's choice, ask students to choose their favorite inventions and explain what problems they solve and why they like them.
2. In the format of the teacher's choice, ask students to draw a sketch of their new and improved mask design and explain their design to someone at home.