



THE PAPER GIRLS SHOW

EDUCATIONAL GUIDE

EPISODE 5: THE “INSPO” BUDDIES

TOPICS: PROBLEM-SOLVING AND CREATIVITY

EPISODE SYNOPSIS

Caily's sister Edie accidentally erases her computer project while Dev worries about Queen Frivol's Shredders stealing his original songs, prompting both to invent securer measures.

FEATURED STEAM TOPICS

BIG IDEA – Everyone faces challenges, and we can use creative thinking to help us solve our way through any problem we face. Sometimes we will need to design and test more than one idea to find the best solution for our challenge.

EXPLANATION FOR CHILDREN:

Thinking creatively can mean to see or imagine new ideas and to use materials or ideas in new and different ways. Creative thinking is a skill that you can improve and get better at by practice.

When you have problem, thinking creatively can help you find new solutions to help you out of your problem. In order to solve problems creatively, you need to think carefully about what you already know, make observations, gather information about what you need to know, design a

new idea or tool, and test your solution out to see if it works or if you need to make changes. Sometimes designing two solutions and testing them out to see which works best can help you with really challenging problems.

RELATED CONTENT STANDARDS (CORE CURRICULAR AIMS) IN THIS EPISODE

The standards and curricular aims listed below are linked to this episode's extension activities. Each activity is designed to promote children's thinking and problem-solving with engineering design and paper.

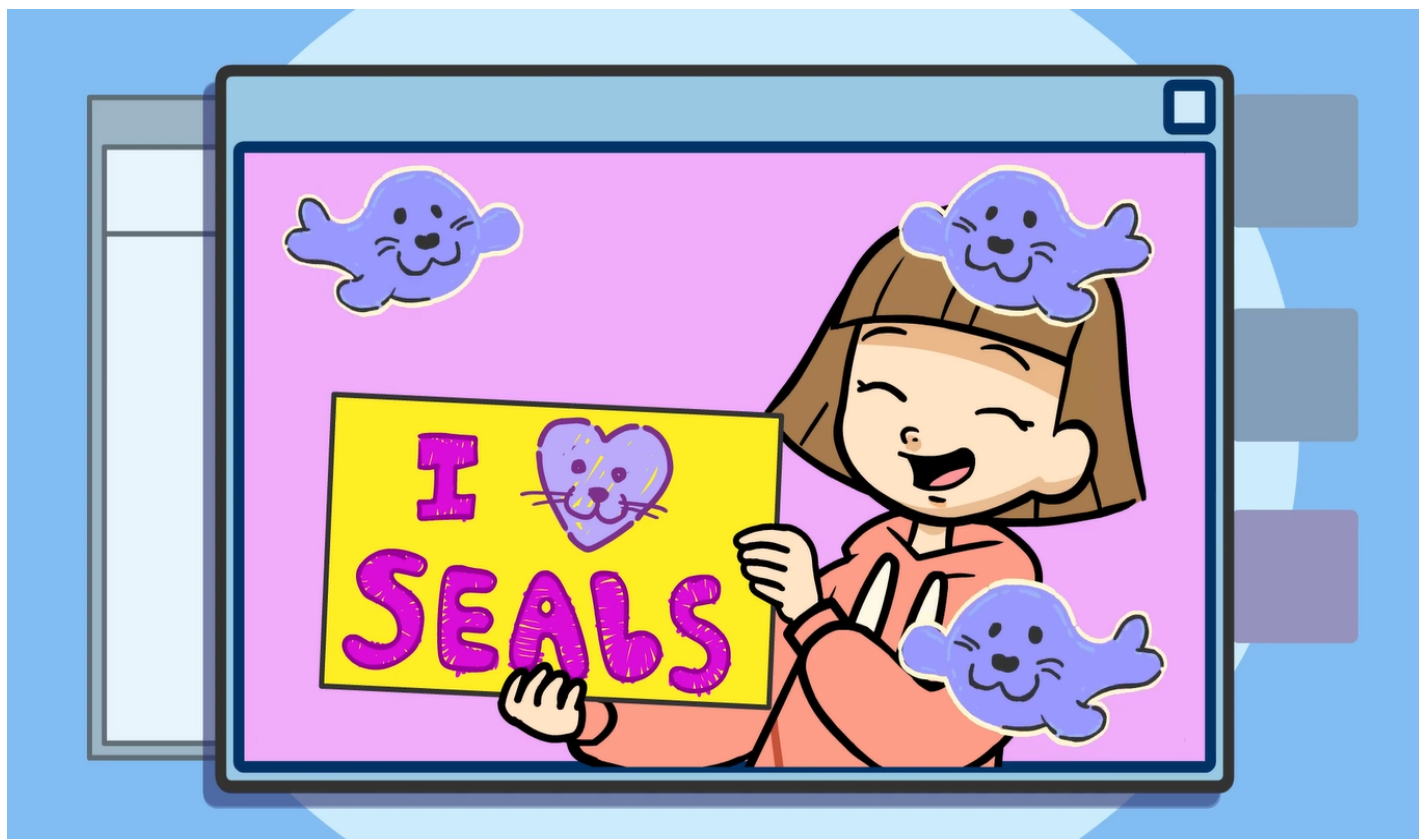
Engineering: Design

Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to

Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Source: NGSS Lead States. 2013. Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.



ACTIVITY EXTENSIONS FOR EPISODE TOPICS

In this episode, children are introduced to creative approaches to problem solving through the use of hidden messages. Below is a brief listing of activities that invite children to explore and design hidden messages using paper and everyday media and materials. In each activity the emphasis is on the process of thinking, design, and making rather than a perfect end product as children take the lead in their own investigations. Parents and teachers can support children in their work by asking prompting questions such as: What do you think will happen when you use this to write a message?; What will you need to test your idea out? How will you tell someone how to read your message?; What's another way to write or send a hidden message?; Which of these materials hides and shares your message best? Why do you think that?

1. Crayon Messages

In this simple extension activity you can invite your students to create hidden messages using only paper and crayons. To begin, invite the children to think about a message they'd like to send a friend but that no one else can read. Show them white paper and crayons and brainstorm how they could write an invisible message. Ask prompting questions and encourage the children to try out their ideas on paper until they arrive at the understanding that white

crayons can write hidden messages on white paper and other crayons can be used to shade color over the hidden text so it appears. Watercolor paints also work well to uncover the writing done with a white crayon.

PROMPTING QUESTIONS

- Who will you send your secret message to?
- What's important about a secret?
- What happens when you try this crayon on this paper?; Is your writing hidden?; What else could you try?

Children's Book Extensions:

Never Let a Unicorn Scribble!

Written & Illustrated by Diane Alber

Publisher: Diane Alber Art LLC

Never Let a Unicorn Scribble! is a book about creative problem solving and trial and error. The main character is trying to find out how she can help her pet unicorn color with a crayon even though it is hard and others have told her that it can't be done.

Spy Guy: The Not-So-Secret Agent

Written by Jessica Young

Illustrated by Charles Santoso

Publisher: HMH Books for Young Readers

Spy Guy: The Not-So-Secret agent tells the story of a spy who goes through lots of trial and error as he finds out the hidden secret of how to be a great spy.

2. Testing Invisible Ink

This extension activity can build off of students' experiences from the Crayon Messages activity as they will explore and evaluate different ways of writing secret messages. In this experience, student will use lemon juice and a light source to make hidden messages just as the Paper Girl characters did in this episode. In addition, you can encourage the students to try out other materials to create hidden messages to find

out which formula works the best for them. As these different formulas involve the use of a light source to reveal the hidden messages, be sure to carefully monitor children's use as light bulbs can get quite hot when switched on for long periods of time. Flashlights can allow for a safer exploration if available for children's use. To begin, talk with children about why lemon juice was used to create secret messages in the episode. To encourage them to think about acidity, ask them to recall how lemons taste sour.

Lemon Juice Messages:

Materials Needed:

- ✓ Small cup with lemon juice
- ✓ White paper
- ✓ Paintbrush or cotton swab
- ✓ Light source (light bulb) or flashlight

Procedure:

1. Soak the paint brush or cotton swab in the lemon juice and write your message on a piece of paper.
2. Wait a few minutes for the paper to dry.
3. When the paper is dry, hold it up to the light source for a few minutes (but don't let the paper get so hot that it burns) so that the message appear.

Other secret solutions:

Try using other acidic liquids, such as apple juice, orange juice, or vinegar, to see which ones work best.

PROMPTING QUESTIONS

- What did they do in the episode to create a hidden message?
- What do you need to do to make the message appear?
- If your writing is very light, what could you do to make it show up a little darker?

Extension Website:

George Washington's Mount Vernon: Spy Techniques of the Revolutionary War shares a kid-friendly connection between Social Studies and United States history and the use of invisible ink at:

[//www.mountvernon.org/george-washington/the-revolutionary-war/spying-and-espionage/spy-techniques-of-the-revolutionary-war/](http://www.mountvernon.org/george-washington/the-revolutionary-war/spying-and-espionage/spy-techniques-of-the-revolutionary-war/)

3. Weaving Messages

This extension activity invites your students to write secret messages on long strips of paper and use them to create a woven, paper artwork. You will need to invite children to help prepare the paper base or invite children to create their own. Children can cut their paper strips easily if you provide a ruler or straight edge to draw lines on paper so they can cut straight strips.

Materials Needed:

- ✓ 8 1/2 x 11 colored paper
- ✓ Scissors
- ✓ Pencils
- ✓ Ruler or Straight edge

Procedure:

To create the paper base, take one piece of paper and fold it in half vertically. In the center of the paper make a cut through the fold but don't go all the way though – leave an inch uncut. Now, cut the two halves of the paper in half again (don't go all the way to the edge again) so that you have four, equal sections. You will need to cut each of those sections in half just as before so you are left with eight equal sections. You are ready to unfold the paper so it is flat and ready for weaving.

Paper strips can be cut so that they are about one inch wide. Cutting strips of different colors will allow the children to create repeating patterns.

To Weave:

Invite your students to weave strips of paper through the slots. A checkerboard can be formed by alternating strips over and under the slots of the paper base. Encourage the students to hide secret messages on the paper that lies under the paper base slots. They can pull their strips slightly out to write messages. The message will be hidden when the strip is slid back into place.

PROMPTING QUESTIONS

- What colors or lengths of paper strips will you need?
- As you weave the paper, can you see your message?; What do you need to do to make sure it's hidden?
- What would happen if you used thinner (or thicker) paper strips?; Would that make hiding the message easier?

Extension Website:

Prairie Public: Artist Spotlight, Jessica Pribula, Paper Weaving

<https://www.youtube.com/watch?v=TEll5xd8dqc> (opens in YouTube)





ABOUT Angela Eckhoff, PhD

Angela Eckhoff, is an Associate Professor of Teaching and Learning and the Director of the Virginia Early Childhood Policy Center at Old Dominion University. Dr. Eckhoff studies the role of creativity in child development and learning, arts-based research and pedagogical practices, and early STEAM learning in both classroom and museum settings.

She is a co-editor of the Full STEAM Ahead column for Teaching Young Children from NAEYC as well as the author of ‘Provoking Curiosity’ and the four-book “Creative Investigations” series from Gryphon House Inc. Dr. Eckhoff holds a dual PhD from the University of Colorado–Boulder in educational psychology and cognitive science.