Slime Design Challenge

SUMMARY

In this activity, youth work together to adjust a slime recipe to ensure that it is as safe as possible for young children to use.

LESSON INFO

Grade: 6-8th grade.
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MATERIALS

Hyperlinks:

- Lesson slidedeck
- Vocabulary Words:
  - Engineering Design Process
  - Borax
  - Toxic
  - Consumer

These links are clickable!

To prepare enough materials for your class, you'll need multiple sets. For example, a class of 28, you will need 7 sets of the materials listed above (7 x 4 = 28).

Materials per group of 4:

- Pencil
- Set of measuring spoons
- Set of measuring cups
- 1 spoon for mixing
- 1 mixing bowl
- 1 copy of the Slime Recipe Worksheet

Materials for the whole class to share:

- Water (from sink or pourable from pitcher)
- 1 bottle of shampoo
- 1 box of cornstarch
- 1 container of shaving cream
- 1 box of baking soda
- 1 bottle of contact lens saline solution
- Stack of plastic cups to collect ingredients
- 1 box of sealable plastic bags
- Spray cleaner and paper towels for clean-up

PREPARATION

Before every lesson, be sure to:

- Order, purchase, and/or gather the activity materials.
- If necessary, prepare materials for each group and lay them out in the classroom.
- Project the lesson slide deck.
- If your room does not have a stable internet connection, make arrangements to download the powerpoint and videos (if using) beforehand.

Print:

- Slime Recipe Worksheet

Prepare:

- Make sure your space has access to a sink and trash can for clean-up.
- If there is time, purchase or make a slime sample to represent what the desired end product should look and feel like. You may consider outsourcing this to a slime expert in your group who can bring in a sample from home.

LEARNING OBJECTIVES & STANDARDS

STEM Learning Goal: Content (What youth will KNOW)
MS-ETS1-4: The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.

STEM Learning Goal: Skill (What youth will DO)
Next Generation Science Standards: Constructing explanations and designing solutions

POSSIBLE ACTIVITY TIMELINE

Session 1

- Hook
- Introduce the content
- Plan and create the new slime recipe
- Answer reflection questions

Session 2

- Review last session
- Adjust slime recipe to make improvements
- Answer reflection questions

Bring learning to the community

- Are any of these new non-toxic slime recipes ready for market? If not, identify additional steps the group could take to make the product sellable. Have the group decide which recipes should be developed for sale. Come up with a marketing plan and consider donating some of the profits to a project that benefits the local community.

Delivering the Lesson

HOOK

- How safe is the toothpaste we use? Use the Environmental Working Group website to learn about the safety of everyday products.
- Take a quiz about popular products that were recalled for being unsafe.
- Watch a video about Jessica Alba who started a natural cosmetics company that is now worth over a billion dollars (play video from the start to 4:16)

EDUCATOR CHOICE POINT:

The hook provided above is just one idea, and may not be the right fit for your youth. Can you think of a more relevant and engaging hook or plan one together with the youth in your program?

INTRODUCTION

1. Explain that it can be difficult for a consumer to know if products they are shopping for are safe for their health. One item in a store might be completely harmless, while another might contain a chemical that can be dangerous to our health.

2. Share that in 2015 a team of researchers investigated the safety of a collection of children's toys and clothing for sale in New York City. Using a special tool called a X-Ray Fluorescence (XRF) Analyzer that looks a bit like a supermarket checkout scanner, they detected heavy metals that can be harmful to human health like arsenic and cadmium. In their study, they found 11 items including a pencil case, key chain and flip flops that were considered highly toxic. (Link to the report with list of products on page 6.)

3. This discovery led to some recent changes in New York State law that now require dangerous materials found in children's toys and clothes to be listed on labels with warnings.

4. While it is great to have laws that protect the health of consumers, it is also important for us to be informed so we don't put ourselves or other people in harm's way.

QUESTIONS TO ASK DURING INTRODUCTION

Have you ever thought about toxic chemicals in the products you use everyday? Why or why not?

Are there any types of foods or chemicals that you or your family members avoid for your health?

Have you ever seen a warning label on a product before? If so, what was it?

Who is responsible for making sure there are not dangerous ingredients in the stuff we buy?

DESIGN CHALLENGE

Slime is a popular toy for people of all ages! Borax, or sodium borate, is a common ingredient that looks like a white powder and gives slime its "goopy" quality. However, borax can also be dangerous for young children who might absorb it through their skin or rub it into their eyes by accident. It has been found to cause skin irritation and burns upon contact. Can you help keep slime fun and make it safer by coming up with a new recipe?

PLANNING

1. Break the class into groups of 4 youth to work on responding to the design challenge. Hand out the slime recipe worksheet and a pencil to each group. Ask them to consult the list of non-toxic materials that are available to them for ideas to swap out borax and to answer questions 1 - 2 on the worksheet. Give them 10 minutes of planning time for this activity. At the end of this planning period, each group should have a plan for what material(s) they will use to replace the borax.

QUESTIONS TO ASK DURING PLANNING

Have you made slime before? If yes, did it contain borax?

How are you deciding which ingredients you should use to replace borax?

What questions are coming up for your group?

BUILDING AND TESTING

2. Referring to the worksheet, have one representative from each group gather the materials they will need to test their new slime recipe.

3. Provide time for each group to try out their new recipe. We recommend letting youth choose a reasonable amount of time; 7, 10, or 15 minutes are all good increments.

4. As groups test their recipes, direct them to the section of the worksheet where they will record their results. Make sure they are using measuring tools (cups, tablespoons, teaspoons) and recording how much of each ingredient they are using on their worksheet under question 3.

5. Once their new recipe is completed, have participants answer questions 4 and 5 to reflect on their new creation in their groups.

6. As time allows, groups can keep making changes to improve their slime recipe until they are pleased with their creation. Direct them to refer to question 6 on their worksheet to keep track of how much of each ingredient they are putting into the slime recipe–this will ensure they could make it again. Teams can save their slime recipe in a sealable plastic bag if desired.

QUESTIONS TO ASK DURING BUILDING AND TESTING:

What questions are coming up for your group?

Did your recipe turn out like you expected?

CLOSING

1. After a borax-free slime recipe has been developed, call the class together for a whole group discussion using the reflection questions on slide 10 to guide you. Consider using the "popsicle sticks" method to keep everyone engaged during this discussion.

2. Consider ending the experience by standing in a circle, prompting each person to share one word or phrase to describe what they learned or took away from today.

3. Use the reminder of the time to clean up all the materials and workstations with the paper towels, spray cleaners and access to a sink that's provided.

QUESTIONS TO ASK DURING CLOSING:

How did your team come up with your new recipe?

What improvements would your team make to the slime if you had more time?

What were some challenges your group had in initially figuring out the recipe?

Is it worth it to come up with a slime recipe without borax? Why or why not?

Educator Choice Points

You can adapt or maximize this lesson for the young people you work with. Use the guiding questions on this page to help you make choices to understand what youth know ("assessment"), to partner with youth ("youth role"), and to ensure all youth feel successful ("differentiation"). Each section includes a few ideas and space for you to choose a strategy that will work for your group.

ASSESSMENT

Educator choice point: How will you know that youth understand this content? Decide how you will check that youth understand the content from this lesson.

- Circulate around the room during the activity to ask reflection questions to small groups. Focus on the reasoning youth are using to select certain borax replacement ingredients over others.
- Take notice how youth are working together in teams. Is everyone participating? Are decisions being made with input from all or just a few?

To check that the youth understood the content from this lesson, I will _____.

YOUTH ROLE

Educator choice point: Where do youth have voice and choice in this lesson? Decide where and when youth can shape the activity.

- Picking their groups (4 youth/group)
- Selecting which ingredients they will use to replace borax.
- Determining how much time they will need to create their new recipe.
- Opportunity to save their slime recipe for future use.

Youth will have voice and choice when _____.

Educator choice point: How can you make opportunities for youth-to-youth interaction? Decide how youth will interact in this lesson.

- Small- and whole-group discussions
- Working as a group to make decisions about their new recipe using the engineering design process.
- Engaging in a closing activity that spotlights each participant's experience during the activity.

Youth will be able to interact with each other when _____.

DIFFERENTIATION

Educator choice point: How will you support all youth to feel successful in this lesson? Decide how you will support youth working at different paces and with different needs.

- Keeping youth who finish early engaged by allowing them to continue adjusting their recipe.
- Engaging participants who are disinterested in the activity sitting with them to figure out what is going on. Consider allowing this participant to help with the materials distribution table. You can also allow them to circulate among the groups to pick another table to join.

I can support youth working at different paces and with different needs by _____.

ADDITIONAL BACKGROUND INFORMATION

To learn more about the content in this lesson, educators and youth can...

- Explore The Honest Company's website for non-toxic products and see if any of the marketing language about safe products sparks your interest in the world of social entrepreneurship. What do you like or not like about these products?
- Watch this short news clip about dangerous chemicals that were found in items found in dollar stores. What does this bring up for you? What rules should companies have to follow to keep these dangerous chemicals off the shelf?
- A 15 year-old has made over $100,000 a year selling slime on the internet. Want to learn more? Read this article.

As you seek out additional content, consider who is represented in the instructional materials. What voices are missing? Where might implicit biases be showing up in this content?