

Follow the Green, Not the Dream

Environmental Science

Brittany Bowens, Lindsey Link
Published by *K20 Center*

This work is licensed under a Creative Commons CC BY-SA 4.0 License

Grade Level	10th – 12th Grade	**Time Frame**	160-180 minutes
Subject	Science	**Duration**	3-4 class periods
Course	Environmental Science		

Essential Question

How can science and technology deliver a higher standard of living while protecting the resources available on Earth?

Summary

This lesson focuses on the benefits, costs, and risks of creating products to protect natural systems and life on Earth. Students will design a tool that can be used to conserve a natural resource, and then they will modify their original designs based on research and peer feedback. In groups, students will present a sales pitch for the model they chose to create in a 3D printer.

Snapshot

Engage

Students watch a video about a farmer's invention for conserving water.

Explore 1

Students brainstorm global and local issues that need to be addressed.

Explain 1

Students research a global or local issue to determine the science behind the problem and the ways in which it has been combated.

Explore 2

Students develop a tool in Tinkercad that can be used to conserve a natural resource.

Explain 2

Students modify one another's tools and develop a 3D design.

Extend

Students create and present a sales pitch for their model.

Evaluate

Students vote for the best tool and explain why they believe it would be effective and efficient in protecting natural systems.

Standards

ACT College and Career Readiness Standards - Science (6-12)

IOD505: Analyze presented information when given new, simple information
EMI401: Determine which simple hypothesis, prediction, or conclusion is, or is not, consistent with a data presentation, model, or piece of information in text

Oklahoma Academic Standards (Environmental Science)

EN.ESS3.4 : Evaluate design solutions for a major global or local environmental problem that reduces or stabilizes the impacts of human activities on natural systems.*

Attachments

- Blank-Cards-Follow-the-Green-Not-the-Dream - Spanish.docx
- Blank-Cards-Follow-the-Green-Not-the-Dream - Spanish.pdf
- Blank-Cards-Follow-the-Green-Not-the-Dream.docx
- Blank-Cards-Follow-the-Green-Not-the-Dream.pdf
- Do-Ink-Scavenger-Hunt-Follow-the-Green-Not-the-Dream - Spanish.docx
- Do-Ink-Scavenger-Hunt-Follow-the-Green-Not-the-Dream - Spanish.pdf
- Do-Ink-Scavenger-Hunt-Follow-the-Green-Not-the-Dream.docx
- Do-Ink-Scavenger-Hunt-Follow-the-Green-Not-the-Dream.pdf
- Lesson-Slides-Follow-the-Green-Not-the-Dream.pptx
- Resource-Research-Follow-the-Green-Not-the-Dream - Spanish.docx
- Resource-Research-Follow-the-Green-Not-the-Dream - Spanish.pdf
- Resource-Research-Follow-the-Green-Not-the-Dream.docx
- Resource-Research-Follow-the-Green-Not-the-Dream.pdf
- Shark-Tank-Instructions-and-Rubric-Follow-the-Green-Not-the-Dream - Spanish.docx
- Shark-Tank-Instructions-and-Rubric-Follow-the-Green-Not-the-Dream - Spanish.pdf
- Shark-Tank-Instructions-and-Rubric-Follow-the-Green-Not-the-Dream.docx
- Shark-Tank-Instructions-and-Rubric-Follow-the-Green-Not-the-Dream.pdf
- Shark-Tank-Presentations-Follow-the-Green-Not-the-Dream - Spanish.docx
- Shark-Tank-Presentations-Follow-the-Green-Not-the-Dream - Spanish.pdf
- Shark-Tank-Presentations-Follow-the-Green-Not-the-Dream.docx
- Shark-Tank-Presentations-Follow-the-Green-Not-the-Dream.pdf
- Tinkercad-Scavenger-Hunt-Follow-the-Green-Not-the-Dream - Spanish.docx
- Tinkercad-Scavenger-Hunt-Follow-the-Green-Not-the-Dream - Spanish.pdf
- Tinkercad-Scavenger-Hunt-Follow-the-Green-Not-the-Dream.docx
- Tinkercad-Scavenger-Hunt-Follow-the-Green-Not-the-Dream.pdf

Materials

- Lesson Slides (attached)
- Blank Cards (attached; one copy per group)
- Resource Research handout (attached; one per group)
- Tinkercad Scavenger Hunt handout (attached; one per student)
- Shark Tank Instructions and Rubric handout (attached; one per student)
- Shark Tank Presentations handout (attached; one per student)
- Do Ink Scavenger Hunt handout (attached; optional; one per group)
- Sticky notes
- Pencils
- Personal devices or laptops for student research and presentation
- Wi-Fi/internet access
- Tinkercad teacher account

- Tinkercad student login information
- 3D printer
- Filament
- 1 x MakerBot PLA Filament (buy 9, get 10-pack large)
- MakerCare for MakerBot Replicator

15 minutes

Engage

Introduce the lesson using the attached **Lesson Slides**. Display **slide 3** to read aloud the essential question. Display **slide 4** to go over the lesson objectives. Review these slides with students to the extent you feel necessary.

Go to **slide 5**. Have students watch the following video: "Shark Tank: The Most Selfless Entrepreneur Ever."

After the video, go to **slide 6** and have students record their answers to the following questions:

- To make an effective sales pitch, what are three essential factors or elements that you noticed the salesperson included?
- What are three factors or elements that you think he should not have included?

Have students use the Stand Up, Sit Down strategy to share out their findings. As they share out, write their opinions on the board.

Optional Video

To show students a commercial about the farmer's invention, use the "Tree T-Pee" video on **slide 7**.

20 minutes

Explore 1

Display **slide 8**. Ask students to get in groups of 4 and use the Collective Brain Dump strategy. Have each group cut out the attached **Blank Cards** and work together to come up with 5–10 examples of man-made problems that deal with a limited natural resource. Students should write each problem on one of the blank cards.

Next, have groups divide their cards into two categories: global problems and local problems. Hand each student a sticky note, or leave a set of sticky notes with each group. Have students rotate around to each group's area, review how their peers sorted the cards, and use the sticky notes and handout to offer suggestions for modifications to the cards or the category arrangements.

Then, ask each group to return to their own cards to read the suggestions from their peers and, if need be, modify their cards. When they are done, ask each group to decide which global or local problem/which limited resource they want to research for their project.

50 minutes

Explain 1

Display **slide 9**. Inform students they are going to research, as a group, where their chosen problem occurs and why the resource is limited, as well as ways to combat the problem. Pass out the attached **Resource Research** handout to each group.

Teacher's Note: Collaborative Work on a Document

If you would like students to collaborate virtually, consider using Google Docs to create multiple copies of the attached **Resource Research** handout. Share a different copy of the handout with each group. Students can each contribute to the document and use the "chat" feature to discuss any changes or issues that arise.

Have group members research each of the following questions in relation to the problem they chose:

- Where does the problem occur?
- Why is this resource limited?
- What is the science behind the problem?
- What tools have been used to combat this problem in the past? Find 2–3 tools.
- What are some ways to combat this issue in the present?
- What type of tool needs to be created to fix the problem?

20 minutes

Explore 2

Teacher's Note: Tinkercad Login

Before beginning this activity, you need to create a Tinkercad teacher account and add your students. Once you add them to your class, Tinkercad will generate a class code and a personalized "nickname" for each student. Have students use these to log in to the program and begin the scavenger hunt.

Transition to **slide 10** and pass out the attached **Tinkercad Scavenger Hunt** handout. Invite students to explore the Tinkercad website to learn how to use the program to create 3D models.

Have students work in pairs to complete the handout using the Tinkercad website. After students have completed the scavenger hunt, have each student use Tinkercad to develop and create their own 3D design of a tool that can assist with the conservation of their group's chosen resource.

Teacher's Note: Direct Starters

After the scavenger hunt, remind students that they can reference the Direct Starters for assistance at any time as they work on their design.

20 minutes

Explain 2

Display **slide 11**. Ask students to use the Two Stars and a Wish strategy to review their peers' 3D designs and provide constructive feedback within their assigned groups. Have students write their two stars and a wish on sticky notes and leave them for their peers to read. After students have left their sticky notes at their peers' designs, allow time for students to modify their designs.

Once students have completed their modifications, have them rejoin their groups to review all members' modified designs. Ask groups to decide which of their tools is the best to create in the 3D printer for a "Shark Tank" presentation. Then, have groups submit their designs to be printed. Finally, pass out the attached **Shark Tank Instructions and Rubric** handout for groups to construct their presentations while their designs are being printed.

Teacher's Note: Time Considerations

Printing 3D designs can take anywhere from 20 minutes to a week or more. For this lesson, it is recommended that students' designs stay at a scaling that keeps the process around 24–48 hours. Also, check to see if your 3D printer gives an estimate of how long it will take for each design to print and determine if you need any groups to rescale their designs for a shorter time period. If applicable, you can print four groups' designs at a time, but keep in mind that this won't shorten the time it takes for them to print.

30 minutes

Extend

Teacher's Note: Sales Pitch and Model Testing

It is recommended that you give groups a day to work on their sales pitch and test their model together. Remind students that this model is only a smaller scale size of the final product.

Display **slide 12** and pass out the attached **Shark Tank Presentations** handout. Invite students to present their products, one group at a time.

As each group presents, have the rest of the class use the handout to take notes on the cost of the product, the potential risks associated with the product, the presenters' best talking points related to the science behind the product, and any improvements that could be made to the product. After the presentation, feel free to open up the floor for questions about the use of the product.

Teacher's Note: Make It Fun!

For some added fun, consider playing the "Shark Tank" theme song as each group makes its way to the front to present.

Optional Presentation Format

*If you choose to have students complete the following optional activities, unhide **slides 13–14** to make them visible to students. You can do so by right-clicking on each slide in the left-hand navigation panel and deselecting "Hide Slide" in the dropdown menu.*

If you would like students to present virtually or create a commercial in video format, consider using a program like Green Screen by Do Ink. Do Ink enables students to use a green screen to add backgrounds to their videos.

Display **slide 13** and inform students that they are going to complete a scavenger hunt to identify and explore key features of the Do Ink application. First, have students collect image(s) for their green screen videos, and then invite them to work in pairs to familiarize themselves with the Do Ink app. Make sure students download the Green Screen by Do Ink app to their devices before they begin. Pass out a copy of the attached **Do Ink Scavenger Hunt** handout to each pair of students. Provide the following directions:

- With your partner, use the checklist on the handout to identify and explore key features of the application.
- As you work through the list, upload the videos and pictures you took into the Do Ink app and create your video using the step-by-step instructions.
- Make sure to ask questions along the way!

It is possible and effective for students to create and produce a green screen video using only the Do Ink app. However, to take it a step further and broaden students' production abilities, consider having students import their Do Ink video files into iMovie (on iPads) and add more sophisticated narration, transitions, and effects. If you choose to have students use iMovie, display **slide 14** to provide students with the following instructions:

- Open iMovie.
- Choose "New Project."
- Import your media from Do Ink into iMovie.
- Record a script. Use your storyboard template as an outline and guide.
- Add visual effects and background sound.
- Export to your camera roll to share it with an audience.
- Ask questions as needed!

If using iMovie, be aware of the following caveats:

- If a student erases a picture from their iPad's camera roll, it will disappear from their iMovie. Their iMovie must be saved to their camera roll to avoid losing material.
- YouTube videos cannot be used.
- It is much easier for students to collect their videos and pictures before creating their iMovie.

15 minutes

Evaluate

Once all groups have presented, ask students to review their notes and, in their groups, discuss which of their classmates' products they would choose to support and why.

Teacher's Note: Voting and Prizes

Remind students that they cannot vote for their own group's product. Consider having a prize for the winner.

On the Shark Tank Presentations handout, have each student individually vote for the product they would choose to support, along with an explanation of how the product reduces or stabilizes the effects of human activity on natural systems. Tally up student votes and announce the winner on **slide 15**.

Resources

- Freel, E. (2010, November 10). Tree T-Pee – The Smart Choice [Video]. YouTube. https://www.youtube.com/watch?v=uTdDcj5UdLI&t=144s
- Instrum & Vocal Official Channel. (2018, March 30). Shark Tank (Theme Song, TV Show Version) [Video]. YouTube. https://www.youtube.com/watch?v=c2y8khVvw1U
- K20 Center. (n.d.). Collective Brain Dump. Strategies. https://learn.k20center.ou.edu/strategy/111
- K20 Center. (n.d.). Green Screen by Do Ink. Tech Tools. https://learn.k20center.ou.edu/tech-tool/632
- K20 Center. (n.d.). iMovie. Tech Tools. https://learn.k20center.ou.edu/tech-tool/636
- K20 Center. (n.d.). Stand Up, Sit Down. Strategies. https://learn.k20center.ou.edu/strategy/1771
- K20 Center. (n.d.). Tinkercad. Tech Tools. https://learn.k20center.ou.edu/tech-tool/2166
- K20 Center. (n.d.). Two Stars and a Wish. Strategies. https://learn.k20center.ou.edu/strategy/83
- Virality. (2017, August 29). Shark Tank The Most Selfless Entrepreneur Ever [Video]. Facebook. https://www.facebook.com/327785634332098/videos/328065774304084