

ARTS ENVIROCHALLENGER

EnviroBots: Inventions to Help Save the Planet Teaching Environmental Sustainability, Visual Arts, and Science

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Grade Level: Third



Enduring Understanding

“Trash” materials can be selected, altered, and reused to create balanced, 3-dimensional artistic and scientific models. Technologies can be designed to help humans reduce waste of resources.

Students learn about reducing trash through re-using materials in art. Students brainstorm, invent, and draw robotic machine technologies called EnviroBots that can help humans reduce, reuse, or recycle materials. Students select, alter, and reuse materials to construct an assemblage sculpture that is a 3-dimensional model of their invention, then write a description/story about their EnviroBot. Last, students introduce their EnviroBot and share its story with the whole class in a closing reflection.

Learning Targets and Assessment Criteria

Target: Understands the EnviroChallenger message.

Criteria: Shares examples of ways to reduce, recycle, and reuse trash and show respect and responsibility for our environment.

Target: Designs an EnviroBot.

Criteria: Invents and draws a 2-dimensional design for a 3-dimensional robotic technology that solves problems within human systems by helping reduce, reuse, or recycle trash.

Target: Selects, alters and reuses materials to create an assemblage.

Criteria: Finds and combines objects to create a 3-dimensional model of EnviroBot.

Target: Uses craftsmanship in assemblage construction techniques.

Criteria: Securely glues, tapes, twists, or ties parts into a sturdy, balanced whole.

Target: Describes EnviroBot.

Criteria: Writes a description and story with EnviroBot name, how it helps people, what problem it solves, it's size and sound, and what it did today.

Vocabulary	Materials	Learning Standards
<u>Arts</u> 2-D 3-D Assemblage Composition Craftsmanship Form Point of view Sculpture <u>Arts Infused:</u> Balance Design Model Transparent <u>Science</u> Parts Role Technology Whole	Artworks: Jeremy Mayer Assemblages, Cathy McClure Assemblages Art Materials: Pencil; Recycled drawing paper; Tiny cardboard and plastic boxes; Costume jewelry, watches, mechanical parts, wire, yarn, string, zip-ties, en caps, lids, plastic dispenser tops, diverse plastic objects; Small clear plastic clamshell containers that close: one for each student; Beads; Colorful tape; Scissors; Hole punches; Wire cutters; Tacky glue; Recycled magazines to use as glue mats; Hammer and block for pounding holes in plastics; 6 black fine tipped markers (Sharpies); Class Assessment Worksheet	State Visual Art Learning Standards 1.1.2 Elements: Shape/Form, 2-D/3-D 1.1.7 Principles of Organization: Balance 1.2.1 Skills and Techniques: Drawing, 3-D Construction 2.1.1 Creative Process 2.3.1 Responding Process 4.2.1 Connection between Visual Arts, Science, Engineering and Writing Next Generation Science Standards http://www.nextgenscience.org/next-generation-science-standards Topic: Engineering Design Disciplinary Core Ideas: ETS1.A: Defining and Delimiting Engineering Problems ETS1.B: Developing Possible Solutions Performance Expectations: 3-5-ETS1-1. Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time and cost. Crosscutting Concepts: Systems and System Models Influence of Science, Engineering, and Technology on Society and the Natural World Science and Engineering Practices: 1. Asking Questions and Defining Problems 2. Developing and Using Models 6. Constructing Explanations and Designing Solutions

ICON KEY:

- 📖 = Indicates note or reminder for teacher
- ✂ = Indicates materials preparation suggestions
- ☑ = Embedded assessment points in the lesson

Pre-Teach

Class Reads: *The Lorax* by Doctor Suess

Residency Steps Outline

Day One

TALK ABOUT THE ENVIROCHALLENGER MESSAGE

1. Introduce the 5 R's through class discussion. Reduce, Recycle, Reuse, Respect, and Responsibility.

2. Discuss what trash is composed of and where it goes.

☑ Criteria-based checklist: Student shares examples of ways to reduce, recycle, and reuse trash and show respect and responsibility for the environment.

3. Discuss why and what objects and materials are thrown away, and ways to creatively reuse materials and objects.

TALK ABOUT ROBOTIC MACHINES

4. Share images of robotic machines.

BRAINSTORM ENVIROBOT TECHNOLOGIES

5. Preview art-making process. Guide brainstorming for ideas and list on board.

DESIGN AN ENVIROBOT

6. Guides sketching design ideas for EnviroBot.

☑ Criteria-based teacher checklist: Student invents and draws a 2-dimensional design for a 3-dimensional robotic technology that solves problems within human systems by helping reduce, reuse, or recycle trash.

Day Two

FOCUS ON 3-DIMENSIONAL ART MADE FROM REUSED MATERIALS

- 1.** Introduce assemblage art examples.

CREATE A ENVIROBOT ASSEMBLAGE MODEL

- 1.** Discuss concept of 2-dimensional versus 3-dimensional.
- 2.** Demonstrate and guide interior machine materials selection and construction.

Criteria-based teacher checklist: Student finds and combines objects to create a 3-dimensional model of EnviroBot.

Day Three

ATTACH OUTSIDE ENVIROBOT PARTS

- 1.** Discuss balance. Guide selection of base or feet for EnviroBot.
- 2.** Discuss strategies and limitations in attaching head and tail or other parts. Emphasize and demonstrate techniques for craftsmanship in gluing, taping, and/or tying parts together.
- 3.** Demonstrate and guide adding additional details of head, eyes, tail, and elements which show function of EnviroBots.

Criteria-based teacher checklist: Student finds and combines objects to create a 3-dimensional model of EnviroBot.

Day Four

TEST CRAFTSMANSHIP

- 1.** Guide craftsmanship test and signing EnviroBot.

Criteria-based peer and self-assessment: Student securely glues, tapes, twists, or ties parts into a sturdy, balanced whole.

WRITE ABOUT AND DRAW YOUR ENVIROBOT

- 2.** Guides writing an EnviroBot description/story.

Criteria-based teacher checklist: Student writes a description and story with EnviroBot name, how it helps people, what problem it solves, it's size and sound, and what it did today.

- 3.** Guide sketching final EnviroBot assemblage model from one or two points of view.

REFLECT ON STUDENT ART, SCIENCE AND ENVIROCHALLENGER MESSAGE

4. Reflect on artistic process by having each student introduce their EnviroBot and artist statement/description along with designs/drawings.

5. Close with affirmation of the EnviroChallenger message.

Group reflection: Students discuss protecting the environment and recycling.

LESSON STEPS

Day One

TALK ABOUT THE ENVIROCHALLENGER MESSAGE

1. Introduce the 5 Rs through class discussion. Reduce, Recycle, Reuse, Respect, and Responsibility.

We are learning about art, science, and ways that we can help take care of our planet earth through our choices and actions. Who can name the 5 Rs? Let's talk about each of them!

Reduce means make smaller: "make less trash by using less." How can we make less trash?

Reuse means "use again." What can we reuse to make less trash?

Recycle means to us change the material through some sort of process (heat, water, mechanical) then form into into something usable again. What are some things we can recycle?

Respect means to value, admire, and take care of our environment and living things. How can we show respect for our environment?

Responsibility means a sense of doing your part in daily actions, or a job that needs to be done to help take care of our environment. Who is responsible? YOU!

2. Discuss what trash is composed of and where it goes.

- *Where does trash go after we put it in the garbage can? Why would we want to reduce the amount of trash we create?*
- *How is plastic, metal, or paper made? ... Does making these materials impact the environment? How does trash harm plants, animals, and other humans?*

Criteria-based checklist: Student shares examples of ways to reduce, recycle, and reuse trash and show respect and responsibility for the environment.

3. Discuss why and what objects and materials are thrown away, and ways to creatively reuse materials and objects.

- *What does obsolete mean? Why do we throw things away?*
 - *Why would someone make something out of trash materials?*
 - *Have you ever made something out of "trash" before?*
-

TALK ABOUT ROBOTIC MACHINES

4. Share images of robotic machines.

We are thinking about new technologies: machines to help the planet. We are also focusing on how the special properties of reused materials can communicate ideas since we are building models for new technologies out of reused materials.

BRAINSTORM ENVIROBOT TECHNOLOGIES

5. Preview art-making process. Guide brainstorming for ideas and list on board.

We are going to reuse materials to make robotic models of machines (that we invent) that can help humans solve the problem of too much trash. Talk with a partner about ideas you have.

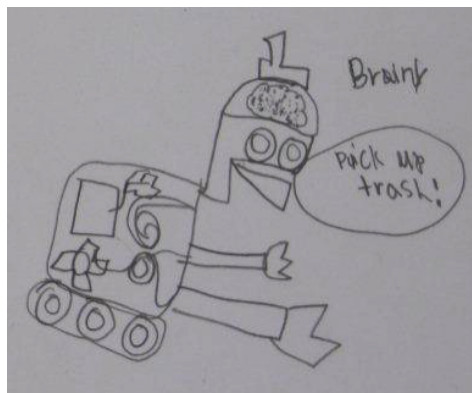
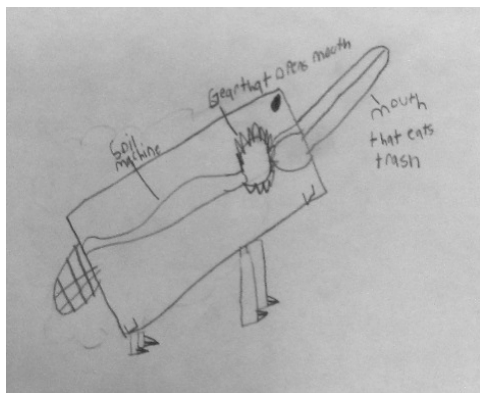
- What are some ways that machines could help reduce trash?
- What are some things that EnviroBots could do?
- Could they transform/recycle trash, educate people, sort?
- What sorts of mechanical parts might they have: sensors, grinders, speakers?
- What do they sound like, look like, smell like?
- How big?

DESIGN AN ENVIROBOT

6. Guides sketching design ideas for EnviroBot.

Use our collective brainstorm ideas to help you decide on what your EnviroBot will do. Sketching will start to give our ideas form.

- Think about what your invention does or its function, and how its shape/form and inner workings might look or show its function.
- Your EnviroBot will have a clear shell (share example) that the working machine parts will be inside of. The outside details will be added tomorrow.
- This is a working sketch or design for your EnviroBot.
- Draw lines and shapes that show the parts and the function of your EnviroBot.
- You can draw your machine from different points of view also: side, front, back, top or bottom.



Criteria-based teacher checklist: Student invents and draws a 2-dimensional design for a 3-dimensional robotic technology that solves problems within human systems by helping reduce, reuse, or recycle trash.

Day Two

FOCUS ON 3-DIMENSIONAL ART MADE FROM REUSED MATERIALS

1. Introduce assemblage art examples.

We are making sculpture—3-dimensional art with height, width, and length. Assemblages are 3-dimensional sculptures made out of objects that are connected together.

- *Describe the materials/objects you see.*
 - *What do you think they are?*
 - *Why do you think the artist chose them?*
-

CREATE A ENVIROBOT ASSEMBLAGE MODEL

2. Discuss concept of 2-dimensional versus 3-dimensional.

Our EnviroBot design drawings yesterday were flat: (2-dimensional). Next we are making sculpture—3-dimensional art with height, width, and length using all kinds of "trash" materials. Our sculptures will become models of our EnviroBot machine design ideas created yesterday.

- *What is a model? Anyone have toy models? Cars, horses, airplanes?*
-

3. Demonstrate and guide interior machine materials selection and construction.

First we will assemble the body or main machine part of our EnviroBot within the transparent box.

✂ Distribute small clear closing boxes for machine. Provide objects for internal machine parts in buckets or trays at each table group. Allow students to select 5 objects to start. Equity is important: make sure that all students have equal access to interesting materials.

- *Select and organize machine parts in your transparent box.*
- *Think about choosing materials that show what your EnviroBot does or how it works.*
- *Clear shells for EnviroBot machines sometimes have labels. Position and fill your clear box with machine parts so the label does not show.*
- *We are not using any glue here, so you need to place, wedge, and tie parts together so they are stable.*
- *Do not add anything to the outside of the clear machine part of your EnviroBot. That will happen tomorrow.*



Criteria-based teacher checklist: Student finds and combines objects to create a 3-dimensional model of EnviroBot.

Day Three

ATTACH OUTSIDE ENVIROBOT PARTS

1. Discuss balance. Guide selection of base or feet for EnviroBot.

In building something that is 3-dimensional, why would balance be important? We want our sculptures to have weight distributed and supported so they do not tip over. We will be thinking about balance as we are adding feet or a base plus head, tail, and possibly other details.

✂ Provide a bucket or tray of big caps and that can easily become balanced feet at each table group.

- *Select caps for feet or base of your Envirobot.*
- *Experiment with balancing the machine part of your EnviroBot on top of caps.*

2. Discuss strategies and limitations in attaching head and tail or other parts. Emphasize and demonstrate techniques for craftsmanship in gluing, taping, and/or tying parts together.

Art needs to be sturdy and interesting to look at. Craftsmanship means care in all construction techniques: neatly cut and applied tapes, knots that stay tied, details that are securely glued and don't fall off.

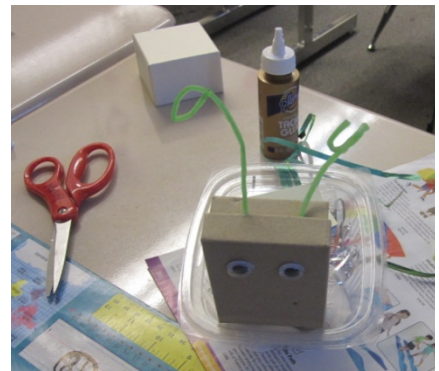
- *Make sure that the two surfaces that you glue together are flat and have clear attachment points.*
- *Squeeze a dime-sized blob of Tacky glue and make sure surfaces squish together and stay put.*
- *If glue cannot connect parts well, can they be tied, laced, and/or taped together using good craftsmanship?*



3. Demonstrate and guide adding additional details of head, eyes, tail, and elements which show function of EnviroBots.

Remember craftsmanship sturdiness tests: When you tie or glue something on, make sure it does not fall off!

- *If you are taping or tying: do that first, then add glue last.*
- *Leave your EnviroBot undisturbed overnight (for a long nap) so it can dry fully.*



✂ EnviroBots can be stored on top of design drawings overnight (to identify them).

Criteria-based teacher checklist: Student finds and combines objects to create a 3-dimensional model of EnviroBot.

Day Four

TEST CRAFTSMANSHIP

1. Guide craftsmanship test and signing EnviroBot.

Work with an elbow buddy to give your EnviroBot a test for sturdiness and balance.

- *If parts are loose or fall off—this is your chance to repair and correct poor craftsmanship.*
- *Sign your name on your EnviroBot (on the bottom) using a sharpie.*

Criteria-based peer and self-assessment: Student securely glues, tapes, twists, or ties parts into a sturdy, balanced whole.

WRITE ABOUT AND DRAW YOUR ENVIROBOT

2. Guides writing an EnviroBot description and story.

A description and story as an artist statement helps people viewing your assemblage/model understand your intentions as an artist and designer of new technology. Your description will include the problem that your EnviroBot solves, and the how it helps solve it.

- *Give your EnviroBot a name.*
- *Write about how your EnviroBot helps people and what problem it solves.*
- *What is the size of your EnviroBot (remember we are making a design/model for the real machine)?*
- *What does your EnviroBot sound like?*

MY ENVIROBOT

My EnviroBot's name is _____.

My EnviroBot helps people _____.

My EnviroBot solves the problem of _____.

My EnviroBot is the size of a _____.

My EnviroBot sounds like a _____.

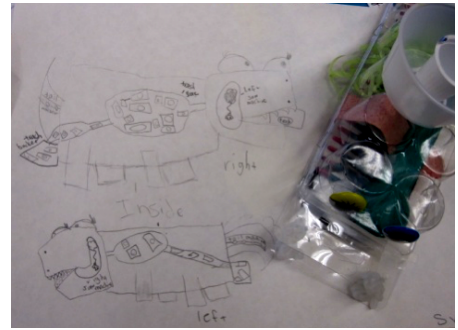
Today, my EnviroBot...

Criteria-based teacher checklist: Student writes a description and story with EnviroBot name, how it helps people, what problem it solves, size and sound, and what it did today.

3. Guide sketching final EnviroBot assemblage model from one or two points of view.

Think about how your ideas changed throughout your process.

- *Draw your finished EnviroBot assemblage model from two points of view (front, back, sides, top...)*
- *Include lots of descriptive visual details that tell us about your EnviroBot.*



REFLECT ON STUDENT ART, SCIENCE AND ENVIROCHALLENGER MESSAGE

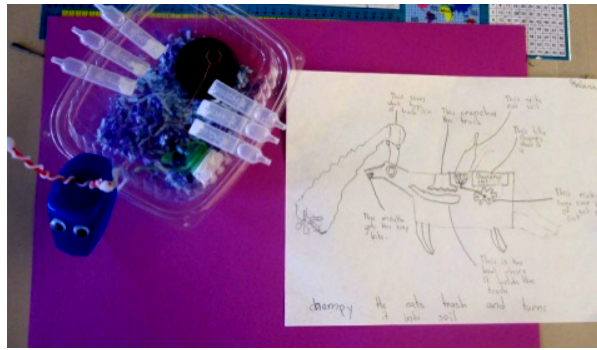
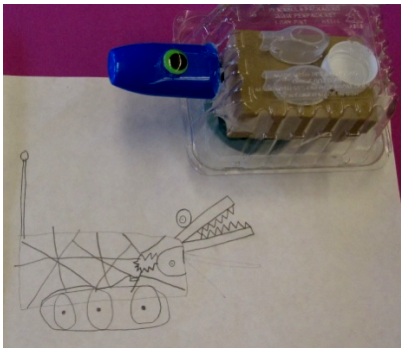
4. Reflect on artistic process by having each student introduce their EnviroBot, description and story along with designs/drawings.

- *Share your EnviroBot description/story*
- *Is your EnviroBot sturdy and balanced? Describe how you used good craftsmanship to make your EnviroBot.*
- *What do you think other students' EnviroBots do to help humans reduce waste? What are questions you have for other artists about their EnviroBots?*
- *Can you see similarities between the first sketch and the assemblage sculpture in your work? What about other artists in the classroom?*
- *Describe how your ideas changed from first 2-dimensional design for an EnviroBot, to building a 3-dimensional model to your final drawing of the finished EnviroBot.*
- *Think about technologies of the future: will we be able to design and create machines that solve our problems?*

5. Close with affirmation of the EnviroChallenger message.

- *What are the EnviroChallenger 5 R's?*
- *Name one way you can protect our environment using the 5 Rs.*
- *What did you discover about reusing materials in art?*
- *How can you use trash materials to make something else in the future?*

Group reflection: Students discuss protecting the environment and recycling.



ARTS ENVIROCHALLENGER

EnviroBots: Inventions to Help Save the Planet

Assessment Checklist

Disciplines	ENVIRONMENTAL SUSTAINABILITY	SCIENCE/ART		ART	LITERACY	Total 5
Concept	Awareness/ Action	2-D Design	3-D Model	Craftsmanship	Descriptive Writing	
Criteria	Shares examples of ways to reduce, recycle, and reuse trash and show respect and responsibility for our environment.	Invents and draws a 2-dimensional design for a 3-dimensional robotic technology that helps humans reduce, reuse, or recycle trash.	Finds and combines objects to create a 3-dimensional model of EnviroBot.	Securely glues, tapes, twists, or ties parts into a sturdy, balanced whole.	Writes a description and story with EnviroBot name, how it helps people, what problem it solves, size and sound, and what it did today.	
Student						



ARTS ENVIROCHALLENGER

EnviroBots: Inventions to Help Save the Planet Teaching Environmental Sustainability, Visual Arts, and Science

- We worked with a **teaching artist** and learned about art, science, and ways that we can help take care of our planet earth through our choices and actions. We learned about the **5 R's** of the **EnviroChallenger message**:
 - **Reduce** means make smaller: "make less trash by using less".
 - **Reuse** means "use again" instead of throwing away.
 - **Recycle** means to us change the material through some sort of process (heat, water, mechanical) then form it into something usable again.
 - **Respect** means to value, admire, and take care of our environment and living things.
 - **Responsibility** means a sense of doing your part in daily actions, or a job that needs to be done to help take care of our environment. Who is responsible? YOU!
- We talked about what trash is composed of, where it goes, and why it is a threat to our planet.
- We talked about why many things become obsolete and are thrown away instead of being reused.
- We brainstormed ideas for **new technologies**—machines called **EnviroBots** that can solve problems by helping humans reduce, recycle and reuse trash. Then we sketched our own ideas.
- We looked at **assemblage sculpture** (3-dimensional art) made from **reused objects connected together**. We identified familiar objects that the artists used based on their properties. We also talked about why artists choose to reuse these materials in their art.
- We made assemblage sculpture **models** based on our EnviroBot designs. We reused objects for the mechanical parts of our EnviroBots and organized those parts within a **transparent** box.
- We **balanced** our sculpture on legs or other supports and added **details** for head, tail, eyes, etc.
- We also added additional parts that show what our EnviroBots do.

- We used **craftsmanship** in attaching parts and **details** through **taping, gluing, and/or tying techniques**. Our EnviroBots are sturdy and balanced.
- We created a **description** and **story** for our EnviroBots describing how it helps people and the problem that it solves.

Enduring Understanding

Trash materials can be selected, altered and reused to create balanced, 3-dimensional artistic and scientific models. Technologies can be designed to help humans reduce waste of resources.