2017

Biology 4920F: Re-Use, Reduce, Recycle

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Re-Use, Reduce, Recycle

Program Designed for the London Children's Museum in part with Community Engaged Learning at Western University.

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Build Bird-Feeders

Objectives

- To show children and their caregivers how recycled items can be reused in a fun and creative way, to help other animals

Materials

1. Reusable material: plastic bottles/containers/milk or cream cartons
2. Plastic spoons
3. Paper or plastic plates
4. Ribbon
5. Construction paper
6. String
7. Colourful tape
8. Safety Scissors
9. Straws
10. Permanent Markers
11. Pencils (to use for the bird feeder)
12. Bird seed
13. Ziplock bags

Note: make sure all reusable items have been thoroughly WASHED before using them

Set Up

1. Place all reusable material (1) in a bin
2. Create some bird seed bags
   a. Pour bird seed in a ziplock bag, to fill ~1/3 of the ziplock
   b. Can make a few to start and continue making these bags as needed
3. Lay materials 2-10 out on the table

Instructions

1. Ask the child to choose a reusable material from the bin that they would like to use for their bird feeder
2. Draw a semi-circle on one or both sides of the reusable material for which to make a hole
3. Have them ask one of the individuals running the event to help them cut the hole on one or either side of the reusable material if they need assistance, making sure it consists of about two-thirds of the side of the bottle
4. Cut a circular dot onto the left side and right side of the lid of the reusable material, using scissors, by punching a hole through it

5. Have the child, or the individual running the event, run either ribbon or string through the top of the right or left side, and out, through the inside of the opposite side
    a. Have the child choose a colour of string
    b. Have the child choose how long they want the string to be (a.k.a. how low their bird feeder will hang)
6. Tie the two ends running out of the lid as close to the end, to allow the bird feeder to be hung
7. Allow the child to choose what they would like to add as a place for the birds to stand and reach bird feed out of the whole cut out :
    a. Tape plastic spoons or pencils to the bottom of the reusable material in an cross-shape (2 spoons or 2 pencils, or one of each)
        - Make two little holes on the sides underneath the lower-most part of the open hole, and stick the spoons or pencils or straws inside the bottle at the bottom (running from front to back or side to side)
    b. Tape a plastic or paper plate in the centre of the bottom of the reusable material

    Note: the child can use more spoons or pencils or straws on the upper portion of the material as well, if they wish
8. Allow the child to decorate their bird feeders using the colourful tape, ribbon, and construction paper. The kids can use safety scissors to cut out different shapes to stick on and make their bird feeders look pretty and unique

Scientific Context

- Recycling is a process that involves taking different pieces of “garbage” and making it into a new item than can be used in a unique way, often different from what it was initially meant to be used for. This helps save the environment because lowering the amount of garbage helps lower the amount pollution that comes from greenhouse gas emissions. Greenhouse gas emissions are gases released in the environment, through taking up (absorbing) and releasing (emitting) energy from sunlight (radiation). This increases how much carbon dioxide is in the air (which is bad for our environment). The amount of energy emitted and absorbed is affected by human activity, such as when we pollute our environment. Recycling is important in reducing waste, and lowering the amount of pollution.
  So remember: “**Reduce, Reuse, Recycle**”

Discussion Questions for Participants

- Help explain how we can transform recyclable material into new items, such as bird feeders, which help other animals within our environment
- Use the following questions to encourage conversation and thought

Participants ages 5-6

- Why do we recycle?
- What can we recycle?
- Can you think of any other items you could reuse?

Participants ages 7-8

- What can we recycle?
- Why is recycling good for the environment?
- What happens if we don't recycle?

Participants ages 9-11

- Why do we recycle?
- Why is recycling good for the environment?
- What happens when we throw out recyclable items into the garbage?
- What types of items are recyclable?
- Should we recycle batteries and electronics?
  - If yes, why?

Participants 12 and Older

- Why do we recycle?
- Why is recycling good for the environment?
- What types of items are recyclable?
  - Can you sort these items into the categories: paper and plastic?
- Can you recycle ice cream and milk containers too, even though they are a different material?
  - If it has the recycling logo on the bottom, you can recycle it!

Mix-and-Match

Objectives

- An interactive game to show children and their caregivers the importance of sorting their 'garbage' into three main categories:
    1. Garbage
    2. Recycling
        a. Paper
        b. Plastic
        c. Other
    3. Compost

Materials

1. 4 already-made Bristol Boards:
    ii. Scenery = Environment
    iii. Labelled "Garbage"
    iv. Labelled "Recycling"
    v. Labelled "Compost"
2. Cut-outs of various items with velcro pieces

Set Up

1. Hang all 4 Bristol boards up, keeping the three labelled ones beside each other, and the fourth "Scenery" one a small distance away from them
2. Velcro on the various cut outs onto velcro pieces on the "Scenery" Bristol board
   Note: the 4 labelled Bristol boards should be kept empty

Instructions

1. Have the children and their caregivers help "clean up" the environment by sorting each image that has been attached to the "Scenery" board with velcro.
    - Can ask the child where they think this item goes, either "Recycling," "Garbage," or "Compost"
    - Followed by having them velcro the piece onto the respective board
2. Once a category has been completely sorted (all velcro pieces have been attached), turn the board over to reveal which animal they are helping by:
    a. Recycling
    b. Composting
3. As the environment is being cleaned up, an individual running the event can begin to add different animals to the board, showing how cleaning the environment helps bring back animals

4. Once the environment is completely cleaned up, turn the board over over for them to reveal which animal they are helping by cleaning up the environment through properly sorting your garbage

Scientific Context

- Everyone has an important role in reducing the amount of waste that is buried in our landfills. Sorting waste into the categories: “garbage,” “recycling,” and “compost,” is essential to helping save our environment, and the animals that inhabit it. For example:
  - Seagulls love wandering the beach. By throwing your garbage aimlessly on the sandy shore, the seagulls might think its food, eat it, and become sick. Garbage needs to be disposed of properly to ensure this doesn’t happen, with seagulls or any other animals, anywhere.
  - Composting is very important in helping our soil. Compositing various things (such as apple cores, orange peels, egg shells, coffee grounds and tea bags), helps enrich the amount of nutrients in the soil, helping flowers grow, which helps the bees collect pollen to make honey.
  - Sea turtles are important in our marine ecosystems. Plastic, such as the plastic rings that hold pop cans and bottles together, can contaminate the waters. These floating in the water can causes sea turtles to get their heads stuck in these nets. By properly recycling, sea turtles, and other animals, can avoid being in such harm, as to get stuck within pieces of plastic

Environment Terms

Individual: a single animal or plant in the same species (Eg. A single pet dog).

Population: multiple individuals of the same species living in the same area (Eg. Population of duckings in a pond).

Community: Many different populations species living together in the same area, and interacting with their environment (Eg. Ducks and fish living together in a pond).

Ecosystem: Many different populations species living together in the same area, and interacting with their environment (Eg. Ducks and fish living together in a pond eating different food and plants).

Pollution: Anything (solid, liquid, or gas) that has negative or bad effects on the environment.

Recycle: Re-using materials that were thrown out.

Garbage: Materials or items that’s are done being used, cannot be re-used, and must be gotten rid of (Eg. Plastic that wraps your toys).

Compost: Fruits, vegetables, other natural materials that can be saved and broken down into really good soil that helps grow heathy plants.

- New terms can be useful in discussion with older participants

Discussion Questions for Participants

- Show participants the boards and explain the game as the approach the activity
- Help explain what an ecosystem is and what the different plants, animals, and areas are
- Use the following questions to encourage conversation and thought

Participants ages 5-6

- Can you identify anything?
  - Show them where the pond is?
- Did know know your backyard is an environment, just like this?

Participants ages 7-8

- Did you know your backyard is an environment, just like this?
- Do you think it's good or bad to clean up the garbage in our environments?
- Do you think it would be good or bad if the garbage gets into the water the animals (and us) we drink?
- Do you see anything in environment that could have been recycled?
  - Why do you think some people throw out things that can be recycled ?

Participants ages 9-11

- Do you see anything in the environment that could have been recycled?
  - Why do you think some people throw out things that can be recycled?
- Why do you think we need to clean up our environments of garbage and pollution?
  - Do you think it would be good or bad if the garbage gets in the water the animals drink? Why?

Participants 12 and Older

- Why do you think there are so many things thrown out that people could have decked?
- Do you know of any other ways people get rid of their garbage? Do you think these have problems too or are they better?
- Other than water contaminations can you think of other ways pollution can harm the environment?
  - Prompt them to think of the animals living with garbage around and how they live around or with it?
- Do you think people would change their behaviour if they saw what environments ended up look like covered in garbage? Why or why not?

Learn About Landfills

Objectives

- The landfill diorama is a made from a large water cooler jug. It demonstrates the different layers of a landfill to participants, helping them to understand where their garbage is going

Creating Diorama

Materials

1. 24 oz of Blue Playdough
2. 48 oz of Orange Playdough
3. 1 Roll of Saran Wrap
4. Black Duct Tape
5. Polystyrene fabric
6. 16 cups of gravel
7. 16 cups of soil
8. Fake or real vegetation

Note: be sure to CLEAN the garbage thoroughly and to not include any compostable materials (use fake fruit to show food) as the garbage will actually begin to decompose in the soil.

Instructions

1. Cut the top off of an empty water cooler jug
2. Add 24 oz of Blue Playdough to the bottom of the jug
3. Add a layer of soil
4. Use orange Playdough to make a ½ inch layer of “clay”
5. Use saran-wrap to create a plastic barrier
6. Fold the black tape in half. Tape the folded tape around the circumference of the jug
7. Add polystyrene fabric, creating a levelled layer that rises approx. 1 inch
8. Add a ½ inch layer of gravel. Smooth until evenly spread atop the cotton balls
9. Add a 2 inch layer of cleaned garbage
10. Add a 1 inch layer of soil on top of the garbage
11. Add a 2 inch layer of cleaned garbage
12. Use orange Playdough to make a ½ inch layer of “clay”
13. Use saran wrap to great a plastic barrier
14. Add a ½ inch layer of gravel
15. Place top soil with real or decorative vegetation

Creating Presentation Board

- The many layers of the landfill diorama can be intimidating to older and more curious participants who will want to understand what is being represented. The creation of a presentation board will help students to understand the diorama and spur questions regarding each layer and the overall trends seen
- Participants of different ages will respond to the diorama differently. It is important for the program administrator to first become educated on the layers of a landfill, the general trends of those layers, and the impacts that landfills have on the environment
- All educational material is included in the Landfill Presentation Board Information document to be adhered to the presentation board, and thus will be in clear sight of both the program administrators and the participants. After the program administrator has prepared, they are advised to read over the questions provided to spur conversation and thought for participants of various ages.

Purpose of Each Layer

- Layers are listed from furthest buried to surface layers

Layer	Purpose
Blue Playdough	represents the ground water in the water table
Soil	represents the outside soil that is not considered a part of the landfill
Playdough	represents clay, a layer added to stop contaminated water inside the landfill from leaking into the outside soil
Saran Wrap	represents a geomembrane, a thin sheet of plastic which also stops contaminated water from leaving the landfill
Black Tape	represents the drainage system that collects contaminated water to be removed from the landfill for treatment
Polystyrene fabric	represents the geotextile layer, a felt like layer above the drainage system that separates solids from the contaminated water and thus keeps pipes from being blocked
Gravel	collects the contaminated water from the trash and allows it to drain into the pipes by gravity
Cleaned Garbage	representative of the garbage found in a land fill
Soil	each new layer of garbage is covered by soil daily to help reduce odour, scavenging, and the movement of the garbage
Orange Playdough	represents the clay placed as a cap on the layers of garbage and soil once the landfill has reached a maximum height. Prevents excess water from entering the landfill and gas from escaping
Saran Wrap	represents a geomembrane, a thin sheet of plastic which also stops contaminated water from entering the landfill

Gravel	drains excess water from the protective soil to help prevent water from entering the landfill
Soil	Protects the cap of the landfill
Vegetation	Protects the soil from erosion and weathering. Must be grass, no vegetation with deep roots can be grown as they would infiltrate the landfill

General Landfill Trends

- Top layers of the landfill focus on keeping water out of the landfill and keeping the garbage and gasses within the landfill
- Lower layers of the landfill focus on keeping water and garbage within the landfill
- Layers of the landfill are designed to keep the system closed, that is to keep existing water within the landfill and prevent new water from entering. This is done to prevent contamination of ground water

Landfill Terms

Leachate: contaminated water from the trash within the landfill.

Cap: Layer of clay that seals the top of the landfill

Cell: section of land within the landfill that contains all of the added trash from one single day. Each day a new cell is made.

- New terms can be useful in discussion with older participants

Discussion Questions for Participants

- Show participants the diorama as they approach the activity
- Help explain what a landfill is and what the different layers are used for
- Use the following questions to encourage conversation and thought

Participants ages 5-6

- Can you identify anything?
  - Show them where the garbage is
- Did you know that garbage is put in the ground?

Participants ages 7-8

- Did you know that garbage is put in the ground?
- Do you think it's good or bad for the ground?
- Do you think it would be good or bad if the garbage gets in the water we drink?
  - Why?
- Do you see anything in the landfill that could have been recycled?
  - Why do you think some people throw out things that can be recycled?

Participants ages 9-11

- Do you see anything in the landfill that could have been recycled?
  - Why do you think some people throw out things that can be recycled?
- Why do you think we can't plant trees with big roots on top of the landfills?
- Why do you think there are so many layers in the landfill?
  - Do you think it would be good or bad if the garbage gets in the water we drink? Why?

Participants 12 and older

- Why do you think there are so many layers in the landfill?
- Do you know of any other ways people get rid of their garbage? Do you think these have problems too or are they better?
- Other than water contamination can you think of other ways landfills hurt the environment?
  - Prompt them to think of the vegetation on top of the landfills and the associated restrictions.
- Do you think people would change their behaviour if they saw what a landfill looks like? Why or why not?

Student Handout

- Student handouts will be given to participants to connect the three separate activities running simultaneously during the program as well as to incentivize participants to complete the full program. Inside each handout is a description of each activity and a spot for a sticker to be placed once that activity is complete. When a participant has collected all three stickers, they may write their name on a leaf and place it on the tree mural posted on the wall. This incentivizes the participant in two distinct ways: they will be rewarded with stickers to complete their booklet, and they will be recognized for their efforts by adding their own leaf to our tree.

- Located on the backside of the booklets are prompts for the participant to further their learning at home by themselves or with their family. Prompts include: hang up your bird feeder, ask to help sort the recycling, try making other crafts out of used containers, talk to your family about starting a compost pile, and volunteer for a park clean-up with your family.

Creating Student Handouts

Materials

1. Paper
2. Colour Printer
3. Student Handout Reuse Reduce Recycle Program document

Instructions

1. Set printer to colour printing, double sided
2. Print Student Handout Reuse Reduce Recycle Program document
3. Fold printed document
4. Repeat steps 1-3 as many times as needed

Tree

- The tree is part of the incentive program created by the student handouts and also works to tie the three activities together. Participants collect stickers stickers in their handouts for completing each activity, when all three activities have been completed they may write their name on a leaf and add it to the tree

- The tree does not need to be made new each time. It was purchased and remains with the London Children's MuseumTo make additional leaves, cut ovals out of green cardboard. Leaves can be adhered to tree with sticky tape.