

Western Engineering Outreach

Green Bean Mosaics

Grade 6-8

Meet Today's ENG HERO!



M. Reza Najafi - Assistant Professor with Western Engineering

Dr. Najafi graduated from Shahid Beheshti University, Iran in 2004 with a BSc in Civil Engineering. He Finished his MSC in Civil Engineering at K.N. Toosi University of Technology, Iran in 2007, then continued to get his PhD in Civil and Environmental Engineering in Portland State University, USA in 2013. He is currently an Assistant Professor in the Department of Civil and Environmental Engineering at Western University. Dr. Najafi's research areas include Watershed Hydrology, Climate Change Impact Assessment, Infrastructure Risk and Resilience, and so much more. *To learn more about Dr. Najafi visit:* https://www.eng.uwo.ca/civil/faculty/najafi_m/index.html

Learning Goal:

- Students will learn about the many different roles of an Environmental Engineer
- Students will learn about different ways to incorporate different methods of waste treatment into their daily lives
- Students will learn about a new style of art - Mosaics
- Curriculum Connections: Grade 7 - Interactions in the Environment

Materials Needed:

- Glue
- Paintbrushes
- Cardboard or any sturdy backing
- Dry beans (kidney, black beans, peas, lentils etc.) of different colors and sizes
- Coffee beans
- Small Pasta



Engineering and Science Connections:

Environmental engineers focus on a lot of different aspects of ways to make our world a cleaner, better place, and improving life for all living things. Today we will talk about the ways they are focused on reducing, reusing and recycling.

What is Composting?

- Composting is a waste treatment method that is not used as widely as recycling.
- Composting is a natural biological process, carried out under controlled aerobic conditions (requires oxygen).
- In this process, various microorganisms, including bacteria and fungi, break down organic matter into simpler substances.
- The effectiveness of the composting process is dependent upon the environmental conditions present within the composting system i.e. oxygen, temperature, moisture, material disturbance, organic matter and the size and activity of microbial populations. These microorganisms are easy to come by. I guarantee they exist in your own backyard!
- Environmental engineers are tasked with the responsibility of designing composting bins that will create the ideal environment to help these waste materials naturally be broken down.
- Composting is an effective way to reduce greenhouse gases.
- By composting, the generation of greenhouse gases, particularly methane, is avoided.
- Fertilizer production requires intensive fossil fuel energy and seriously impacts human and environmental health.
- By using compost, the greenhouse gas emissions related to fertilizer production are avoided. There is significant reduction in the use of pesticides (avoiding emissions associated with their production).



What are Mosaics?

- Mosaics are made of tiny colored pieces of stone, pottery, glass or other materials, arranged together and set in plaster or cement to make patterns and images. They can be used to decorate a floor, a wall or in some cases a ceiling.
- Mosaics have a long history. They were created in Ancient times in Babylon, Egypt, Greece and Rome. When the cities of Pompeii and Herculaneum (which were buried under lava when Mount Vesuvius erupted in A.D. 79) were rediscovered, many wonderful mosaics were found.



10 Pillars of Environmental Engineering:

1. Climate Change
2. Green Living and Sustainability
3. Waste
4. Air
5. Water
6. Health & Safety
7. Land & Cleanup
8. Chemicals & Toxins
9. Pesticides & Agriculture
10. Emergencies



Video Recommendation: What do Environmental Engineers do?

<https://www.youtube.com/watch?v=MUT8zya53Vg>

Activity:

Today we will be creating mosaics out of only entirely compostable materials (Beans, coffee and pasta)

Instructions:

1. Draw a simple shape or figure as a thumbnail on a piece of paper. Keep the details down to a minimum. Simple is good for this project. Try to have the theme of your work be related to one of the pillars of environmental engineering that have previously been discussed. Draw 3-4 thumbnails before you begin
2. Select your best thumbnail and draw the simple shape/figure on the cardboard.
3. Paint glue in a small portion of the design. Note: Do not use too much glue if your cardboard is not sturdy. It will curl.
4. Place beans of different colors in the portion with glue.
5. Repeat for the entire picture.
6. The result is quite beautiful, and you will have a piece of art you are proud to display.

Example:



What Did You Learn?



- What other items do you think are compostable?
- Are there any situations in which recycling could be a better option than composting?
- Why do we have to be careful about the amount of greenhouse gasses being emitted into the atmosphere?

Future Learning



- Now that you have learned about composting, use household items to create a compost box. Put compostable items (such as a teabag or a banana peeling) in your box and place it in your garden. Did it work? Why or why not? What could you do to make it work?

Share your creations!

We would love to see what you made. Email us at discover@uwo.ca or tag us on social media.

Instagram: @westernueng

Twitter: @westernueng

Facebook: @westernueng

Thanks for discovering with us!