Pontoon: the polystyrene white disaster spill

Resource one: Waste impacts

Learning overview

We use plastic in our lives everyday, it is found in many different products. Polystyrene is a light weight plastic product that forms drinking cups, product packaging and floating pontoons! We know plastics are helpful when they are in use! but they have a long lasting impact on our planet. In this lesson students discover the uses of polystyrene, how it can be recycled and how polystyrene became a big problem for the sunshine coast. Get ready to explore polystyrene and the impacts in this power packed lesson.

Focus Question: What is polystyrene? How is it used? and How can it become an environmental problem?

Key concepts: polystyrene, materials, insulator (heat and cold), uses, waste, recycling, product life cycles.

Teaching Strategies

- ★ Whole class collaboration - brainstorm
- ★ Hands on investigation- materials investigation - mini experiments
- ★ P.O.E - Predict, Observe and Explain.
- ★ Design thinking - waste reduction, re-thinking polystyrene solutions.

Equipment & resources

- Examples of polystyrene products (cups, packaging: food, boxes etc)
- Polystyrene cups (1 per student or 1 per group)
- Warm water, cool water, ice blocks
- Thermometers (if available)
- Paper, post-it notes and marker pens
- Device suitable to play the Pontoon documentary
- Ipads or computers to assist students in their research

National Curriculum linkages

Lesson	Years 3 and 4	Years 5 and 6	Years: 7 and 8	Years 9 and 10
1	**Science - questioning and predicting** Pose questions to explore observed patterns and relationships and make predictions based on observations AC9S3I01	**Science - Use and influence of science** Investigate how scientific knowledge is used by individuals and communities to identify problems, consider responses and make decisions AC9S5H02 and AC9S6H02	**Science - Use and influence of science** Examine how proposed scientific responses to contemporary issues may impact on society and explore ethical, environmental, social and economic considerations AC9S7H03 and AC9S8HO3	**Science- Earth and space sciences.** Use models of energy flow between the geosphere, biosphere, hydrosphere and atmosphere to explain patterns of global climate change. AC9S10U04

Learning Intention:

To learn about polystyrene and the impact on the environment:

- **What is polystyrene? What do we use it for?**
- **What are the waste impacts?**
- **How do we reduce the waste impacts? What can we do?**

Success Criteria

I am successful when I can describe:

- The uses of polystyrene and what polystyrene is made of
- How polystyrene can be recycled
- The impacts of polystyrene in the environment
- One new innovations to replace polystyrene

Activity sequence

1. Tuning In:

What is polystyrene? and How is it made? Polystyrene is an expanded plastic product. It is made from oil or gas (benzene and ethylene) when combined creates a new product. Raw polystyrene is as small as a grain of salt, but once exposed to steam it expands to fill out the shape of the mold. Polystyrene is light weight and has many different uses.

Undertake a quick class brainstorm, write the student responses on the board:

- Where have you seen polystyrene packaging before?
- What was it used for?

2. Finding out:

Activity 1 : The purpose of polystyrene.

Materials investigation (heat, cold, float, sink) explore the properties of polystyrene.

Equipment required: cups (24), ice cubes (3 per cup), warm water (jug), thermometers, post-it notes, marker pens, poster paper (A3).

Set up the mini experiment to discover the uses of polystyrene:

Hot and cold - Is polystyrene good at keeping things hot or cold? Does it act as an insulator?

1. Provide each student or group with a cup.
2. Give each student or group a choice of experimentation conditions: warm or cold, student place hands around the cup to look and feel the difference:
    a. Warm: add in warm water into the cup - look , feel, think.
    b. Cold: add in ice cubes to the cup - look, feel, think.
3. Record student results: on post-it notes - (hot, warm, cold or icy etc.) add the notes to the poster paper for the investigation. Invite the students to create a title and elaborate their ideas on the poster paper.
4. Share students findings by asking each group to show and discuss their investigation.

Float or sink - Is polystyrene built to float or sink?

5. Provide each student or group with a cup.
6. Provide students with smaller polystyrene pieces (ie. taken from a tray)
    a. Ask the student to add in the pieces into their cup.
    b. Undertake a quick P.O.E (predict- observe - explain) investigation,
        i. Predict: What do you think will happen to the pieces?
        ii. Observe: What did you see?
        iii. Explain: How do you explain this?
7. Record results: on post-it notes -Did it float or sink - Why? Add to the investigation poster.
8. Share - students findings by asking each group what they found.
9. Add the post-it notes to the large group poster.

Use these questions to guide a classroom discussion:

- Is polystyrene a good insulator? Did it keep things warm or cold?
- How did it help your hands feel holding the cup?
- Can polystyrene float? or did it sink?

- What makes it float? How does being light help?

Activity 2: Washed away

Introduce the students to the documentary: Polystyrene pontoon pollution.

1. **Watch the documentary Pontoon: The polystyrene white pollution disaster. 1- 25 mins**

2. **Reflect on the documentary: Undertake a class discussion based on these ideas**

- Why was polystyrene used as the material to build pontoons?
- What happened to the polystyrene in the flood waters?
- How do the properties (ie. light, brittle and breaks easily) of polystyrene make it hard to clean up in the environment?
- What happens to the polystyrene when it is left exposed in the environment? Think about the statement:
    - 'it doesn't break down, it just gets smaller' ***Alison Foley - Ten Little Pieces***

3. **Brainstorm, think-pad, impact solutions**

- Consider the how the detachment of the pontoons impacted on the natural ecosystems (ie. rivers, oceans, beaches).
- Where did the pontoons come from? How did the pontoons make it to the beaches at Noosa?
- What did people do to help clean up the environment? What equipment did they use?

3. Going further: Noosa Council

Investigate: How is Noosa Council working to reduce polystyrene waste?

Read the article:
Polystyrene recycling - Noosa Council.

Discuss these questions as class or break up into small teams:

- How is Noosa Council reducing the polystyrene problem?
- What polystyrene facilities does Noosa council have?
    - What is an expanded polystyrene thermal (EPT) compaction machine.
    - How does compacting the expanded polystyrene help the environment?
    - Does this make a difference to landfill, recycling and reusing materials?

4. Taking action: Everyday actions - Making positive choices.

What brilliant ideas do you have to help reduce the use of or need for polystyrene? Brainstorm as a whole class or in smaller groups to investigate everyday actions we can take.

Is there another way?

Are there different types of materials that could be used instead of polystyrene? Bioplastics like cornstarch packing peanuts? or another solution?

Ideas into action:

How can you get involved and help out:

Recycling at school:

- School community action- aligned with Noosa Council - Can you organise a collection of polystyrene for your school? https://www.noosa.qld.gov.au/

Picking up plastic litter:

- Ten Little Pieces- Support wonderful community action and engagement programs, like Ten Little Pieces encouraging you to pick up plastics when you're out and about.
  https://tenlittlepieces.com/

Care for subtropical reef systems:

- The Reef Check - Discover the amazing ecosystems of the subtropic reef and how to care for the reef and its environment.
  https://www.reefcheckaustralia.org/south_east_queensland

Volunteer for Ocean Crusaders team:

- Ocean Crusaders- Encourage participation in volunteering for ocean crusader river cleaning teams. https://oceancrusaders.org/