THE E-WASTE PROBLEM

This lesson introduces students to e-waste and why it's causing problems globally. It then encourages them to consider how they may be able to help.

LESSON OBJECTIVES

Students will be able to:

- Understand what e-waste is
- Understand why e-waste is a problem
- Have some ideas of how to address the e-waste problem

SUMMARY OF TASKS

PART 1 – INTRODUCTION

- Intro question for the class: Would you buy used or repaired electronics? Why or why not?
- Give a brief introduction from the 'Introduction to E-waste' fact sheet
- Ask students questions from the front, write answers on the board:
  - How many pieces of old electronic equipment do you have around your house? And what are they?
  - How do you get rid of your old or broken electronics?
- Watch '*The Story of Electronics' video*[1] (8 mins) and ask students what they thought of the ideas in the video

PART 2 – ACTIVITY

- Split into groups for the 'E-waste quiz' activity

PART 3 – DISCUSSION

- Ask students (still in groups) to discuss and write down ideas on:
  - How big a problem is e-waste compared to other global challenges
  - What could governments, businesses, and we do to help tackle e-waste
- During the discussion you may wish to go around the class and assist weaker learners by giving some prompts or ideas
- Finally, come back together as a class and ask groups to share some of their ideas with everyone

RESOURCES/ EQUIPMENT

- 'Introduction to E-waste' fact sheet
- 'E-waste quiz' activity

HOMEWORK/ EXTRA ACTIVITIES

- Ask students to research and report on what is the best thing that they could do with their waste electronics around their house

[1] https://www.youtube.com/watch?v=sW_7i6T_H78

FACT SHEET: INTRODUCTION TO E-WASTE

FACT SHEETS HAVE BEEN DESIGNED FOR TEACHER USE TO AID CREATING OF TEACHING RESOURCES, OR THEY ARE FREE TO BE REPURPOSED FOR STUDENT USE.

Rapid advances in technology have likely led to an increase in the quality of life of many people around the world. An unfortunate side effect of this revolution has been one of the most quickly growing and sizable global waste streams, with estimates of 30 to 50 million tonnes disposed each year, and an annual growth rate of 3 to 5%.[2]

Electronic waste (e-waste) is generated when electrical and electronic equipment reaches the end of its lifecycle and is disposed of by trash or recycling. This is a problem as it is often hazardous and can pollute the environment through landfill, a particular problem in developing countries.[3]

E-waste contains many valuable components including metals such as gold, silver and palladium. However, these are hard to access due to the complicated designs of electronic equipment that make them very difficult to take apart and recycle. In addition, many of the rare materials used to make these products are running out![4] The longer we do nothing about this problem, the bigger the problem will become.

ADDITIONAL RESOURCES

- https://www.who.int/ceh/risks/ewaste/en/
- https://recyclecoach.com/residents/blog/an-intro-to-e-waste-why-its-a-problem/

[2] Cucchiella, F.; D'Adamo, I.; Lenny Koh, S. C.; Rosa, P. *Renew. Sustain. Energy Rev.* 2015, *51*, 263–272.
[3] Frazzoli, C.; Orisakwe, O. E.; Dragone, R.; Mantovani, A. *Environ. Impact Assess. Rev.* 2010, *30* (6), 388–399.
[4] Graedel, T. E.; Harper, E. M.; Nassar, N. T.; Nuss, P.; Reck, B. K. *Proc. Natl. Acad. Sci.* 2015, *112* (14), 4257 LP – 4262.

ACTIVITY: INTRODUCTION TO E-WASTE

Instructions

This activity gives students an understanding of the scale of the e-waste problem.

It is intended to be used alongside 'The E-waste Problem' lesson plan but could be adapted to use as a stand-alone activity.

The activity could also be given as an online quiz through a platform such as Kahoot or Quizlet.

Task

Ask students in groups to match up the question cards with the answer cards.

Then discuss why students chose certain matches.

Sources:

- https://www.theworldcounts.com/stories/Electronic-Waste-Facts
- https://jointhepod.org/teachers/take-home-sheets/ewaste-facts
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6236536/
- https://earth911.com/eco-tech/20-e-waste-facts/
- https://techcollect.com.au/8-e-waste-facts-for-global-recycling-day/

The E-waste Problem
Age Range: 11-18 years

Question cards	Answer cards	Question cards	Answer cards
If all e-waste was laptops, how many would be thrown away every second worldwide?	800	After how many years do most people replace their TV?	7
After how many months does an average person replace their mobile?	18	After how many years do most people replace their laptop?	3
What percent of all toxic waste is e-waste?	70	How many mobiles are in use today worldwide?	7.2 billion
What percent of e-waste is recycled?	12.5	How many estimated child workers in e-waste are there in India between 10 and 15 years old?	500,000
What percent of US e-waste is sent to Asia?	80	What is the value of all the raw materials in e-waste generated per year? ($)	62.5 billion
How many computers are made per year worldwide?	300 million	What is the average wage of e-waste site workers per day? ($)	1.5
How many mobiles are made per year worldwide?	1 billion	What is the value of the mobiles thrown away in the US each year? ($)	60 million