

E- waste

Before you Begin

Electronic Waste, or E-waste, refers to all items of electrical and electronic equipment (EEE) and its parts that have been discarded by its owner as waste without the intent of re-use (Step Initiative 2014).

The Global E-waste Monitor – 2017 describes six different categories of E-waste.

1. Temperature exchange equipment, (commonly referred to as cooling and freezing equipment). Typical equipment includes refrigerators, freezers, air conditioners, heat pumps.
2. Screens and monitors. Typical equipment includes televisions, monitors, laptops, notebooks, and tablets.
3. Lamps. Typical equipment includes fluorescent lamps, high intensity discharge lamps, and LED lamps.
4. Large equipment. Typical equipment includes washing machines, clothes dryers, dish-washing machines, electric stoves, large printing machines, copying equipment and photovoltaic panels.
5. Small equipment. Typical equipment includes vacuum cleaners, microwaves, ventilation equipment, toasters, electric kettles, electric shavers, scales, calculators, radio sets, video cameras, electrical and electronic toys, small electrical and electronic tools, small medical devices, small monitoring and control instruments.
6. Small IT and telecommunication equipment. Typical equipment includes mobile phones, Global Positioning Systems (GPS), pocket calculators, routers, personal computers, printers, telephones.

How is E-waste generated?

Electronics waste, is the waste generated from surplus, broken and obsolete electronic devices. Also the different categories of products mentioned above produce different types of waste. The production of waste depends on the life of the product, on technological advancements and also on social and economic developments.

Why is E-waste of concern?

E-waste contains hazardous substances that, if treated inappropriately at end-of-life, can damage human health and the environment. It also contains complex valuable materials, such as precious metals which need to be treated properly to effectively recover them with minimal environmental impact and in the process reduce the demand for such material through mining.

The mounting problem

There are several reasons for the mounting E-waste problem. These include rapid technological advancements, social and economic development, and more spending power to buy a variety of electronic products.

The statistics!

The Global E-waste Monitor – 2017, reported a staggering amount of e-waste generated in 2016. According to the report 44.7 million metric tonnes of E-waste was generated in 2016. This is an equivalent of almost 4500 Eiffel Towers! The statistics are even more overwhelming as globally, only 8.9 Mt or 20 percent of the total E-waste generated is documented to be collected and recycled.

E-waste recycling

E-waste or electronics recycling is the process of recovering material from old devices to use in new products. Electronics are full of valuable materials including copper, tin, iron, aluminum, fossil fuels, titanium, gold, and silver. Many of the materials used in making these electronic devices can be recovered, reused and recycled, including plastics, metals, and glass.

The problem is however severe as the production of E-waste rates are not matching their recycling rates. The Global E-waste Monitor – 2017 mentions that only 41 countries have Official E-waste Statistics. The fate of a large majority of the E-waste (34.1 Mt) is simply unknown. The report goes on to state that “In countries where there is no national e-waste legislation in place, E-waste is likely treated as other or general waste. This is either land-filled or recycled, along with other metal or plastic wastes. There is the high risk that the pollutants are not taken care of properly, or they are taken care of by an informal sector and recycled without properly protecting the workers, while emitting the toxins contained in E-waste.”

E-waste survey (inventory and behaviour)



INTRODUCTION

The lesson plan introduces students to the concept of E-waste. Through hand-on data collection students will become aware about people's behaviour towards E-waste; through secondary research students will become aware about the different laws and regulations pertaining to E-waste.

Objectives:

Students will be able to

- undertake surveys to gather data pertaining to waste management and disposal practices followed by individuals from a small sample of 15-20 households.
- understand the behaviour of the respondents towards E-waste.
- undertake an internet search to investigate E-waste management laws applicable in their country.
- analyse and interpret the information collected and report their findings in the form of an articles.

YRE steps: Investigate, Research Solution, Report, Disseminate

Curriculum Linkage: Science/ Environmental Studies/Social Science

Time required/ Duration:

- **Classroom session 1:** 45 minutes for the teacher to do a background introduction on e-waste, - including its sources and associated problems.
- **Group Assignment 1:** One week for students to undertake the survey with different respondents, each group could interview 5 respondents.
- **Classroom session 2:** 90 minutes for internet search to investigate rules and educational programmes that exist with regards to e-waste, minimum one country should be selected by a group.
- **Home Assignment:** Two days for individual students to pen their thoughts in the form of a newspaper article.
- **Classroom session 3:** 45 minutes for 4-5 students to read their articles followed by a wrap up of the lesson plan.

Resources Required:

- Resource 1 (Questionnaire : E-waste survey)
- Internet
- Student stationery
- Laptop/ computers



Activity

Classroom session 1

- Introduce the term and concept of E-waste - its sources, some statistics and why E-waste is an emerging issue of concern.
- Divide the class into groups of 3-4 students.
- Guide each group to undertake a survey using the Resource 1 (E-waste survey).

Group Assignment 1

- Ask students to undertake a survey. Each group should survey about 5 respondents. Resource 1 will be useful for the survey.

Classroom session 2

- 90 minutes for internet search to investigate rules and educational programmes that exist related to E-waste, minimum one country should be selected by a group.
- Guide students to tabulate the information in the E-waste laws table, Resource 2 (E-waste law awareness).
- Guide the groups to plan individual as well as group actions that they plan or can undertake to address the problem of E-waste.

Home Assignment 2

- Guide students to document various information gathered both as a result of the findings of the E-waste survey as well as the internet search on laws pertaining to E-waste and their individual actions planned and pen these down in the form of a newspaper article to create awareness about proper disposal of the same.
- For article: Refer Lesson Plan 1 from chapter “Learning to be an Environmental Journalist”

Evaluation:

Evaluate the student articles and ascertain whether students have been able to capture various aspects pertaining to E-waste. Some of these aspects could include

- An understanding of the magnitude of the e-waste problem (sources, present mechanism in terms of laws and systems in place to tackle these wastes).
- A need to create awareness, so people could be engaged in efficient management of E-waste.

Resource 1

E-waste Survey

Questionnaire for Inventorization of Electronics/Electrical items and understanding behaviour

Name of respondent (Title, Full Name):

Contact Address:

Phone no.:

Email ID:

1. Do you have Electronic or Electrical appliances in your home which are:

[Tick any one $\sqrt{\quad}$]

a) Broken/damaged	Yes	No
b) Not working but repairable	Yes	No
c) Working but not used	Yes	No
d) In working condition	Yes	No

2. If yes, list the appliances you found in the house along with its condition (as above) & quantity
(a, b, c and d indicate whether the device is damaged/ not working/working but not used/ working condition respectively)

Name	Condition (✓) and Quantity (No.)								Name	Condition (✓) and Quantity (No.)							
	(a)	No.	(b)	No.	(c)	No.	(d)	No.		(a)	No.	(b)	No.	(c)	No.	(d)	No.
Computer									DVD/VCD Player								
Laptop									CD/DVDs/ Cassettes								
Mobile Phone									Microwave								
Tablet									Telephone								
Video game									Printer								
TV									Others								
Digital camera																	
Pencil batteries																	
Toys																	
Mobile charger																	
Electric sockets/ plug																	
Tubelight/ CFL bulbs																	
Refrigerator																	

3. In the last six months if you have bought new electronic/electrical appliances, what have you done with the old ones? [Tick one or more $\sqrt{\quad}$]

- | | | |
|----------------------------------|--------------------|------------------------------|
| - Threw in dustbin | - Kept in cupboard | - Gave to waste collector |
| - Donated it | - Sold it | - Sold it in exchange scheme |
| - Gave it family members/friends | | - Others |

4. In case you have kept broken/ damaged/non working/ non usable appliances at home, why have you done so? [Tick one or more $\sqrt{\quad}$]

- Don't want to sell/donate it
- Don't know what to do with it
- Gifted/Sentimental value/attachment
- Others
- Not getting good price for it
- I am planning to get it repaired
- It doesn't bother me

5. Does your waste collector ask for a non working computer/mobile phone to be given off in exchange of money?

Yes No

6. Have you ever heard of E-waste before?

Yes No

7. From where did you get this information?

Newspaper TV Internet Others

8. Do you know what happens to E-waste in your country? If yes, explain.

Resource 2

E-waste laws - awareness

Country	Existing Laws pertaining to E-waste	Existing awareness programmes pertaining to E-waste

Individual Actions (Indicate a list of actions that you would take to create awareness and re-route the generation of E-waste at a personal level)
