



Research Article

A COMPARATIVE STUDY ON AWARENESS OF E-WASTE MANAGEMENT IN SCIENCE AND ARTS BACKGROUND STUDENTS FROM SOME UNIVERSITIES OF ASSAM

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ABSTRACT

E-waste management is a growing issue on a global scale that cannot be ignored. We must manage e-waste if we want to keep our environment sustainable. The goal of the current study was to determine the level of knowledge among university students about the management of e-waste, and a comparative study was done among the students with science and arts backgrounds. In this study, the descriptive research method was used, and data were acquired utilising a random sampling approach. A total of 50 candidates are selected randomly from different universities of Assam. According to the study's results, students with a science background have a greater understanding of e-waste management than those with an arts background.

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INTRODUCTION

In this 21st century along with our fascination towards more comfortable and luxurious life, waste materials are also getting generated in a large scale. In this modern world in addition to other solid wastes e-wastes are also acting as one of the major environmental pollutant.

E-waste refers to electronic waste generated due to disposal of electronic appliances. It comprises of number of electronic and electrical appliances including products like cell phones, headphones, chargers, batteries, remotes, CDs, air conditioners, LCD TVs, refrigerators, mercury and fluorescent containing lamps etc. Computers and all the computer accessories such as CPU, monitors, keyboard, mouse, printers etc. are also included in this category[1].

Heavy metals including mercury, cadmium, and lead, as well as flame retardants like pentabromophenol, polybrominated diphenyl ethers (PBDEs), tetrabromobisphenol-A (TBBPA), and others, may all be found in electrical and electronic equipment. E-waste is typically categorised as hazardous waste due to the presence of these compounds, which, if handled poorly, may pose serious threats to both human and environmental health[2]. Gaidajis *et al.* have listed different contaminants like heavy metals, radioactive substances etc. and their source of occurrence connected to e-waste[3]. These hazardous substances can impact the unit's workers and the surrounding neighbourhood in addition to contaminating the land, groundwater, and air. Additionally, there is a risk that the workers in e-waste recycling operations will experience hazardous environmental issues.

In country like India, the generation of huge quantity of e-waste and the lack of proper infrastructure for appropriate management of are the major concerns. All E-Waste related tasks including collections, segregation, dismantling, recycling, and disposals are performed manually. Most of the methods utilized for recycling or treating e-waste are extremely primitive and hazardous in the absence of the necessary tools and technology. Additionally, the labors and employees working in the recycling and dismantling facilities are deficiently literate and uneducated, lacking the fundamental understanding of the significant occupational and health dangers connected with the activities. The majority of the time, workers do recycling and dismantling tasks without the required personal protective equipment. These activities are conducted in crowded areas of the urban core and slums. The recycling and dismantling sections typically lack enough illumination and ventilation. In absence of proper procedures and infrastructure, the employees and laborers operating in such places are prone to major occupational health concerns[4]. Thus, there is a need for formal and organized E-waste management system in India so that e-wastes can be collected, recovered and recycled by safe methods and their disposals can be done by proper techniques to reduce its harmful effect on environment.

Significance of the Study

E-wastes are becoming problem for world, not only for present generation but also for future generation. The consequences generated by other solid wastes are familiar to every individual but the consequences caused by electronic

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wastes will be more hazardous and threatening for the future generation. If it is not treated just in time, this is not so far that people will see mountains of electronic wastes just like the mountains of garbage we see in those dumping grounds. In global problem like e-wastes, it is very necessary to create awareness among the students, as today's students are tomorrow's future. The educational background should not be a barrier for any of the students in getting proper knowledge regarding e-waste management. This study is conducted to get a comparative idea about the level of awareness among the students from science and arts background.

It is noticed that most of the people have a preconceived notion that science background students are more concerned about the management of e-waste. Through our survey we are trying to establish whether this pre assumed concept is true or arts background students are also equally concerned about this global problem.

Objective of the Study

- To study about the awareness regarding e-waste management among the students from different universities of Assam.
- To study about the awareness of arts background students regarding e-waste management.
- To study about the awareness of science background students regarding e-waste management.
- To compare the level of awareness among science and arts background students.

Delimitation of the Study

- This study is limited to the undergraduate and post graduate students studying in different universities of Assam.
- The study is confined to 50 samples among the large number of science and arts background undergraduate and postgraduate students.

REVIEW OF RELATED LITERATURE

A summary of the major sources of e-waste and their quantification was provided by Mundada *et al.* in 2003. Hazardous materials and their composition, handling techniques, and processing techniques are taken into account to identify environmental and occupational risks connected with processing e-waste. A suitable improvement strategy is developed by analysing the current waste management systems. A waste management system with shared responsibility for the collection and recycling of electronic wastes among manufacturers/assemblers, importers, recyclers, regulatory organizations, and consumers was discussed by Kurian Joseph in the year 2007. Various issues with managing e-waste, notably in India, are outlined by Wath *et al.* (2010), and necessary governmental interventions are considered. The influence of general awareness, motivation, and intentions in e-waste is examined by Dhingra *et al.* (2018). It offers a novel paradigm to investigate the impact of consumer knowledge of e-waste on their intents to manage it, with e-waste management motivation serving as a mediating factor. The Preacher and Hayes mediation model was used to assess the data gathered from young users. They also discussed the recent global trend in e-waste creation, the recycling of e-waste, and the effects of e-waste toxins on human health. Finally, a few methods that may be used to make recycling e-

waste more effective and secure have been presented. Through their review paper article, Awasthi *et al.* (2018) give a quick overview of India's e-waste management status, legal framework, and technological applications. Sivannatham *et al.* in the year of 2020 have conducted a study to learn about undergraduate students' perspectives on the management of e-waste, which is one of the world's most urgent concerns now a days. The potential and restrictions, as well as the methods for better e-waste management, have been covered by Ahirwar *et al.* (2021). They have also discussed the recent global trend in e-waste creation, the recycling of e-waste, and the effects of e-waste toxins on human health. Finally, a few methods that may be used to make recycling e-waste more effective and secure have been presented. In the context of improper recycling processes for Ewaste and their hazardous consequences on human health and the environment, the paper by Rautela *et al.* (2021) offers a thorough overview of initiatives to address these difficulties.

Design of the Study

The investigator used a descriptive research strategy based on the goals of the current investigation. A straightforward random sample technique was used by the researcher. Undergraduate and graduate students from several Assamese universities made up the study's population. Both male and female students who are majoring in the arts and sciences make up the population.

Research Methodology

On the basis of the objectives the investigator used descriptive survey method. The investigator employed simple random sampling method. The population of the study comprises the undergraduate and postgraduate students from different universities of Assam. To conduct the study researcher includes both male and female students studying in arts and science stream. In this study researcher has taken 50 students from both arts and science background. . A self structured questionnaire is employed as a data collection instrument in this study. For the purpose of gathering data for this study, closed-ended questions are included in the questionnaire

Data Analysis and Interpretation

Following the data collection, the investigator evaluated the data to support the study's conclusions. For the examination of the gathered data, the researcher employed the technique of sample percentage and graphical depiction method.

In table 1, researchers have shown the overall responses given by different students from different universities of Assam and in table 2 researchers have shown a comparative study between science and arts background students.

Objective 1: To study about the awareness regarding e waste management among the students from different universities of Assam.

Interpretation of Data

From **table number 1**,

- From item number 1 it can be interpreted that 77.55% of students already understood what e-waste management is, leaving 22.45% of students in the dark about it.
- Item number 2 suggests that 91.80% of pupils are familiar with the phrases "reduce," "reuse," and

"recycle," which are the three most crucial waste management factors.

- According to item number 3, 76% of students said "No" when asked whether the discarded electrical gadgets ought to be burnt in the open area.
- According to item number 4 and 5, 10.20% of students purchased their last phone or laptop because a new or updated model had hit the market, while 89.80% of students did so because their previous device got damaged and 12% of students throw their damaged phone to the dustbins.
- Item number 6 and 7 suggests that only 16% of students are aware of any facilities that collected e-waste and only 22% of individuals were found to be aware of any e-waste recycling methods.
- Item 8 indicates that 42.86% of students are worried about the potentially dangerous effects of e-waste.
- According to item number 9, when the students are asked whether they had any chapter regarding e-waste management in their textbook before, only 36% of students are found to have so.
- As indicated by items 9 and 10, 54% of students say that their educational background makes them more concerned about managing e-waste, and 56% of students believe that students with a science background are more environmentally conscious.

management, compared to 70.83% of students with arts backgrounds.

- According to item number 2, when a comparison is made between students with science and arts backgrounds regarding their awareness of the triple R-Reduce, Reuse, and Recycle-it is discovered that 96% of science background students are aware of it as compared to 84% arts background students.
- As item number 3 suggests, students from both background mostly believe that disposed electronic appliances should not be burnt in an open area. 80% of science students and 72% of arts people share the same belief about it.
- As per item number 4 when the students are asked about the reason for buying their last mobile/laptop, 83.33% of science students said that they bought their last phone/laptop, because the old one got damaged as compared to 96% arts background students. Whereas 16.67% of science students as compared to 4% of arts students bought their last phone because a new/ updated version had arrived in the market.
- According to item number 5, same portion of students (ie. 88%) from both the streams do not throw their damaged phone to dustbins.

Table 1

Sl. No.	Items	Response options	Number of students response	Percentage of responses (%)
1	Are you aware what e-waste management is ?	Yes	38	77.55
		No	11	22.45
2	Are you aware of "Triple R (Reuse, Reduce & Recycle) for waste management ?	Yes	45	91.80
		No	4	8.20
3	Do you think that disposed electronic appliances need to be burnt in an open area ?	Yes	12	24
		No	38	76
4	Why did you buy your last mobile phone/ Laptop ?	Because the old one got damaged.	44	89.80
		Because the new/ updated version of the phones had arrived at the market.	5	10.20
5	Whenever your mobile phone got damaged, do you throw it to the dustbins ?	Yes	6	12
		No	44	88
6	Are you aware of any facilities that collects e-waste such as old electronic product, batteries, chargers, adapters etc. ?	Yes	8	16
		No	42	84
7	Are you aware of any recycling method for e-waste ?	Yes	11	22
		No	39	78
8	Are you aware of the hazardous consequences of e - waste ?	Yes	21	42.86
		No	28	57.14
9	Do you have any chapter regarding e - waste management in your textbook before ?	Yes	18	36
		No	32	64
10	Do you feel that you are more concerned about e - waste management due to your educational stream (Science/ Arts)	Yes	27	54
		No	23	46
11	Do you feel that Science background students are more environment friendly ?	Yes	28	56
		No	22	44

Objective 2,3,4

- To study about the awareness of arts background students regarding e waste management.
- To study about the awareness of science background students regarding e waste management.
- To compare the level of awareness among science and arts background students.

Interpretation of Data

From table number 2

- Table 2's item number 1 reveals that 84% of students with science backgrounds are already aware of e-waste

- As per item number 6, when the students are asked if they are familiar with any facilities that collect e-waste, it is found that maximum number of students from both the streams are unaware of such facilities (80% from science background and 88% from arts background).
- Item number 7 can be interpreted as, only 32% of science students and 12% arts students are familiar with any recycling method for e-waste.
- According to item number 8, 72% of science students are aware of the hazardous consequences of e-waste.
- We came to know from item number 9 that 52% of science students had some textbook chapters on e-waste management, compared to 20% of arts students.

- From item number 10 it can be interpreted that, 76% of science students think they are more concerned about e-waste management due to their educational stream as compared to 32% of arts students.
- As per item number 11, when students are asked whether they feel that science background students are more environment friendly, 92% of science students replied “Yes” as compared to 20% of arts background students.

CONCLUSION

The invasion of e-waste, particularly computer garbage, is complicating India's already enormous challenge of managing solid waste. A thorough analysis of the present and future situation, including its dimensions, traits, current disposal procedures, environmental effects, etc., is urgently required.

Table 2

Sl. No.	Items	Response options		Number & (percentage) of students response (Science)	Number & (percentage) of students response (Arts)
1	Are you aware what e-waste management is ?	I	Yes	21 (84%)	17 (70.83%)
		II	No	4 (16%)	7 (29.17%)
2	Are you aware of "Triple R (Reuse, Reduce & Recycle) for waste management ?	I	Yes	24 (96%)	21 (84%)
		II	No	1 (4%)	3 (16%)
3	Do you think that disposed electronic appliances need to be burnt in an open area ?	I	Yes	5 (20%)	7 (28%)
		II	No	20 (80%)	18 (72%)
4	Why did you buy your last mobile phone/ Laptop ?	I	Because the old one got damaged.	20 (83.33%)	24 (96%)
		II	Because the new/ updated version of the phones had arrived at the market.	4 (16.67%)	1 (4%)
5	Whenever your mobile phone got damaged, do you throw it to the dustbins ?	I	Yes	3 (12%)	3 (12%)
		II	No	22 (88%)	22 (88%)
6	Are you aware of any facilities that collects e-waste such as old electronic product, batteries, chargers, adapters etc. ?	I	Yes	5 (20%)	3 (12%)
		II	No	20 (80%)	22 (88%)
7	Are you aware of any recycling method for e-waste ?	I	Yes	8 (32%)	3 (12%)
		II	No	17 (68%)	22 (88%)
8	Are you aware of the hazardous consequences of e - waste ?	I	Yes	18 (72%)	3 (12.50%)
		II	No	7 (28%)	21 (87.50%)
9	Do you have any chapter regarding e - waste management in your textbook before ?	I	Yes	13 (52%)	5 (20%)
		II	No	12 (48%)	20 (80%)
10	Do you feel that you are more concerned about e - waste management due to your educational stream (Science/ Arts) ?	I	Yes	19 (76%)	8 (32%)
		II	No	6 (24%)	17 (68%)
11	Do you feel that Science background students are more environment friendly ?	I	Yes	23 (92%)	5 (20%)
		II	No	2 (8%)	20 (80%)

Findings

The following are the study's key findings

- From the analysis and interpretation of the data it is clear that, most of the students are familiar with term e-waste.
- Even though most of the students have a basic understanding of e-waste management, our study shows that a nearly equal percentage of students from both backgrounds are still unaware of the facilities that collects and recycle e-waste such as used electronic devices, batteries, chargers, adapters, etc.
- Only 36% of students had some chapters regarding e waste management in their textbook. Which is very less as compared to the scale of problem like e-waste.
- From the overall analysis of all the given data, we can conclude that the students with science background are better knowledgeable about the subject of e-waste management than students with an arts background. This may be attributable to their educational background because in India, scientific books tend to focus more on themes like e-waste than arts literature.

For the ecologically sound management of e-wastes, institutional infrastructures comprising e-waste collection, transportation, treatment, storage, recovery, and disposal must be built at national and/or regional levels. We should learn from the countries like Japan how they launched Tokyo Medal project under which they produced olympic medals for Tokyo 2020 from recycled e-waste. The topic of e-waste should be treated as stream neutral in order to properly address the worldwide issue. Therefore, a more in-depth discussion of e-waste management must be included in textbooks for both science and the arts stream.

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