



## Teacher Trainees Awareness Regarding E-Waste and Its Disposal

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# **Teacher Trainees Awareness Regarding E-waste and Its Disposal**

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## **Abstract**

Extensive use of electronic devices is becoming the concern regarding e-waste disposal. Policies and regulation framed are unable to get transformed into practices. Practices need awareness programs. The Younger generation are the biggest consumers of e-devices and rapid change in the technology accelerates the obsolescence of devices generating e-waste. So, it is essential to make the younger generation undergo awareness drives to address this issue. TEI serves as a nodal agency for school education and HEI. Rigor training in TEI can be helpful in transforming school education. Present study aims to investigate teacher trainees' awareness and understanding regarding e-waste and its disposal leading to environmental and health degradation. Investigators had discussed e-waste and its disposal leading to hazardous effects. It was noted that trainees had brief awareness regarding the disposal of e-waste. This originated e-waste collection drive in the institute. Investigators collected data from 75 trainees. 50% students were not aware about e-waste management whereas 98% trainees were aware of the correct disposal method of e-waste and how to manage the domestic e-waste on their own. 80% of respondents recognized e-waste recycling companies. 67% student-teachers enthusiastically donated e-wastes like Mobile, TV Remote, Charger, Earphone, Headphones, old computer accessories, cable, mouse, wire, video game, light bulb , CD, DVD, pen drive, speaker etc. during 'E-waste Collection Drive'. Major outcome of the research was that the institute drew a short term plan to proactively deal with e-waste management. Institutions should launch various activities to create more awareness, knowledge, and positive attitudes toward e-waste management.

**Keywords:** E-waste Management- Awareness- Disposal – TEI

# **Teacher Trainees Awareness Regarding E-waste and Its Disposal**

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## **Introduction**

Technology lays a dominant role in our lives. Post pandemic use of electronic gadgets have increased enormously. But the increase in its use coupled with an extreme consumerist approach has come out with some shedding effects on the environment. The rapid advancement in technology, the constant introduction of innovative designs and smart functions, appealing marketing, and compatibility issues have caused the reduction in lifespan and accelerated obsolescence of electronic products, resulting in escalated quantities of e-waste (Kiddee et al., 2013; Agamuthu et al., 2015; Cucchiella et al., 2015; Kitila and Woldemikael, 2019). India is the third largest producer of e-waste after China And USA. More than 95% of this waste is handled by the informal sector. (Down to Earth, 2021). E-waste generation has globally reached 53.6 million metric tons (Mt) in 2019 and is predicted to amplify approximately to 74 Mt by 2030 (Forti et al. [2020](#)). Developed countries such as the USA, Europe and Australia are the major producers of E-waste. These E-wastes are then transported to developing countries such as India, China, Ghana, Pakistan, Nepal, Bhutan and Vietnam due to easy availability of open space for dumping and low-cost labour for recycling purposes (Arya and Kumar [2020a](#); Chi et al. [2011](#); Balde et al. [2017](#)). The untreated solid waste having e-waste gets dumped into open spaces and water bodies causing air-soil-water pollution, resulting in health hazards. Policies and regulation framed are unable to get transformed into practices. Practices need awareness programs. The Younger generation are the biggest consumers of e-devices and rapid change in the technology accelerates the obsolescence of devices generating e-waste. So, it is essential to make the younger generation undergo awareness drives and sensitize them for this issue. TEI serves as a nodal agency for school education and HEI. Rigor training in TEI can be helpful in bringing awareness among young citizens. Usage of electronic devices can't be reduced but awareness regarding proper disposal management of e-waste can definitely be helpful in e-waste management.

## **Review of related literature**

Research conducted to find the awareness of students regarding e-waste management shows that the current awareness regarding the existence and dangers of e-waste are extremely low and urgent measures are required to address this issue. Being a responsible citizen we can play a major role in e-waste management by donating electronics for reuse, which extends the lives of valuable products and keeps them out of the waste management system for a long time. While buying electronic products, opting for those that are made with fewer toxic constituents, use recycled content, are energy efficient, are designed for easy upgrading or disassembly, use minimal packaging and offer leasing or take back options. The building of consumer awareness through public awareness campaigns is a crucial point that can contribute to a new responsible kind of consumerism.(Sindhu Bala and Ms. Sukirti Goel, 2012). Similarly a study conducted for e waste disposal method for Delhi University students reflected that the awareness amongst the users regarding the recycling, reuse and reduction is important as it may help in managing the balance of health and sustainable environment. More awareness campaigns and educating the students may help in improving knowledge regarding treatment of scraps.(N.Tyagi, S.K. Baberwal and N. Passi, 2015). Students have a significant level of awareness regarding e-waste but disposal management is seen missing. Schools should organize campaigns for proper e-waste disposal and draw more responsive policies to address today's challenges. (Gerald L. Meneses, Warlito M. Galitathe, 2015).

The review of research identifies that e-waste management in the country, including HEIs, remains implausible. Students across the HEI have some awareness regarding e-waste but e-waste management remains a question. Institutes who have put some efforts to bring awareness have resulted in beneficial e-waste management. Teachers can influence a big mass of society. Teacher Education institute serves as a liaison between school education and HEI. So efforts in TEI have exponential benefits. No research in Gujarat has been conducted in this area for prospective teachers for this burning issue. Given the gaps, this study seeks to evaluate the awareness regarding e-waste and its disposal management. The study therefore came with the following research questions:

1. What is the awareness of teacher trainees regarding e-waste?
2. What is Teacher trainees understanding regarding e-waste disposal?

## **Definition of Terms**

### **E-waste definition**

“E-waste describes discarded electrical or electronic devices. Used electronics which are destined for refurbishment, reuse, resale, salvage recycling through material recovery, or disposal are also considered e-waste.” -

### **Wikipedia**

“E-waste is any electrical or electronic equipment that’s been discarded. This includes working and broken items that are thrown in the garbage or donated to a charity. E -waste is electronic products that are unwanted, not working, and nearing or at the end of their “useful life.”

- **Great Lakes Electronics Corporation**

Electronic waste is a full form of e-waste. Variety of electronic equipment and digital gadgets are part and parcel of human beings. Due to excessive use of such products or items it becomes useless and thrown in the garbage. Electronic items, gadgets and equipment which are useless i.e. mobile phone, charger, computers, televisions, VCRs, stereos, copiers, fax machines, hands free, iron, CD, DVD, Pendrive are called e-waste.

### **E-waste management definition**

“E-waste management is a process to collect e-waste, recover and recycle material by safe methods, and dispose of e-waste by suitable techniques to reduce its adverse impacts on the environment.”

- **IGI Global Publisher for Timely Knowledge**

E-waste is particularly dangerous due to toxic chemicals that naturally leach from the metals inside when buried. Systematic and scientific way of disposing of electronic waste is called e-waste management.

## **Research Methodology**

### **Tool**

The researchers designed the questionnaire to measure the awareness and understanding of e-waste management. It contained questions about knowledge levels, environmental and health effects, and disposal practices of e-waste. The questionnaire utilized open and closed-ended

questions to assess students' knowledge and practices regarding e-waste management. There were a total of 17 questions framed on google form.

### Sample

Population for the present study was 152 B.Ed. trainees of A.G. Teachers College, Ahmedabad, Gujarat State. In the present study 75 teacher trainees of B.Ed. programs of A.G. Teachers College, Ahmedabad, Gujarat state were selected randomly as a sample. Detail of sample is as shown in following Table-1.

**Table- 1**  
**Sr. No. Batch-year , Number of student teachers and percentage**

<b>Sr. No.</b>	<b>Batch (Year)</b>	<b>No. of Student Teachers</b>	<b>Percentage</b>
1	2020-22	02	2.7 %
2	2021-23	32	42.7%
3	2022-24	41	54.7%
<b>Total</b>		<b>75</b>	

### Data collection

Survey method was executed to understand the awareness regarding e-waste and its disposal by the teacher trainees of A.G. Teachers College, Ahmedabad. Research area of present study was Environmental Science and Educational Psychology. This study was conducted through a survey questionnaire which was distributed to B.Ed. Trainees of different batches. The questionnaire was created and hosted using Google Forms and was distributed through whatsapp groups. All the questions were marked as "mandatory" in order to submit the form. Total 75 valid questionnaires were filled in. The data of the survey were analyzed using the MS Excel. Descriptive statistics such as percentages and graphs were used to analyze the data from the survey.

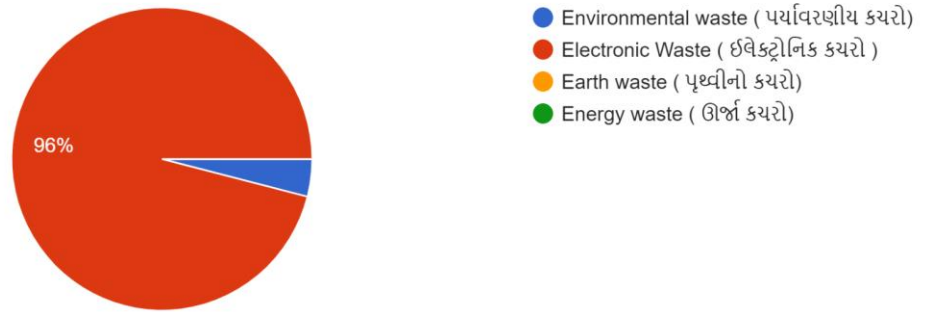
## Data Analysis and Interpretation

For the present study data was collected by questionnaire through Google Form. Collected data was analyzed with the help of MS Excel Program. Total 75 responses of teacher trainees were received through Google form. Questionnaire consisted of two parameters: awareness regarding e-waste and understanding of e-waste disposal. So during data analysis researchers divided collected data into two parts to know the teacher trainees' awareness regarding e-waste and understanding of e-waste disposal. Graphical presentation and interpretation for each item is mentioned below.

### Teacher trainees awareness regarding e-waste

Researchers included item no.- 1,2,3,5,,8,9,10,,12,13,14 of the questionnaire in Teacher trainees awareness regarding e-waste for data analysis and interpretation.

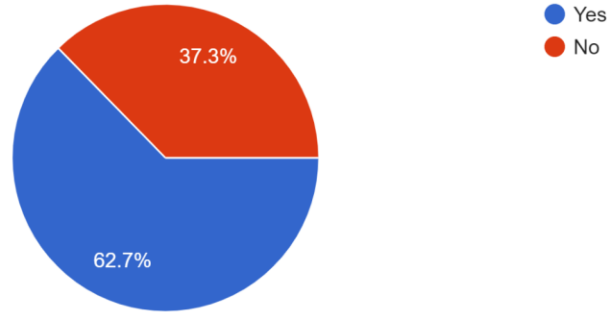
1.Full form of e-waste . ઇ-વેસ્ટનું પૂરું નામ.  
75 responses



It is clear from the above graphical presentation that 72 (96%) of the student teachers of A.G. Teachers College, Ahmedabad were able to give the full form of e-waste.

2. Did you have any idea about e-waste management before attending AGian Eco -club activity ? શું તમને એજીયન ઈકો-ક્લબ પ્રવૃત્તિમાં ભાગ લેતા પહેલા ઈ-વેસ્ટ મેનેજમેન્ટ વિશે કોઈ ખ્યાલ હતો?

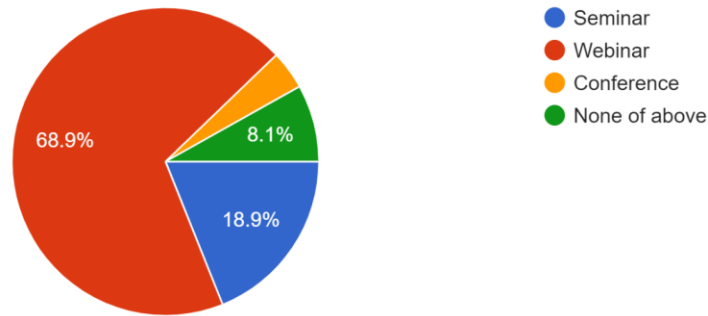
75 responses



Above pie-chart depicts that 47 ( 62.7%) of B.Ed. trainees of A.G. Teachers College,Ahmedabd had ideas about e-waste management before attending eco-club activity while 28 (37.3%) of B.Ed. trainees hadn't ideas about e-waste management before attending eco-club activity.

3. Have you ever participated in any of the following E-waste management activity ? શું તમે ક્યારેય નીચેની કોઈપણ ઈ-વેસ્ટ મેનેજમેન્ટ પ્રવૃત્તિમાં ભાગ લીધો છે?

74 responses

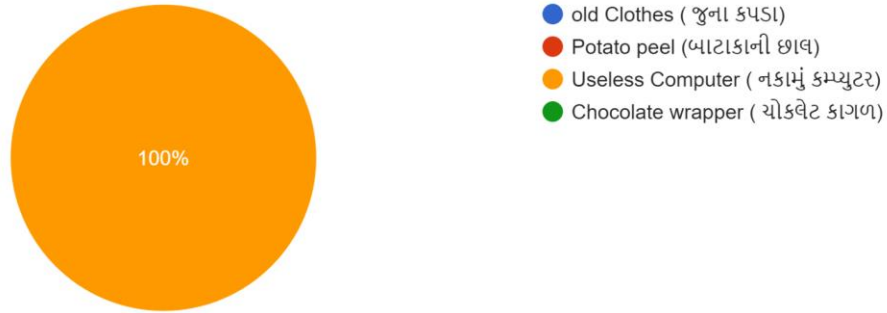


Majority of prospective teachers participated in e-waste management activities like webinars ,seminars and conferences. 14 (18.9 % ) prospective teachers attended Seminars, 51 (68.9 % ) prospective teachers participated in webinars and 03 (4.1%) attended conferences.



5. What is an example of e-waste ? ઇ-વેસ્ટનું ઉદાહરણ શું છે?

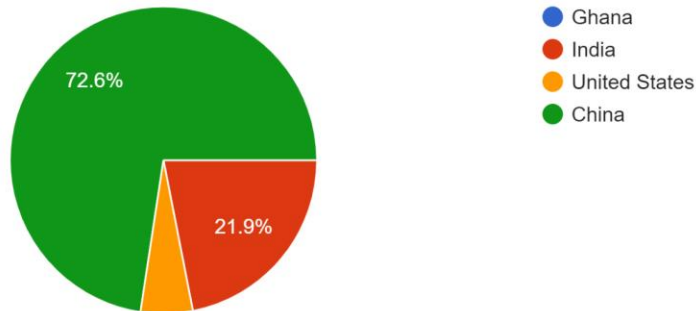
75 responses



It is crystal clear from the above graphical presentation that 75(100% ) of the student teachers of A.G. Teachers College, Ahmedabad could easily identify the e-waste example.

8. Which country produces the most e-waste ? કયો દેશ સૌથી વધુ ઇ-વેસ્ટ ઉત્પન્ન કરે છે?

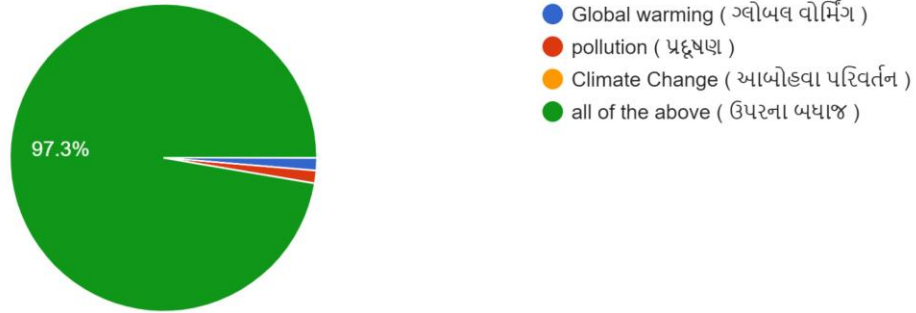
73 responses



53 (72.6 %) respondents of A.G. Teachers College, Ahmedabad agreed that China produces the most e-waste, 16 ( 21.9%) respondents agreed that India came in second place to produce the most e-waste while 4 (5.5 %) respondents gave preference to the United States producing the most e-waste.

9. E-waste causes....ઈ-વેસ્ટના કારણે .....

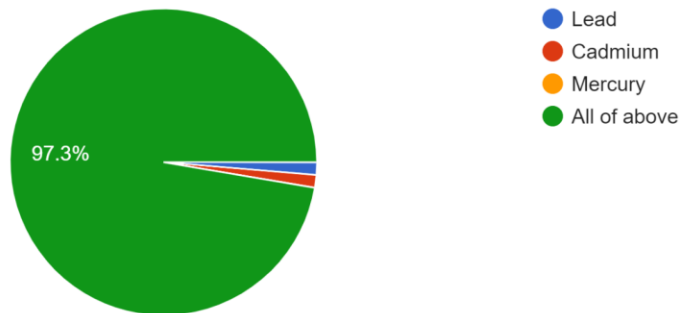
75 responses



The highest percentage of (73) students of A.G.Teachers College, Ahmedabad agreed that e-waste causes Global warming , Pollution and Climate Change. It could be seen from the above presentation.

10. E-waste contains toxic substances such as.....ઈ-વેસ્ટમાં ઝેરી પદાર્થ હોય છે જેમ કે .....

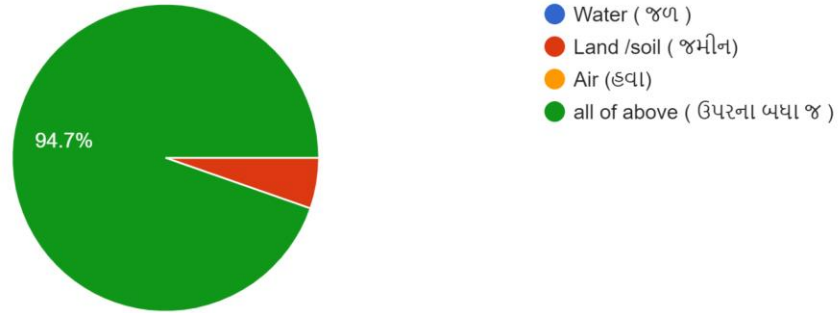
75 responses



It is clear from the above graphical representation that the majority of the prospective teachers of A.G.Teachers College, Ahmedabad were aware that e-waste contains toxic substances such as lead, Cadmium, Mercury.

12. Which is largely affected by E-waste? ઈ-કચરાથી મોટાભાગે કોને અસર થાય છે?

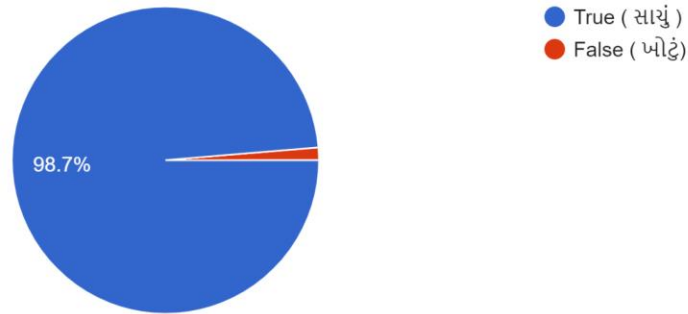
75 responses



Pie -chart shows that 71 (94.7 %) trainees of A.G.Teachers College, Ahmedabad were aware about the effects of E-waste on Water, Land /soil and Air.

13. E-waste contributes to global warming. ઈ-વેસ્ટની ગ્લોબલ વોર્મિંગ પર અસર થાય છે.

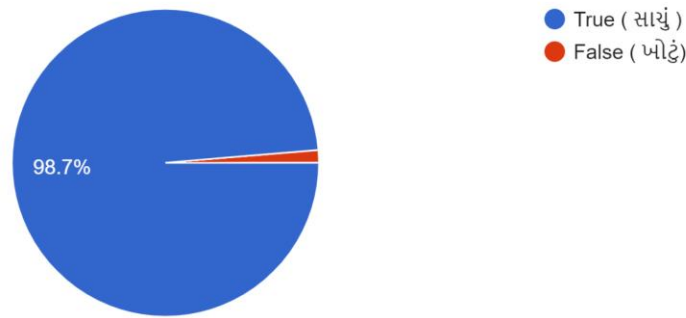
75 responses



It can be seen from the above graph that the majority of the (74) students of A.G.Teachers College, Ahmedabad had awareness about the dangerous effects of e-waste to global warming.

14. E-waste is a risk to human health. ઇ-વેસ્ટ માનવ સ્વાસ્થ્ય માટે જોખમી છે.

75 responses



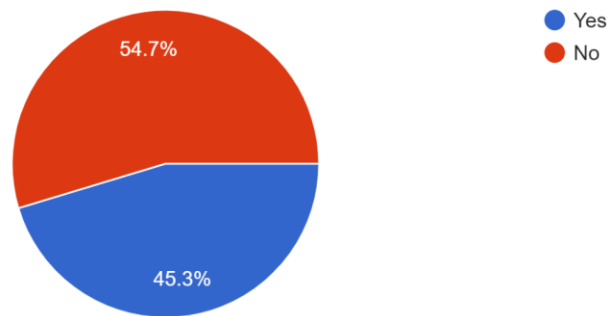
Above graphical presentation depicts that 98.7 % of trainees of A.G.Teachers College, Ahmedabad accepted that e-waste is a risk to human health.

### Teacher trainees understanding regarding e- waste disposal

Researcher included item no.-4,6,7,11,15,16,17 of questionnaires to measure teacher trainees understanding regarding e-waste disposal. Data analysis and interpretation with graphical representation is shown below:

4. Did you participate in "E-waste Collection Drive" ?શું તમે "ઇ-વેસ્ટ કલેક્શન ડ્રાઇવ" માં ભાગ લીધો હતો

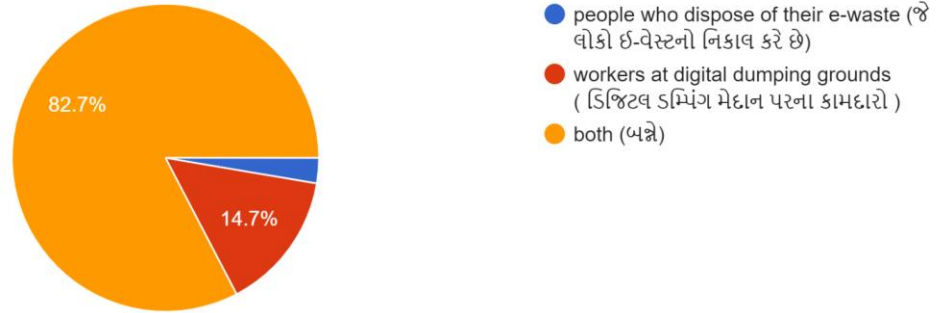
75 responses



Pie -chart shows that 41( 54.7%) respondents of A.G. Teachers College, Ahmedabad participated in "E-waste Collection Drive" while 34 (45.3% ) respondents of A.G. Teachers College, Ahmedabad were not participated in "E-waste Collection Drive"

6. Who is affected by throwing away e-waste ? ઇ-વેસ્ટ ફેંકવાથી કોને અસર થાય છે?

75 responses



From the above pie-chart representation that 2(2.7 %) B.Ed. trainees of A. G. Teachers College,Ahmedabad agreed with option -I while 11 (14.7 %) B.Ed. trainees agreed with option -II and 62 (82.7 %) B.Ed. trainees agreed with option -III . So it could be concluded that people who dispose of their e-waste and workers at digital dumping grounds both are affected by throwing away e-waste.

7. What is a good way to dispose of e-waste? ઇ-વેસ્ટનો નિકાલ કરવાની સારી રીત કઈ છે?

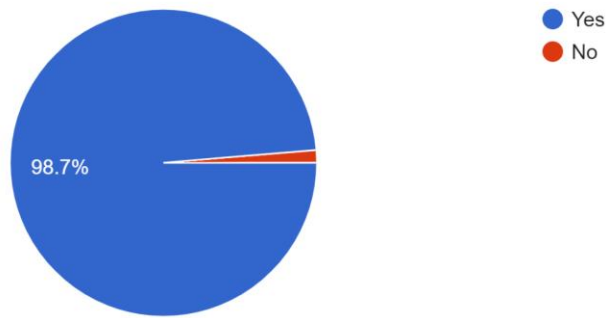
75 responses



It is clear from the above graphical presentation that trainees were aware of good ways to dispose of e-waste. 100 % of teachers trainees of A.G. Teachers College, Ahmedabad agreed to give it to a reliable e-waste recycling company.

11. Is recycling of e-waste possible ? ઈ-વેસ્ટનું રિસાયકલિંગ શક્ય છે?

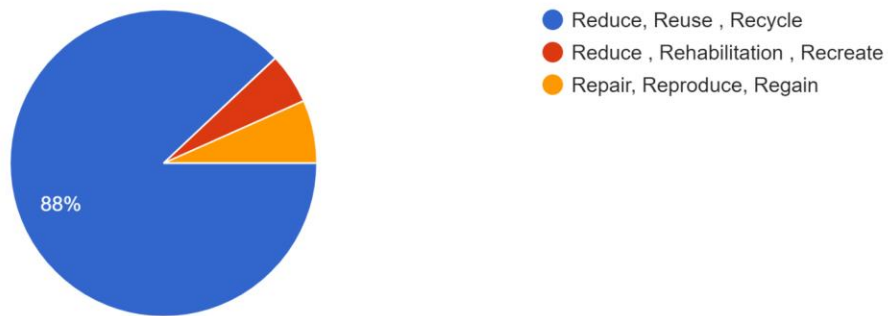
75 responses



Majority of the (74) student teachers of A.G. Teachers College, Ahmedabad agreed that recycling of e-waste is possible from the above graphical presentation.

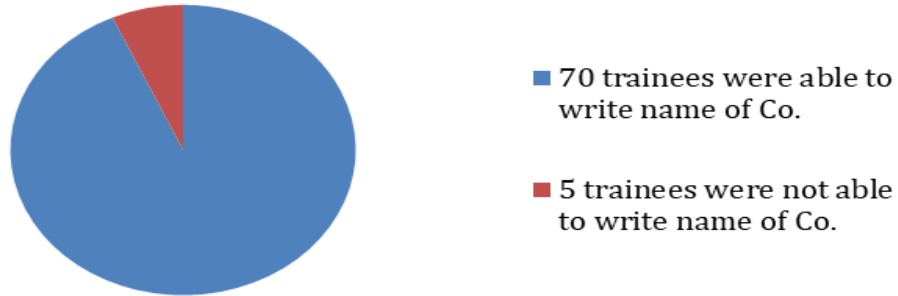
15. RRR means ..... આર. આર. આર. એટલે .....

75 responses



Present pie-chart deals with. 88% (66) of the respondents A.G. Teachers College, Ahmedabad have an idea of 3 R's (Reduce, Recycle & Re-use) of e-waste while the rest 12% (9) have no idea about RRR meaning of e-waste.

**16. Give the name of any one e-waste recycling Company.**



Above chart shows that 70 ( 93.3% ) trainees of A.G. Teachers College,Ahmedabad were able to write the name of Recycling Companies while 5 (6.7%) trainees of A.G. Teachers College,Ahmedabad were not able to write the name of Recycling Companies.

**17. Which e-waste object did you dispose of in College e-waste drive ?**

In the e-waste collection drive, 67% teacher trainees donated very generously. Major donations were CDs, DVDs, wires and cables. After conversation with faculty they started donating e-wastes like Mobile, TV Remote, Charger, Earphone, Headphones, old computer accessories, mouse, video game, light bulb, pen drive, speaker. The pattern of donation reflects their understanding regarding the nomenclature of e-waste. Teacher trainees had a very convergent thinking about e-waste.

**Outcomes of the study**

Results of the research reflect that teacher trainees are quite aware regarding the burning issue of e-waste management. Institutes should take a lead role in developing understanding among teacher trainees. The e-waste problem is in its nascent stage but dealt poorly. In view of sustainable development goals (SDG) this research was taken up which points towards developing institute level policy for better solution of the problem. Institute organized an e-waste collection drive and found a very motivating response from teacher trainees. This led researchers to further promote the activity on the basis of research findings.

Following short term plans are designed by the researchers for their institute based on research interpretations:

- Institute will design and implement environment conservation policy.
- Eco club activities will have strategic planning for e-waste management programs like webinars, seminars, field visits etc.
- Institute will plan for an e-waste collection drive and encourage teacher trainees to donate e-waste.
- MoU will be signed with e-waste recycling companies and funds will be generated from the sale of e-waste.
- Co-Curricular activities will have essence of e-waste management awareness
- Institute will design outreach activities based on e-waste management to spread awareness in the society.
- Use different media to create awareness regarding consumerism approaches..

Waste is unwanted or unusable material but unknowingly generated by all. It is everyone's responsibility to ensure that hazardous waste is taken care-off in a safe and environment-friendly manner, complying with all waste disposal regulations to achieve environmental sustainability.

### **Conclusion**

Global flow of e-waste from developed countries to developing countries continues to harm environmental sustainability. Rapid advancement of technology and accelerated consumerist approach of the young generation is elevating the issue. Post pandemic presence in the digital world is becoming essential. Sharing of IT resources is no longer possible and so personalized e-devices have become a necessity. This is one of the major reasons for the increase in consumerism. HEI can serve as a nodal agency in spreading awareness regarding e-waste. HEI should develop strategic planning to fulfill SDG. Judicious usage of e-devices needs to be promoted and students should be sensitized regarding the environment and health hazards created due to improper disposal methods. Teacher education institutes play a significant role in spreading awareness as prospective teachers are the representatives of different schools so thought penetration in society becomes in multiple modes. Results of the present research are very motivating. Small steps of the institute yield great dividends is the outcome of this research. Young generations are always ready to absorb new thoughts but igniting minds is very much needed by institute.



## References

- Aboelmaged, M. (2021). E-waste recycling behaviour: An integration of recycling habits into the theory of planned behaviour. *Journal of Cleaner Production*, 278, 124182.
- Arya S, Kumar S(2020). E-waste in India at a glance: current trends, regulations, challenges and waste management strategies. *J Clean Prod.* 2020 doi: 10.1016/j.jclepro.2020.122707.
- Bala, S. and Goel S. A Study of E-Waste Management in Relation to Awareness of College Students. *International Journal of Educational and Psychological Research*, (2012),Volume 1, Issue 2, pp: 31-35,
- Forti V, Baldé CP, Kuehr R, Bel G (2020) *The Global E-Waste Monitor 2020*. Bonn/Geneva/Rotterdam.: flows and the circular economy potential. United Nations
- Gerald L. Meneses, Warlito M. Galita,(2015) *Electronic Waste (E-Waste) Management at Selected Colleges of the Bulacan State University: Perspectives for Program Development*, OALibL, Vol.2, No.4
- *Global E-Waste Monitor, 2020 report*
- Jatindra, P. K., & Sudhir, K. (2009). E-waste management: a case study of Bangalore, India. *Research Journal Environmental and Earth Sciences*, 1(2), 111-115.
- Kiddee P, Naidu R, Wong MH. *Electronic waste management approaches: An overview*. *Waste Management* 2013;33(5): 1237-50.
- N.Tyagi, S.K. Baberwal and N. Passi, (2015) *E-Waste: Challenges and its Management*, *DU Journal of Undergraduate Research and Innovation*, Volume 1, Issue 3 pp 108-114
- Sindhu Bala and Ms. Sukirti Goel,(2012) *A Study of E-Waste Management in Relation to Awareness of College Students*, Dr., *International Journal of Scientific Research*, volume-1, issue 2, PP31-35,
- Sikdar, M. and Vaniya, S (2014).. *The New Millennium and emerging concern*. *International Journal of Scientific and Research Publications*, Volume 4, Issue 2,ISSN 2250-3153
- Shaharudin, M. R., Said, R., Hotrawaisaya, C., Nik Abdul Rashid, N. R., & Azman Perwira, N. F. S. (2020). Linking determinants of the youth's intentions to dispose of portable e-waste with the proper disposal behavior in Malaysia. *The Social Science Journal*, 1-15.

- Sivathanu, B.(2016) User's Perspective: Knowledge and Attitude towards E-Waste. International Journal of Applied Environmental Sciences. ISSN 0973-6077 Volume 11, pp. 413-423.
- Wath, S. B., Vaidya, A. N., Dutt, P. S., & Chakrabarti, T. (2010). A roadmap for development of sustainable E-waste management system in India. Science of the Total Environment, 409(1), 19-32.
- [https://en.wikipedia.org/wiki/Electronic\\_waste](https://en.wikipedia.org/wiki/Electronic_waste)
- <https://www.ewaste1.com/blog>
- <https://www.igi-global.com/dictionary/waste-management-east-african-community/8956>