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TEACHER'S ROLE IN E-WASTE MANAGEMENT AND ITS IMPACT ON THE ENVIRONMENT

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ABSTRACT

Electronic waste or e-waste is one of the rapidly growing problems of the e-waste and it comprises of a multitude of components, some containing toxic substances that can have an adverse impact on human health and the environment if not handled properly. Waste electrical and electronic equipment (WEEE) is becoming major thread to the whole world. Its toxic emissions are mixed with virgin soil and air and are causing harmful effects to the entire system either directly or indirectly. Direct impacts include the release of acids, toxic compounds, including heavy metals, carcinogenic chemicals and indirect effects such as bio magnification of heavy metals. Many private firms are involved in collecting, dismantling, separation and exporting e-wastes for recyclers. In the present scenario, teachers have multiple roles to perform. To fulfill their roles professionally, teachers need to be competent enough in their responsibilities towards their students inside and outside the classroom. The important role of a teacher inside and outside the classroom is to provide the awareness about the environment regarding E-waste and its importance for protection. This paper has two objectives. First, objective of the study is to find out the Environmental awareness among secondary school teachers regarding E-waste management and the second objective intended to describe the responsibilities of teachers to protect the Environment through E-waste management. A simple random sampling technique was used for the selection of the sample from the population for the study. Samples of 75 participants were drawn, including 25 teachers and 50 students by using simple random sampling techniques. Three instruments were used for data collection, namely close and openly ended questionnaire, interview and focus group discussion. The data were analyzed by using both the qualitative and quantitative approach. The Major finding of this paper was, Teachers are not trained how to deal and work with the E - waste for research activities. No give proper information about E-waste management by teacher due to lack of knowledge. The student does not have any idea regarding the serious effect of E-waste on health and the environment.

KEYWORDS: *Environmental Awareness, E- Waste, Teachers Role, Waste Management*

INTRODUCTION

E-waste is a popular informal name for electronic products nearing the end of their useful life. Anything that runs on electricity/battery or has wire and completed its life is e-waste. Electronic waste may be defined as discarded computers, office electronic equipment, entertainment device electronics, mobile phones, television sets and refrigerators. E-wastes are considered dangerous, as certain components of some electronic products contain materials that are hazardous, depending on their condition and density. The hazardous content of these materials pose a threat to human health and the environment. Discarded computers, televisions, VCRs, stereos, copiers, fax machines, electric lamps,

cell phones, audio equipment and batteries, if improperly disposed can leach lead and other substances into soil and groundwater.

Industrial revolution followed by the advances in information technology during the last century has radically changed people's lifestyle. Although this development has helped the human race, mismanagement has led to new problems of contamination and pollution. The technical prowess acquired during the last century has posed a new challenge in the management of wastes. For example, personal computers (PCs) contain certain components, which are highly toxic, such as chlorinated and brominated substances, toxic gases, toxic metals, biologically active materials, acids, plastics and plastic additives. The hazardous contents of these materials pose an environmental and health threat. Thus, proper management is necessary while disposing or recycling e-wastes. The paper highlights these issues and poses some concrete suggestions.

The earth's environment is in crisis mainly because it is being abused beyond its capacity of human beings. The present paper examines the need for E-waste management and environmental awareness in the present times. Teachers play a predominant role in imparting knowledge and sensitizing the students and society about E-waste management. The paper focused on the role of teachers to spread awareness about environmental issues and problems regarding E-waste management. The emphasis is on sensitizing the student community through their teachers who can play a pivotal role in transmitting the requisite knowledge, skills, attitudes and values, essential. The paper describes various strategies to be implemented to protect the environment. Since E-waste education cuts across all disciplines and levels of study, it is time that education planners and policy framers incorporate the elements of E-waste education as a compulsory at all levels. The teacher training curricula could be redesigned to include the environment, education component in the theory and practical courses. Convergence of formal and non-formal system can be heavily relied on for capacity building of teachers in the area of E-waste education. Hence, imparting E-waste education in teachers training and teacher's education is essential to build a clean and pollution free notion.

Rational of the Study

Electronic industry is the world's largest and innovative industry for its kind. Every year tons of electronic items are shipped over oceans, however, after their usage time, they are becoming a complex waste matter which consists of many hazardous heavy metals, acids, toxic chemicals and non-degradable plastics. Many are dumped, burnt or exported to recyclers. However, about 75% of e-wastes are uncertain about their use or finding ways to use them, which includes refurbishment, remanufacture and reuse their parts for repair, etc. While others are junks occupying usable space at houses, apartments, firms and industries. Most e-recyclers were exporting the toxic materials such as leaded glass, circuit boards, and mercury lamps usually to China, Africa and India (Basel Action uploaded on 2013). Dismantling process takes much labor, in countries like China and some parts of India there are tones e-wastes junked and dismantled; dismantling is not only involved in unscrewing, but also in shredding, tearing and burning. The smoke and dust particle consists of carcinogens and other hazardous chemicals which causes severe inflammations and lesions including many respiratory and skin diseases. Circuits are burnt to hunt the valuable metals such as gold, platinum, cadmium but the wire coat of those consists of PVC and PCB which may produce erotic smoke, and carbon particles from the toners are carcinogens, they may lead to lung and skin cancer (Kevin *et al*., 2008). Due to the poverty some places in China such as city of Guangzhou still risking their health with e-waste full of used computers and television sets, according to the data received in 2007 about

70% of e-waste of the world reaches China and the rest to Africa and India, due to their cheap labor they have become the world's dumping station of e-waste, in Ghana about 20% of their population are working on e-waste; they use after reconditioning them (Basel Action uploaded on 2013). Poverty is the main reason for third world countries to consume e-wastes from Europe and USA.

There are chances of accidents like cuts and burns during the dismantling, shredding, acid baths and incineration process, in addition, exposure to following chemicals have many long-term effects. Phthalates such as DEHP in tis monomer form affects the development of testis, Butylbenzyl phthalate (BBP) and dibutyl phthalate (DBP) also hazardous to reproduction exposure to phthalates in pregnancy reduces ano-genetal index in male child (distance between anus and genitals) (Swan *et al*. 2005), DINP and DIDP (diisodecyl phthalate) effects liver and kidneys. Chlorinated compounds include Polychlorinated biphenyls (PCBs), PCB accumulates in fishes and other organisms and undergo bioaccumulation which result in high value in top-level carnivore such as humans, PCB also absorbable via skin and inhaled or ingested causing neurotoxicity, liver damage, tumors, immune suppression and behavioral changes, and reproductive disorders, abnormal sperms (Allsopp *et.al*. 1999, Allsopp *et al*. 2001a). Chlorobenzene causes acute and chronic effects in mammals, effects CNS (central nervous system), liver and thyroid. The increasing degree of chlorination such as tetrachlorobenzenes also affects the kidneys. Hexachlorobenzene (HCB) are group 2B carcinogens it damages immune system, liver, thyroid, CNS, kidney and nervous system (van Birgelen 1998). It is also reported the bioaccumulation of HCB. Polybrominated diphenyl ethers (PBDEs) is an environmentally persistent compound, which is also reported in bioaccumulation, it causes abnormal brain development during the initial development of a fetus, it also associated with impacts on learning, memory, behavior and thyroid, oestrogen hormone systems and effecting the immune system (Legler & Brouwer 2003). When PBDEs are burnt, they produce brominated dioxins/furans which are similarly hazardous. Triphenyl phosphates (TPP) are a contaminant in human blood (Jonsson *et al*. 2001), potent inhibitor of a key enzyme (monocyte carboxyl esterase) in human blood cells (Amini & Crescenzi 2003). Potent inhibitor of a key enzyme (monocyte carboxyl esterase) in human blood cells (Amini & Crescenzi 2003). Heavy metals such as lead may produce irreversible effects; it affects nervous system, blood, reproductive system and kidneys, it affects brain development in children (ATSDR 2007, Canfield *et.al*., 2003). Cadmium is a toxicant which can accumulate in tissues, exposure may affect kidneys and bones (Elinder& Jarup 1996, WHO 1992), it disrupts calcium mechanism, causing hypertension and heart diseases Cadmium oxide in fume affects the respiratory system (ATSDR 1999, Elinder & Jarup 1996, WHO 1992), in addition it is a carcinogen causing lung cancer (DHSS 2005). Antimony is a toxic compound causing dermatitis, affecting skin cells and respiratory tract and affects the immune mechanism (Kim *et al*., 1999). It is also stated as possible carcinogen by International Agency for Research on Cancer (IARC 1989). Mercury results in respiratory and skin disorders and causing chronic damage to the brain. Chromium is a known carcinogen, it affects the DNA and causing asthmatic bronchitis. Barium causes damage to the heart, spleen and liver also causing muscle weakness, Beryllium is a carcinogen causing lung cancer inhalation also causes chronic disease beryllicosis and resulting skin warts (Ramachandra and Saira Varghese, 2004), free Carbon radicles are carcinogens.

The majority of research studies is focused on e-waste management and its effect on the environment, etc. Very few researches have been reported that studied the role of teacher regarding e-waste management. No study found that studied the Environmental awareness among secondary school teachers regarding E-waste management and responsibilities of teachers to protect the Environment through E-waste management. No one study found out regarding

these factors from the above literature review. Therefore, an attempt is made to conduct research on this topic.

OBJECTIVES OF THE STUDY

The present study has following objectives:

- To find out the Environmental awareness among secondary school teachers regarding E-waste management.
- To describe the responsibilities of teachers to protect the Environment through E-waste management.

Research Questions

As per the above need and significance of the present study, the following research questions were emerged in the mind of the investigator;

- What are the roles of teachers in promoting Environmental awareness regarding E-waste management among secondary school students?
- What are the responsibilities of a teacher to protect the environment through E-waste management?

Design of the Study

Survey research has been employed as the method of the study, which is commonly used in educational research to study the existing condition or the phenomenon.

Population of the Study

The population of the study was all the secondary schools in Dhanbad district in the state of Jharkhand. All the schools were provided quality education to the students.

Sample of the Study

The simple random sampling technique has been used in the selection of the sample. Five schools were selected by using simple random sampling techniques as the sample of the study. In each school, 5 teachers and 10 students were selected. In this way the selected participants are 25 teachers and 50 students.

Tools used for the Study

In order to achieve objective, the data were collected through the following instruments.

- Questionnaire for teachers.
- Questionnaire for student.
- Interview schedule for teachers.
- Focus group discussion for students.

Procedure Adopted in Data Collection

The researcher was taken the permission from principal for data collection. The data were collected by the researcher personally with the help of the three tools, i.e., questionnaire for teachers and questionnaire for students, interview schedule and focus group discussion. The interview was taken from each teacher through personal interaction

and this interview was recorded and important note was taken, for each item of the questionnaire the clear instruction was given to the respondents and interaction of focus group discussion was recorded and also important note was taken from students. Each interview took on an average of 20 minutes and focus group discussion took about 1 hour.

During the data collection the investigator introducing himself and describing about the purpose of conducting this type of research, then according to the tools the data was collected from the respondents.

Techniques of Data Analysis

The data collected from students and teachers by questionnaire for according to objective has been tabulated and analyzed by using simple descriptive statistics, i.e., frequency, percentages and graphical data representation, etc. The data collected through interview of teachers and focus group discussion of students has been analyzed qualitatively on the basis of different views and themes that has come from this interview and discussion. Finally, the triangulation has been done among these data and analyzed on the basis of these triangulations.

Delimitations of the Study

The present study is delimited to:

- All the government schools in Dhanbad district in the state of Jharkhand.
- The collection of the sample was only from 5 schools in Dhanbad district in the state of Jharkhand.
- The sample of study was randomly selected from 25 teachers and 50 students of the respective schools from Dhanbad district in the state of Jharkhand.

Major Findings

- All of the teachers have aware of environmental related issues whereas 90% teachers have not aware of E-waste management.
- 80% of teachers have taken training on protection and conservation of environment while none of them have taken training and knowing about E-waste is a serious problem of our environment.
- Teacher training curricula could not be designed to include the E-waste education component in the theory and practical courses.
- Lack of digital library facilities to aware the serious impact of E-waste on our health in the school
- The student does not have any idea regarding the serious effect of E-waste on health.
- No give proper information about E-waste management by teacher due to lack of knowledge.
- Teachers are not trained how to deal and work with E-waste for research activities.
- Lack of supportive facilities was the significant problem in almost all the schools.

Educational Implications

- School teacher should organize awareness programmes for students to inculcate and foster positive thoughts about E-waste in them.

- There should be community awareness program about E-waste in co-operation with school and some community personnel.
- Each school should be updated with required learning materials to create better learning environment for E-waste schools.
- Regular interactive programms are needed to make E-waste open to communicate with their teachers and peers.

SUGGESTIONS AND RECOMMENDATION

- Training should be provided to the teacher regarding E-waste management.
- In this emerging topic, more seminar, conference and workshop should be organized.
- NCERT and SCERT should start refresher course and training program for pre-service and in-service teachers regarding E-waste management.
- The teacher training curricula could be redesigned to include the E-waste education component in the theory and practical courses.

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