ENVIRONMENTAL EDUCATION AND ATTITUDE TOWARDS SOCIAL AWARENESS ON PLASTIC POLLUTION OF HIGHER SECONDARY SCHOOL STUDENTS IN HOOGHLY DISTRICT

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Abstract:

Plastic pollution is a global problem, trashing our rivers and oceans, harming animals, and possibly even threatening our health. Plastics have improved the health, safety, and efficiency of everyday life. With their unique qualities of lightweight and strength, plastics are used in packaging, automotive applications, medical systems and more. The versatility and low cost of plastics have contributed to plastic's displacement of other materials, such as glass and paper, causing an increase in plastic production at a rate of about 5% per year since 1973. A large percentage of plastic produced each year is used to make single-use, disposable packaging items or products which will get permanently thrown out within one year. Often, consumers of the various types of plastics mainly use them for one purpose and then discard or recycle them.

Environmental education is the study of the relationships and interactions between natural and human systems. It is interdisciplinary, combining aspects of natural sciences such as ecology and geography with aspects of social sciences such as economics, law, and public health. It is hands-on, student-centered, inquiry-driven, and relevant to students' everyday lives. Two National Science Foundation boards have underscored the importance of environmental education and have called for a systematic approach to environmental education a report found that 95 percent of the public supports environmental education in schools.

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The present study was aims to investigate the concept of environmental awareness in plastic pollution of higher secondary school students of Hooghly District. Concept and attitude of environment awareness in plastic pollution measure by questionnaire was used to assess their environment awareness. The data were analyzed with the help of statistical techniques like mean, Standard deviation and t-value. The result of Analysis shows that, there exists significant difference in plastic pollution awareness among higher secondary school student. Urban students are more aware in plastic pollution than rural school student in Hooghly district. Science students are more aware than commerce and arts students in plastic pollution.

Key Words: Environmental Awareness, plastic pollution, Environmental Education, Statistical treatment, significant difference.

Introduction:

Plastic has been widely used in our daily lives since the 1950s. The qualities of plastic; inexpensive to manufacture, flexibility, and durability; have made it a valuable alternative to using wood, glass and metal for many products. Buttons made from river mussels were cheaper when made from plastic. Unfortunately, plastic enters our natural environment and causes problems because it does not biodegrade like wood, glass and metal. Plastic lasts forever. This is the origin of a serious pollution problem, more so if these materials are disposed of irresponsibly. Plastic is now a regular material that is being used on a daily basis. Plastic is everywhere either in the form of food containers, financial transactions (Debit/Credit cards, plastic money), storage, baggage, stationary items, electronic and electrical products and every foreseeable item that a human being can think of. Plastic as a product is now like a regular feature of manufacturing, consumption, and service activities. Plastic is made up of various chemical elements and therefore is regarded as a highly contagious material that does not easily degrade in the natural environment after its usage or utility period. Therefore plastic management or plastic waste management involves the techniques to be used to manage the plastic waste in an environment friendly way and helping in the proper utilization of plastic material**.**

Plastic bags and bottles, like all forms of plastic, create significant environmental and economic burdens. They consume growing amounts of energy and other natural resources, degrading the

environment in numerous ways. In addition to using up fossil fuels and other resources, plastic products create litter, hurt marine life, and threaten the basis of life on earth. We are producing over 25 million tons of plastics per year in the United States, a trivial fraction of which is getting recycled. Here are some steps that you can take to reverse the tide of toxic, non-biodegradable pollution so that it will not overtake our planet.

Environmental education is now being seen as an instrument and a process that enables participation and learning by people of all ages, based on two-way communication rather than the old paradigm of a one-way flow of information, from teachers to pupils. The content and substance of environmental education is also undergoing review and change. Reorienting education as a whole towards sustainability involves the various levels of formal, non-formal and informal education at all levels of society.

Nowadays, environmental education (EE) is sometimes integrated into school curricula as an interdisciplinary goal of formal education. It is also part of informal education, and a part of daily life during leisure time activities, as well as a substitute for or extension to the formal education sector. Environmental education is about experiencing, sharing, creativity, pleasure and sensitivity: environmental education activities can be informing the population, discovery activities (guided visits, games, outings), but can also consists of the active participation of the public (workshops, volunteering, excursions, role play, field trips or holidays). The public sector, as well as NGOs, provides materials, education and guidelines on environmental education. Protected Areas also play a vital role in environmental education in regions, having the scientific and protection issues at hand and being able to transfer the knowledge using participation opportunities to a broad public.

EE has a positive impact on student achievement in core subjects. When integrated into the core curricula or used as an integrating theme across the curriculum, environmental education has a measurably positive impact not only on student achievement in science but also in reading, math, and social studies. Moreover, outdoor activities increase student engagement and interest in science and in all core subjects. It helps improve the health of children. Field experiences and related programs as part of the regular school curriculum contribute to healthy lifestyles through

outdoor recreation and sound nutrition. Getting kids outdoors to exercise, play and experience their natural world is an important tool in the battle to prevent obesity, alleviate attention deficit disorder and address other related health problems. EE provides critical tools for a 21st Century workforce. We will be passing on complicated environmental problems to future generations. We must give the next generation a solid understanding of these problems and the basic tools to overcome them and make informed choices in their own lives. Business leaders also increasingly believe that an environmentally literate workforce is critical to their long term success. Finally, environmental education helps prepare students for real-world challenges.

Effects on the environment

Land

Chlorinated plastic can release harmful chemicals into the surrounding soil, which can then seep into groundwater or other surrounding water sources. This can cause serious harm to the species that drink this water. Landfill areas are constantly piled high with many different types of plastics. In these landfills, there are many microorganisms which speed up the biodegradation of plastics. Regarding biodegradable plastics, as they are broken down, methane is released, which is a very powerful greenhouse gas that contributes significantly to global is warming. Some landfills are taking initiative by installing devices to capture the methane and use it for energy, but most have not incorporated such technology. Release of methane does not only occur in landfills, biodegradable plastics also degrade if left on the ground, in which case degradation takes longer to occur.

Ocean

Nurdles are plastic pellets (a type of micro plastic) that are shipped in this form, often in cargo ships, to be used for the creation of plastic products. A significant amount of Nurdles are spilled into oceans, and it has been estimated that globally, around 10% of beach litter is Nurdles. Plastics in oceans typically degrade within a year, but not entirely, and in the process toxic chemicals such as biphenyl A and polystyrene can leach into waters from some plastics. Polystyrene pieces and Nurdles are the most common types of plastic pollution in oceans, and combined with plastic bags and food containers make up the majority of oceanic debris. In 2012,

it was estimated that there was approximately 165 million tons of plastic pollution in the world's oceans.

Effects on animals

Plastic pollution has the potential to poison animals, which can then adversely affect human food supplies. Plastic pollution has been described as being highly detrimental to large marine mammals, described in the book *Introduction to Marine Biology* as posing the "single greatest threat" to them. Some marine species, such as sea turtles, have been found to contain large proportions of plastics in their stomach. When this occurs, the animal typically starves, because the plastic blocks the animal's digestive tract. Marine mammals sometimes become entangled in plastic products such as nets, which can harm or kill them.

Over 260 species, including invertebrates, have been reported to have either ingested plastic or become entangled in the plastic. When a species gets entangled, its movement is seriously reduced, therefore making it very difficult to find food. Being entangled usually results in death or severe lacerations and ulcers. It has been estimated that over 400,000 marine mammals perish annually due to plastic pollution in oceans. In 2004, it was estimated that seagulls in the North Sea had an average of thirty pieces of plastic in their stomachs.

Effects on humans

Plastics contain many different types of chemicals, depending on the type of plastic. The addition of chemicals is the main reason why these plastics have become so multipurpose; however this has problems associated with it. Some of the chemicals used in plastic production have the potential to be absorbed by human beings through skin absorption. A lot is unknown on how severely humans are physically affected by these chemicals. Some of the chemicals used in plastic production can cause dermatitis upon contact with human skin. In many plastics, these toxic chemicals are only used in trace amounts, but significant testing is often required to ensure that the toxic elements are contained within the plastic by inert material or polymer.

Plastic pollution can also affect humans in which it may create an eyesore that interferes with enjoyment of the natural environment.

Effect on Climate

The effect of plastics on global warming is mixed. Plastics are generally made from petroleum. If the plastic is incinerated, it increases carbon emissions; if it is placed in a landfill, it becomes a carbon sink. Although biodegradable plastics causes methane emissions. Due to the lightness of

plastic versus glass or metal, plastic may reduce energy consumption. For example, packaging beverages in PET plastic rather than glass or metal is estimated to save 52% in transportation energy.

Control through Education

- ***Seminars/talks/debates:*** The seminars/talks/ debates aimed to inform the student members of the eco-clubs on issues related to exposure to various kinds of environmental pollution, the state of the problem and further actions that could be undertaken by them to eliminate such problem.
- ***Nature camp/Field Visit:*** These programmes provided the young minds with an excellent opportunity to grow, by way of observing the relationships between plants and animals.
- ***Plantation programmes:*** Plantation programme for school children is an important investment in environmental education. Planting trees by children was an activity aimed to develop interest of children to save the earth.
- ***Cleanliness Drive:*** With a vision that "Cleanliness begins in schools", the school children were involved in cleaning activities within their school premises.
- ***Awareness by rallies:*** The student members of the eco-clubs participated in rallies to make the local people aware of various environmental issues.
- ***Survey:*** Intensive nature survey works conducted by school children enabled them to recognize the intricate problems and devise strategies to eliminate them.
- ***Book exhibition***
- ***N.S.S and college students collect old plastic covers***
- ***School children Jatha***
- ***Wall painting awareness***

Control through Recycling and reuse:

- Recovery and reuse of synthetic polymers is ideally the best way in solving the problem of plastic waste. In principle, polymers can be recycled without significant loss of their properties.

- Plastic bottles may not be reusable as bottles, but the polymers can be recycled. For example, PET bottles can be recycled to give an acceptable grade of PET resin for carpet fiber, furniture stuffing or insulation.
- Currently there is growing interest in chemically converting the PET into polyols for the manufacture of polyurethane foams.
- Waste nylon can also be recycled profitably.
- Containers made from high-density polyethylene (HDPE) are widely used for detergents, lubricant oil, printing inks, antifreeze and other chemicals, and enormous amounts are used in disposable applications.
- The recycled HDPE could be remolded for making drainpipes, flowerpots, dustbins and plastic crates.
- Re-use bags when shopping.

Controls through Awareness:

- Choose biodegradable bags to use for litter (photodegradable bags used in this way are guaranteed to end up on landfill sites taking hundreds of years to break down).
- Re-use large plastic sacks whenever possible
- Refrigerate food in containers rather than plastic bags
- Awareness meeting
- Awareness programme
- Transport wet waste to auto waste dumped container

Controls through Enforcement:

- Unexpected raid and seizure of Plastic
- Awareness meeting for wholesale dealers and users.
- Caution through miking for violation of CMC decision.
- Passed resolution by cmc on penalty
- Notification and leaflet

- Enforcement and penalty
- Penalty collection
- Enforcement public Display at municipal area
- taxes on plastic bags

Area of study:

The study area is Hooghly is one of the most economically developed districts in West Bengal. It is also the main jute cultivation, jute industry, and jute trade hub in the state. There are also a number of industrial complexes including one of the largest car manufacturing plants in India, the 'Hindustan Motors' plant located in Uttarpara. The jute mills are located along the banks of the river Hooghly in Tribeni, Bhadreswar, Champdani and Sreerampur.

The district is a completely flat land with no place having more than an elevation of 200 meters. The River Hooghly borders it to the east. Another major river is 'Damodar'. The district is bordered by Howrah District to the south, Bardhaman District to the north, and to the east by the River Hooghly. There are 2992 primary schools, 408 high schools, 127 higher secondary schools, 22 colleges, and 6 technical institutes in Hooghly district.

1. Area Type: Administrative region, Location Type: Second-order Administrative Division
2. Latitude: **North** [23 0 01' 20"N] ::. **South** [22 0 39' 32"N], Longitude: **East** [88 0 30' 20"E] ::. **West** [87 0 30' 15"N]
3. Latitude (DMS): 22° 45' 0 N
4. Longitude (DMS): 88° 45' 0 E

Objectives:

1. To measure the environmental awareness level among higher secondary school student
2. To study the general environmental awareness in plastic pollution and environmental practices among the school students
3. To know the level of attitude towards environmental awareness on plastic pollution of higher secondary students.
4. To measure the environmental awareness level among the H.S students
5. To study the general environmental practices among the H.S students

6. To suggest actions towards creating environmental awareness and environment friendly practice among the H.S students
7. To study the significant difference in knowledge of social awareness on plastic pollution between the male and female higher secondary students.
8. To study the significant effect of environment education on plastic pollution knowledge.

Assumptions:

1. Higher Secondary students completed class XI.
2. Higher Secondary students are now in class XII.
3. All the students are age of 16-17 years.
4. 120 students are of urban area and 120 students are of rural area
5. 80 students from arts group, 80 students from science group and 80 students from commerce group.

Hypothesis:

1. There is no significant mean difference in awareness on plastic pollution among Urban and rural students in secondary level.
2. There is no significance difference in awareness on plastic pollution among urban boys and urban girls in secondary level.
3. There is no significance difference in awareness on plastic pollution among rural boys and rural girls in secondary level.
4. There is no significance difference in awareness on plastic pollution among urban boys and rural boys in secondary level.
5. There is no significance difference in awareness on plastic pollution among urban girls and rural girls in secondary level.

Methodology:

The following steps and procedure adopted in conducting the study.

Instrument:

A questionnaire adapted by self was used to collect data. The 50 item questionnaire focuses on the awareness in plastic pollution concerns. Each participant completed this questionnaire. The questionnaire addresses four dimensions: Environment, awareness, plastic pollution and environmental education. Each item contains 1 mark. The validity of the questionnaire was established by a review of three experts in educational technology. Selected items were revised based upon their comments and recommendations. Data were collected from students score.

Data Analysis:

The questionnaire was used to assess secondary school student's environmental awareness in plastic pollution. A paired t-test was used to compare means score of male and female students. A one-way ANOVA was used to compare means among grades. The test was used to identify the source of significant differences at 0.05 level of confidence.

Selection of sample:

Type	Urban area	Rural area	Total
Arts-Boys	20	20	40
Arts-Girls	20	20	40
Science-Boys	20	20	40
Science-Girls	20	20	40
Commerce-Boys	20	20	40
Commerce-Girls	20	20	40
Total	120	120	240

Variables:

- Boys and girls
- Arts, Science and Commerce
- Environmental awareness
- plastic pollution
- reduction of plastic pollution

Tool:

In this study we used the descriptive method. Data were collected with a quantitative data collection technique. Industrial pollution awareness questionnaire was constructed by the investigator and was used in this study. The tool consists of 50 items in the form of objective type questions. The correct answered questions will get one mark each. Therefore 50 marks are the maximum score and zero is the minimum score. There was no option of part marking. Students answered the test paper questions. The student needed an average I hours to finish it.

Reliability of the Tool:

For reliability of the tool, we used Test-retest method. Retest was taken after 20 days and the correlation is 0.889 (r=0.889).

Validity of the Tool:

At the initial stage we choose 60 items for the questionnaire. After content validation 50 items are drafted.

Result:

Table 1: Mean, standard deviation, standard error and t-value for awareness on plastic pollution of Science, Arts and Commerce students (boys and girls) in higher secondary level of urban area

Group	Sum	Mean	SD	SE	t	p	Remark
Science-boys(Urban)	873	43.65	2.45	0.549	-6.905	3.30E-8	At the 0.05 level two means are significantly different
Science-girls(Urban)	763	38.15	2.58	0.577			
Arts-boys(Urban)	761	38.05	4.96	1.108	-2.603	0.013	At the 0.05 level two means are significantly different
Arts-girls(Urban)	658	32.9	7.33	1.639			
Commerce-boys (Urban)	807	40.35	3.19	0.715	-1.959	0.058	At the 0.05 level two means are not significantly different
Commerce-girls(Urban)	758	37.9	4.50	1.025			

Table 2: Mean, standard deviation, standard error and t-value for awareness on plastic pollution of Science, Arts and Commerce students (boys and girls) in higher secondary level of rural area

Group	Sum	Mean	SD	SE	t	p	Remark
Science-boys(Rural)	821	41.05	2.187	0.489	-6.905	3.31E-8	At the 0.05 level two means are significantly different
Science-girls(Rural)	749	37.45	4.82	1.079			
Arts-boys(Rural)	712	35.6	2.37	0.530	-2.542	0.015	At the 0.05 level two means are significantly different
Arts-girls(Rural)	665	33.25	3.385	0.757			
Commerce-boys (Rural)	745	37.25	2.712	0.606	-2.08	0.043	At the 0.05 level two means are significantly different
Commerce-girls(Rural)	711	35.55	2.438	0.545			

Table 3: Percentage of awareness on plastic pollution of urban students and rural students in higher secondary level

Group	N for urban student	Degree of freedom	Mean score for Urban higher secondary students	Percentage of awareness for Urban higher secondary students	N for rural student	Degree of freedom	Mean score for Rural higher secondary students	Percentage of awareness for Rural higher secondary students
Science-boys	20	19	43.65	87.3 %	20	19	41.05	82.1%
Science-girls	20	19	38.15	76.3%	20	19	37.45	74.9%
Arts-boys	20	19	38.05	76.1%	20	19	35.6	71.2%
Arts-girls	20	19	32.9	65.8%	20	19	33.25	66.5%
Commerce-boys	20	19	40.35	80.7%	20	19	37.25	74.5%
Commerce-girls	20	19	37.9	75.8%	20	19	35.55	71.1%

Fig 1:Cyllinder diagram for percentage of mean score of science, arts and commerce students in higher secondary level of Urban area in Hooghly District

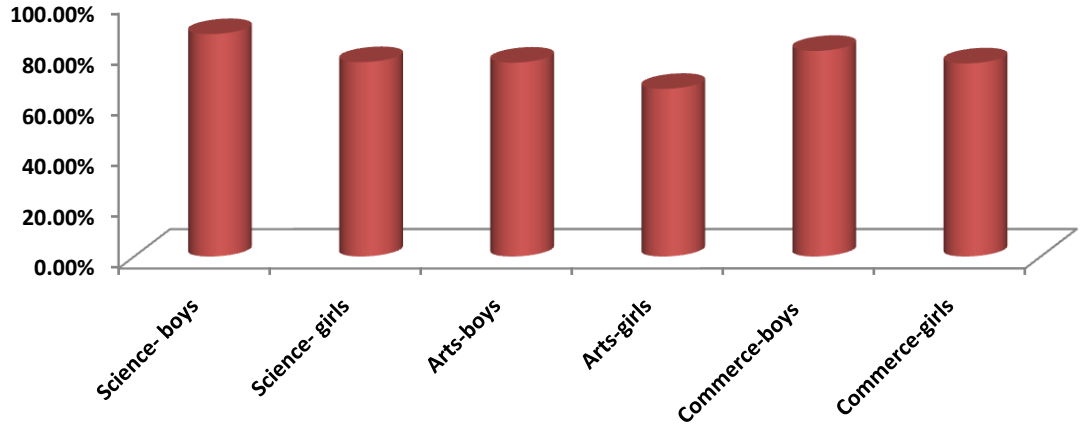
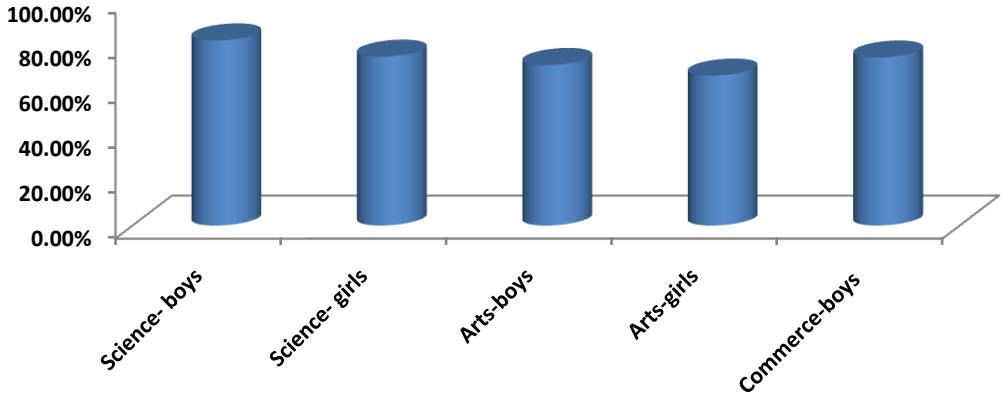


Fig 2: Cyllinder diagram for percentage of mean score of science, arts and commerce students in higher secondary level of Rural area in Hooghly District



Findings from Tables and graphs:

1. There is significant mean difference in awareness in plastic pollution among Urban and rural students in higher secondary level.
2. Urban students have significantly higher awareness than rural student about plastic pollution in higher secondary level.

3. Both rural and urban girls' students have lower awareness in plastic pollution in higher secondary level.
4. Rural arts boys and rural commerce girls have same awareness in plastic pollution
5. Science students are significantly higher than Arts and Commerce student about plastic pollution.
6. Boys(science, arts, commerce) students are more aware than girls student about plastic pollution
7. Urban boys' students of science group have greatest awareness in plastic pollution than other group.
8. Urban girls' students of science group have least awareness in plastic pollution than other group.
9. Urban science girls and urban arts boys students have same awareness in plastic pollution
10. Rural science girls and rural commerce boys have same awareness in plastic pollution
11. Rural Science boys' students have greater percentage of awareness than rural science girls, rural arts (boys & girls) and rural commerce (boys & girls) students.
12. Rural Science boys' students have greater percentage of awareness than urban science girls, urban arts (boys & girls) and urban commerce (boys & girls) students.
13. Urban commerce boys student have greater percentage of awareness than urban science girls, urban arts (boys & girls) and urban commerce girls students.
14. Urban commerce boys student have greater than rural science girls, rural arts (boys & girls) and rural commerce (boys & girls) students.

Limitation of the study:

1. The study was limited to a few schools.
2. The sample of the study was restricted to 240 higher secondary students only.
3. The research was limited only to Hooghly District of West Bengal due to shortage of the time.
4. The reliability of the awareness of plastic pollution scale was determined only by test-retest method due to shortage of time
5. Only the content validity of the scale was determined.

6. The difference in the mean score of plastic pollution awareness was found out only by paired t-test.

Suggestions for future study:

1. The scale of awareness in Plastic pollution can be standardized on the basis of large samples.
2. A similar study can be conducted by including larger samples from various schools of West Bengal or other state of India.
3. This work will be applicable on different college and university students.
4. Other independent variable like age, cast and region etc. will be considered for future study.
5. The study can be conducted upon common people not only the pupils.

Conclusion:

One solution to the growing problem of plastic waste is to control the use of these materials in packaging. The production of synthetic polymers itself could be a polluting industry. Whenever possible, we should look at increasing the use of natural polymers such as natural rubber rather than to increase the production of more synthetic rubbers. Plastics cannot be completely banned, and it is not necessary that they should be. Their usage will have to be carried out more thoughtfully in the future than it has been in the past.

Urban boys' students of science group have greatest awareness in plastic pollution than other group. Urban girls' students of science group have least awareness in plastic pollution than other group. Higher secondary rural students are less aware than higher secondary urban students about plastic pollution in Hooghly District. There is an urgent need that the central Government of India should manage to get a legislation passed for the control of plastic pollution. Majority of the secondary in Hooghly district are found to be in the average level in their knowledge in plastic pollution and environmental education awareness. Suitable activities and curriculum related to the environment that are developed and used by the teachers would certainly bring proper attitude in the minds of the students.

Recommendations:

- As with any procurement activity, seek to identify whether the purchase of products containing or wholly made from plastics are absolutely necessary. Explore packaging reduction with suppliers.
- Where a purchase is required, identify whether products can be made from alternatives to petrochemical plastics such as wood and bio-plastics.
- Develop a policy on the purchase or substitution of PVC products, considered to be the most contentious forms of plastic
- Make it a rule that *no* trash goes overboard, *especially old fishing line*, which is particularly hazardous to marine life.
- Substitute reusable containers and other items for disposable ones to reduce the volume of trash.
- Students will understand that they can personally play an important role in reducing plastic pollution and increasing recycling rates for a healthier environment.
- Students will gain a greater understanding of the different types of plastics, and which can and cannot be recycled.
- Students will learn more about different states of matter and how plastic can be changed into different states and reformed during the recycling process.
- Students will understand that recycling involves a firsthand commitment to making the environment healthier.

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Summary:

Plastic really is fantastic. The problem is improper disposal. Remember that a careless moment may last for generations. There is an urgent need that the central Government of India should manage to get a legislation passed for the control of plastic pollution. Government should pass the 'plastic pollution control Act' to meet special India condition. Apart from such kind of Central legislation, there should be a city noise control code for all major cities in India. Tomorrow's leaders need to be equipped for tomorrow's challenges, and we must adequately prepare our children for the future they will inherit. That requires a commitment to providing children with environmental education that helps them become the educated thought leaders of tomorrow. The need to identify educational best-practices and evidence-based reform programs has spurred research on the connection between outdoor and environmental education and student academic achievement. So we summarize that there is urgent need of environment education in secondary, higher secondary and college level in our country. Also the burning issues should be included in syllabus of school level.

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