



## Effectiveness of an Educational Program on Awareness of Air Pollution Among Secondary School Students

Dr. Malavika Ahlawat<sup>1</sup> Mrs Soma Guha<sup>2</sup>

<sup>1</sup>Asst Professor, Lord's Universal College of Education

<sup>2</sup>Asst Professor, Lord's Universal College of Education

Corresponding Author: Dr. Malavika Ahlawat

Email: [malavika.ahlawat@gmail.com](mailto:malavika.ahlawat@gmail.com)

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### Abstract:

For a few years, air pollution has emerged as a global issue due to human activities, leading to serious health problems and a decline in overall well-being. Raising awareness and encouraging behavioral changes are crucial in reducing the negative impacts of air pollution. This research aimed to study the effectiveness of an educational program on awareness of air pollution among secondary school students in Mumbai. A quasi-experimental design was adopted, involving 106 students from Govind Nagar B.M.C. Secondary School, Mumbai. Using the "Air Pollution Awareness Questionnaire (APAQ)," the study measured students' knowledge before and after the program. The results showed a significant increase in awareness following the program ( $p < 0.05$ ). Less difference was found between male and female students in terms of awareness levels, although both groups demonstrated a willingness to take action to reduce air pollution.

**Keywords:** Air Pollution, Causes and Impact of Air Pollution, Pollution Prevention Measures, Sustainable Development, Experimental Design, Education Program.

### Introduction:

The Sustainable Development Goals (SDG) are crucial because they provide a universal framework for countries, businesses, and individuals to work together towards a more sustainable and equitable future. Sustainable development is a global challenge that requires a holistic approach to balance economic growth, social equity, and environmental Awareness of Air Pollution among Secondary School Students. SDGs recognize that the world's challenges are interconnected and require a comprehensive approach to address them. Air pollution is a significant environmental issue with far-reaching consequences for human health, ecosystems, and climate change.

Global warming is an alarming phenomenon characterized by a significant and unusually swift rise in the Earth's average surface temperature. This occurrence is primarily attributed to the emission of greenhouse gasses resulting from human activities, particularly the burning of fossil fuels. In recent times, the detrimental effects of global warming on our environment have become increasingly apparent. Factors such as rapid industrialization, population growth, agricultural activities, vehicle emissions, and household activities contribute to the escalation of global warming.

### Need of the Study

In urban areas such as Mumbai, where pollution poses a significant threat to public health and well-being, education on air pollution is crucial.

Students must understand the sources, effects, and prevention strategies related to air pollution in order to contribute to sustainable practices that reduce its harmful effects.

Air pollution's impacts, particularly on the respiratory and cardiovascular systems, highlight the importance of educating young generations about its dangers. It is needed to increase awareness of air pollution among secondary school students, equipping them with knowledge and encouraging proactive measures.

People must all join hands to stop the increasing pollution in the atmosphere. For that, each individual must take action to prevent air pollution and that will happen only if we reorient the students and imbibe them with proper attitudes and values (ethics), especially those that will lead to a greater concern for preserving balance in the ecosystem. Air pollution contributes significantly to global warming. Hence, it becomes obligatory to develop awareness of air pollution among each citizen.

### Aim of the Study

To study the Effectiveness of an Educational Program on Awareness of Air Pollution among Secondary School Students of Govind Nagar BMC School, Malad East, Mumbai.

### Operational Definitions

**Awareness of Air Pollution** - Knowledge and understanding of air pollution, its causes, effects, and preventive measures.

**Effectiveness** - The degree to which the educational program successfully enhanced students' awareness.

**Educational Program** - A structured series of lessons and activities developed by the investigators to increase students' understanding of air pollution.

#### Objectives of the Study

1. To develop an Educational Program for enhancing the awareness of air pollution among Secondary School Students of Govind Nagar BMC School.
2. To study the effectiveness of the developed Educational Program on the awareness of air pollution among Secondary School Students of Govind Nagar BMC School.
3. To compare the effectiveness of the Educational Program on the awareness of air pollution among male and female Students of Govind Nagar BMC School.

#### Hypotheses of the Study

The following Null Hypotheses were formulated

**H0 1:** There is no significant difference in the level of awareness of Air Pollution among Secondary School Students of Govind Nagar BMC School as reflected in their pre-test and post-test scores.

**H0 2:** There is no difference in the level of awareness of Air Pollution between the male and female Students of Govind Nagar BMC after using the educational program.

#### Scope and Limitations of the study

The study was limited to 106 students of 8<sup>th</sup> to 10<sup>th</sup> grades at Govind Nagar BMC school, Malad (East), Mumbai.

#### Significance of the Study

The program will not only help students, but it will also help other stakeholders of the education system. This program will help students to know air pollution and its harmful effects. It will also help them to know about the preventive measures and steps that need to be taken to control pollution. It will also educate them about the measures adopted in recent years to tackle global warming and improve the quality of air.

This awareness program will also help teachers to guide their students in a better way with some concrete examples and in an effective way.

#### Research Methodology

A quasi-experimental research design was used, employing a one-group pre-test and post-test format. A random sampling method was used to select participants.

#### Tools of the Study

The tool used in the present investigation was the 'Air Pollution Awareness Questionnaire (APAQ)' developed by the researchers. This tool consists of four components, viz. (i) Concept of Air Pollution, (ii) Causes of pollution (iii) Effects of Air Pollution (iv) Measures to prevent Air Pollution. There were 18 items in the questionnaire. Each item consists of three multiple-choice answers which is A, B, and C. Then, the students need to answer the question with the best answer for each item in the questionnaire. Each best answer carries the value of 1 mark. Thus, on the total scale, the scores of 18 questions ranged between 0-18.

#### Educational Program

The objective of this investigation was to create awareness of Air Pollution among Secondary School Students. The Air Pollution Awareness Program (APAP) was prepared, which included activity-based lessons. All lessons were delivered using a constructivist approach, and visual aids such as puppets, models, and videos, PowerPoint presentations to foster students' engagement.

#### Data Collection Procedure

At first, permission was sought from the principal of the school to conduct the present investigation. Initially, the investigators gave instructions to the students on the pre-test and administered it to find an awareness of air pollution among students, this reflected their lack of awareness about air pollution. The lessons for the Air Pollution Awareness Program (APAP) were conducted using various learning resources and teaching methods. Then the investigators administered a post-test to evaluate the impact of the educational program.

#### Data Analysis

Descriptive analysis of Awareness of Air Pollution scores: Awareness of Air Pollution comprises four components viz. concept, causes, effects of Air Pollution, and measures to prevent it.

**Table 1**  
**Air Pollution Components Awareness Scores on the Pre-Test and Post-Test**

Components	No of Questions	Pre-Test	Post -Test
Concept of Air Pollution	2	1.10	2.00
Causes of Air Pollution	6	2.58	4.72
Effect of Air Pollution	5	2.30	4.87
Measures to Prevent Air Pollution	5	1.72	4.52
<b>Total Awareness of Air Pollution</b>	<b>18</b>	<b>7.71</b>	<b>16.10</b>

#### Interpretation:

The results show that students' awareness of air pollution significantly increased across all components. The post-test scores were substantially

higher than the pre-test scores, demonstrating the program's effectiveness. This indicates that students have increased Awareness of Air Pollution levels after undergoing an Educational program.

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The graphical representation is given below:

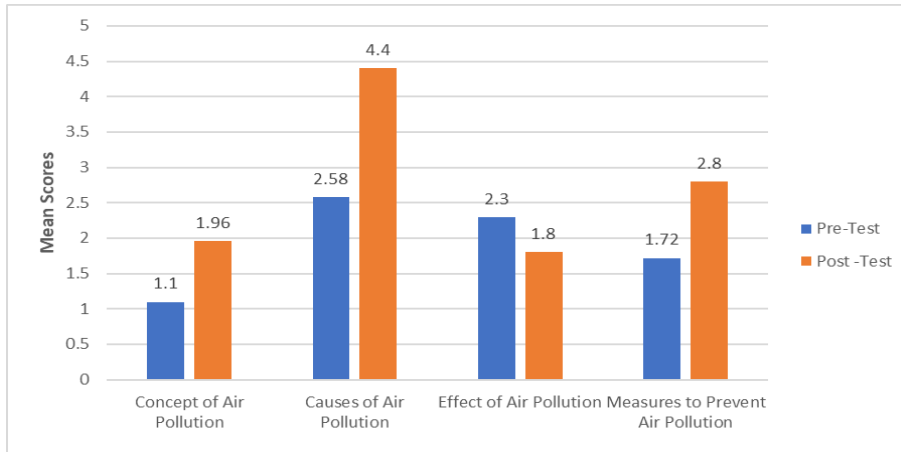


Fig 1

**Air Pollution Components Awareness Scores on the Pre-Test and Post-Test**

**Descriptive analysis of Awareness of Air Pollution scores with respect to gender**

The measures of central tendency namely, mean, median, and mode, and measures of

variability namely, SD of Awareness of Air Pollution score with respect to gender are shown below.

Table 2

**Awareness of Air Pollution scores with respect to gender**

Test	Gender	N	Mean	Std Dev
Pre-Test	Male	47	7.55	1.02
	Female	59	7.83	1.34
Post-Test	Male	47	15.81	0.92
	Female	59	16.34	0.76

**Interpretation**

The mean score of the female students in the pre-test is higher than that of the male students. standard deviation of both the genders is high on the Pre-Test.

The mean scores of both the groups in the post-test are higher than their mean scores in the pre-test. This indicates that the female students exhibited a slightly higher level of awareness of Air Pollution than the male students.

The graphical representation is given below:

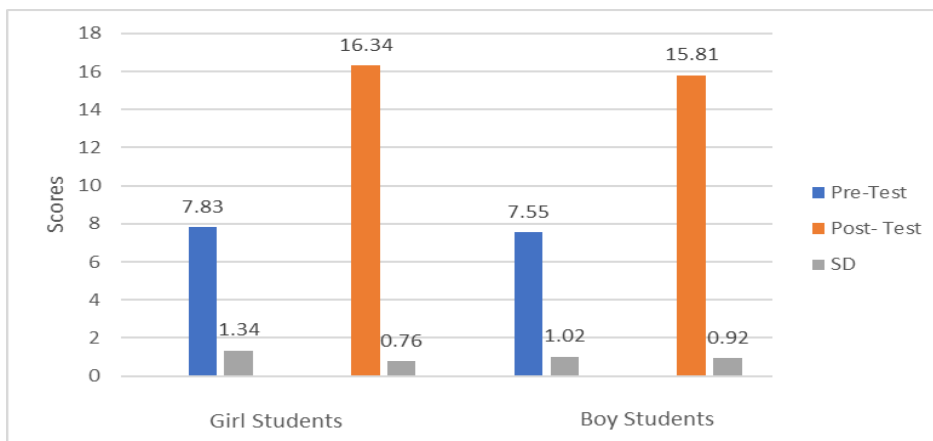


Fig 2

**Awareness of Air Pollution scores with respect to gender**

**Inferential Analysis**

**Hypothesis Testing (H<sub>0</sub>):**

A paired sample t-test was conducted to assess the difference between pre-test and post-test scores.

HO 1: There is no significant difference in the level of awareness of Air Pollution among Secondary School Students of Govind Nagar BMC School as reflected in their pre-test and post-test scores.

**Table 3**  
**t-test scores of Awareness of Air Pollution for Pre-Test and Post –Test**

Test	N	df	t-table
Pre Test	106	104	1.74
Post - Test			

\* p < 0.05

### Interpretation

The above table shows the difference in the mean value of the scores acquired by the Govind Nagar B.M.C. Secondary School Students in the Pre-test and Post-test. The mean of the post-test score is higher than the pretest score. t-value is 1.74 greater than the t-table value. t-value is a significant value therefore the Null Hypothesis is rejected at the level of significance.

### Inferences

The data shows a significant increase in Govind Nagar BMC Secondary School students' awareness of air pollution after the implementation

of the Educational program. This implies that the educational program on air pollution had a meaningful impact, significantly increasing the students' level of awareness regarding air pollution, as reflected in their improved post-test scores.

### Hypothesis Testing (H<sub>02</sub>):

A t-test was also conducted to compare the post-test scores of male and female students.

H<sub>0</sub> 2: There is no difference in the level of awareness of Air Pollution between the male and female Students of Govind Nagar BMC after using the educational program.

**Table 4**  
**t-test of gain scores of post-test for Awareness of Air Pollution with respect to Gender**

Gender	N	df	t-value
Male	47	104	3.35
Female	59		

\* p<0.05

### Interpretation

The investigators applied a t-test to check the difference between the awareness of Air Pollution among male and female students of Govind Nagar B.M.C. Secondary School. The t value is 3.35 greater than the t-table value. Therefore the Null Hypothesis ie. 'There is no difference in the level of awareness of Air Pollution between the male and female Students of Govind Nagar BMC school after using the educational program' is rejected.

### Inference

Despite the statistical significance, the actual difference in mean scores between male and female students is 0.53, which is minimal, indicating that both male and female students had nearly equal levels of awareness of air pollution following the educational intervention.

### Results and Discussion

The present study supports the fact that Air pollution is increasingly recognized as a critical public health issue, with widespread effects on both physical and cognitive health. Soraya Smaoun, Air Quality Coordinator at UN Environment, emphasizes this by stating that air pollution has a negative effect on the aging brain, and can significantly reduce intelligence levels over time (UNEP, 2018)

At the beginning of the study, it was clear that the students lacked a comprehensive understanding of air pollution, as indicated by their low scores in the pre-test. This finding aligns with previous research that highlights the general lack of environmental awareness among young people. For instance, a study by Kalantzis et al. (2017) found that students, especially in urban areas, often have limited knowledge of environmental issues, despite being directly affected by problems like air pollution.

The investigators found that There is a difference in the level of awareness of Air Pollution between the male and female Students of Govind Nagar BMC school after using the educational program. Martin Stanisstreet et. al. (2000), found that females were more "environmentally sympathetic" than males. Females are more concerned about environmental issues than males (Tynsys, 2000, Yilmaz, Boone and Andersen, 2004).

The educational program in this study utilized various interactive teaching methods. Research consistently shows that interactive and engaging teaching methods can significantly improve students' understanding of a good environment. For example, Alexandar R. and Poyyamoli G. (2014) found that the active teaching /learning approach significantly improved

knowledge, attitude, skills, and knowledge of local environmental issues.

This study's findings also support the broader literature on the importance of environmental education in fostering environmentally responsible behaviour. Manisalidis et.al (2020), found that students who are well-informed about environmental issues are more likely to adopt sustainable behaviors and advocate for environmental protection. By improving students' knowledge about air pollution, the program at Govind Nagar B.M.C. Secondary School not only enhanced their academic understanding but also likely contributed to shaping their attitudes and behaviors toward environmental issues.

### Conclusion

The study highlights the positive impact of educational programs in raising awareness about air pollution among Govind Nagar BMC secondary school students. By integrating interactive and engaging teaching methods, such programs can effectively increase knowledge and encourage positive attitudes and behaviors toward environmental conservation.

Despite being a core component of lower-grade curricula, pollution is often overlooked in classroom discussions. While the syllabus itself provides a solid foundation, effective implementation relies heavily on teacher engagement. Neglecting this crucial topic can hinder students' understanding of environmental issues and their ability to become responsible citizens. Educational institutions must prioritize pollution education and ensure that teachers are equipped to deliver engaging and informative lessons on this vital subject.

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