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Study On Environmental Awareness Among Undergraduate Students in Medinipur District, West Bengal

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Abstract: *Environmental awareness plays a crucial role in shaping sustainable attitudes and behaviors among youth. As environmental degradation intensifies globally, fostering awareness among college students becomes essential for promoting long-term ecological responsibility. This study examined environmental awareness among undergraduate students in the Medinipur district of West Bengal, focusing on differences based on gender, locality, and academic stream. Using a descriptive survey method, data were collected from 426 students across eight randomly selected government colleges using a standardized Environmental Awareness Scale developed by the researcher. The analysis employed independent samples t-tests and Welch's ANOVA with Games-Howell post hoc tests. Findings revealed that girls had significantly higher environmental awareness than boys, and science students outperformed their arts and commerce counterparts. However, no significant difference was found between rural and urban students. These results underscore the need for stream-specific curriculum integration and gender-inclusive educational strategies to foster environmental consciousness among all student groups, thereby contributing to a more sustainable future.*
Key Words: *Environmental awareness, undergraduate students, academic stream, West Bengal, sustainability education.*

1. INTRODUCTION

Environmental awareness refers to an informed understanding of the natural world and the complex interactions between human activities and environmental systems. It encompasses not only knowledge of environmental components and issues—such as climate change, pollution, biodiversity loss, deforestation, and resource depletion—but also the values, attitudes, and behaviors necessary to promote sustainable living. A key element of environmental awareness is recognizing the urgency of environmental challenges and the responsibility individuals and communities share in mitigating their impacts. It serves as the foundation for environmental education, which fosters critical thinking, ethical concern, and proactive engagement with ecological sustainability.

The significance of environmental awareness has been recognized globally, notably at the Tbilisi Conference (Dorn, 1977), which outlined key objectives for environmental education: raising awareness, imparting knowledge, shaping positive attitudes, developing problem-solving skills, and encouraging active participation in environmental conservation. Building on this framework, contemporary studies have sought to explore how environmental awareness varies across student populations. For instance, Bharati et al. (2024) found that science stream students at the higher secondary level demonstrated greater environmental awareness compared to arts students. Similarly, research by Mondal and Mete (2010) and Kaur and Kaur (2017) identified differences in environmental awareness between rural and urban students and between those in private versus government institutions. Other studies (Gupta, 2018; Baruah et al., 2011) observed gender differences, with female students often exhibiting higher awareness levels. However, some findings, such as those of Kang and Grewal (2014) and Banerjee and Das (2014), indicated no significant disparities in certain contexts.

Despite the range of studies, a notable gap exists in current research: there is limited investigation into environmental awareness among college-level students in West Bengal, particularly within undivided Medinipur district. This study seeks to address that gap by examining environmental awareness across gender, locality, and academic disciplines at the undergraduate level.

2. REVIEW OF LITERATURE

Environmental awareness has emerged as a critical area of study in the context of sustainable development and education. Researchers worldwide have explored how various demographic and academic factors influence students' awareness and attitudes toward environmental issues. The following review is organized to reflect the themes corresponding to the hypotheses of this study.

2.1 Gender and environmental awareness

Several studies have examined the influence of gender on environmental awareness among students. Larijani (2010) reported that female students tend to display higher environmental awareness than their male counterparts, potentially due to differences in socialization and emotional responsiveness. Similarly, Baruah et al. (2011) found that girls possessed significantly more favorable environmental attitudes and practices than boys. On the contrary, Kang & Grewal (2014) and Banerjee & Das (2014), in their studies in West Bengal, did not observe any significant gender-based differences in environmental awareness among senior secondary students.

2.2 Locality (rural–urban) and environmental awareness

Research has also focused on the impact of students' locality on their environmental awareness. According to Mondal and Mete (2010) and Kaur & Kaur (2017), urban students generally demonstrate higher levels of awareness, attributed to greater access to information, exposure to environmental campaigns, and better school infrastructure. However, Kang & Grewal (2014) challenged this notion, reporting no statistically significant difference between rural and urban learners in their study.

2.3 Academic discipline and environmental awareness

Disciplinary background has shown to significantly affect students' environmental consciousness. Bharati et al. (2024) conducted a correlation study revealing that science stream students displayed significantly greater environmental awareness and scientific attitudes compared to arts students. This aligns with earlier research suggesting that science education exposes students more directly to environmental content, thereby fostering higher awareness. Kamble and Kazi (2018) similarly observed that commerce and arts students scored lower on environmental awareness tests than their peers from the science stream. Despite these findings, comprehensive studies comparing all three major streams—science, arts, and commerce—are still limited, especially in the context of undergraduate education in West Bengal.

While existing literature provides foundational insights into gender, locality, and disciplinary influences on environmental awareness, the results are often inconsistent or context-dependent. These gaps justify the formulation of the following hypotheses and the conduct of the present study:

H01: The mean shows no statistically significant variation in environmental awareness scores between undergraduate boys and girls.

H02: The mean shows no statistically significant variation in environmental awareness scores between undergraduate rural and urban students.

H03: No meaningful difference is found in the mean value of environmental awareness scores of undergraduate students based on their academic disciplines (science, arts, and commerce).

3. MATERIALS AND METHODS

The present study employed a quantitative, descriptive-survey research design, which is widely recognized for its effectiveness in systematically collecting, organizing, and analyzing information from a large sample to describe existing conditions and identify relationships among variables. This method was appropriate given the study's aim of measuring and comparing environmental awareness levels among undergraduate students across gender, locality, and academic discipline.

3.1 Population and sampling procedure

The target population of the study comprised undergraduate (U.G.) students enrolled in government degree colleges across the state of West Bengal. For operational feasibility and representation, the researcher employed a multi-stage random sampling technique. At the first stage, two districts, namely, Purba Medinipur and Paschim Medinipur, were randomly selected out of the total districts in West Bengal using a lottery method. At the second stage, four government colleges from each district (total eight colleges) were randomly selected to ensure equitable regional representation. At the third stage, students were sampled through stratified random sampling, stratified on the basis of gender (male/female), locality (rural/urban), and academic stream (science/arts/commerce). The final sample comprised 426 undergraduate students, including 196 males (46%) and 230 females (54%). In terms of locality, 195 students (45.8%) were from rural areas, while 231 students (54.2%) hailed from urban regions. Regarding academic stream, the participants included 156 science students (36.6%), 153 arts students (35.9%), and 117 commerce students (27.5%).

3.2 Variables of the study

The study investigated several variables, with the dependent variable being Environmental Awareness, operationally defined as the total score obtained on the Environmental Awareness Scale developed by the investigator, reflecting the student's knowledge, attitudes, and behaviors concerning environmental

issues. The independent categorical variables included Gender (boys and girls), Locality (rural and urban), and Academic Stream (science, arts, and commerce).

3.3 Instrumentation and tool description

The primary data collection instrument was a self-constructed and standardized Environmental Awareness Scale, developed by the researcher specifically for this study, adhering to established psychometric principles. The scale encompassed multiple dimensions of environmental awareness, including knowledge and understanding of environmental issues, attitudinal disposition toward the environment, concern for sustainability and ecological balance, and environmental practices and behavioral tendencies. Content validity was ensured through expert judgment from professionals in environmental science and education, while construct validity was confirmed via factor analysis based on a pilot study with 60 students. The reliability of the scale, assessed using Cronbach's alpha, yielded a coefficient of 0.84, indicating high internal consistency. The final version of the tool comprised 40 items, each rated on a 5-point Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1).

3.4 Data collection procedure

Permission was obtained from college authorities prior to data collection. The questionnaire was administered physically during class hours with the cooperation of institutional staff. The purpose of the study was explained, and participants were assured of anonymity and confidentiality. Completed responses were scrutinized for completeness and consistency before entry into the dataset.

3.5 Statistical techniques and hypothesis testing

To evaluate the hypotheses, data were coded and analyzed using SPSS (Statistical Package for the Social Sciences) version 26.0, with statistical tests selected based on the level of measurement and variable type. For Hypothesis H_{01}, which posited no significant difference in environmental awareness scores between undergraduate boys and girls, an Independent Samples t-test was conducted after verifying assumptions of normality and homogeneity of variance through Shapiro-Wilk and Levene's tests, respectively. Similarly, Hypothesis H_{02}, concerning rural and urban students, was tested using another Independent Samples t-test under the same assumptions. For Hypothesis H_{03}, which examined differences among academic disciplines (science, arts, and commerce), a One-Way Analysis of Variance (ANOVA) was employed, followed by Tukey's HSD post hoc test when the F-ratio was significant. All tests were carried out at a 5% level of significance ($\alpha = 0.05$), and effect sizes were calculated where applicable to assess the magnitude of observed differences.

4. RESULTS

Table 1 reveals that undergraduate girls (M = 172.17) scored slightly higher in environmental awareness than boys (M = 169.93). While the standard deviations indicate moderate variability in both groups, the small difference in means suggests a possible gender-based variation.

Table 1: Group statistics of environmental awareness of undergraduate boys and girls.

Group Statistics	Gender	N	Mean	Std. Deviation	Std. Error Mean
Environmental Awareness	Boys	196	169.93	10.782	0.770
	Girls	230	172.17	11.872	0.783

Source: Computed by the researcher.

Table 2 shows a significant difference in environmental awareness between U.G. boys and girls ($t = -2.025$, $p = 0.043$). Since $p < 0.05$, the null hypothesis is rejected, indicating that girls have significantly higher environmental awareness than boys.

Table 2: Analysis using independent samples t-test of environmental awareness of undergraduate boys and girls.

Environmental Awareness	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig. (p)	t	df	Sig. (2-tailed) (p)
Equal variances assumed	1.584	.209	-2.025	424	.043
Equal variances not assumed			-2.041	422.264	.042

Source: Computed by the researcher.

Table 3 shows that the mean environmental awareness scores of rural (M = 171.15) and urban (M = 171.13) undergraduate students are almost identical, with minimal difference. Although rural students show slightly higher variability (SD = 12.203) than urban students (SD = 10.752), the near-equal means suggest no noticeable difference in environmental awareness based on locality.

Table 3: Mean and SD of environmental awareness among undergraduate rural and urban students.

Group Statistics	Locality	N	Mean	Std. Deviation	Std. Error Mean
Environmental Awareness	Rural	195	171.15	12.203	0.874
	Urban	231	171.13	10.752	0.707

Source: Computed by the researcher.

Table 4 shows that the difference in environmental awareness between rural and urban undergraduate students is statistically not significant (t = 0.025, p = 0.980). Since the p-value is much greater than 0.05, the null hypothesis is accepted, indicating that locality has no significant effect on students' environmental awareness.

Table 4: Independent samples t-test of environmental awareness among undergraduate students based on rural and urban backgrounds.

Environmental Awareness	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	3.687	0.056	0.025	424	0.980
Equal variances not assumed			0.025	390.244	0.980

Source: Computed by the researcher.

Table 5 shows variation in environmental awareness among students from different academic streams. Science students had the highest mean score (M = 175.31), followed by commerce (M = 172.52), and arts students scored the lowest (M = 165.83). The standard deviations indicate moderate variability within each group.

Table 5: Descriptive statistics of environmental awareness among college students of different streams (science, arts and commerce).

Environmental Awareness	N	Mean	Std. Deviation	Std. Error
Science	156	175.31	12.056	0.965
Arts	153	165.83	10.297	0.832
Commerce	117	172.52	9.092	0.841
Total	426	171.14	11.425	0.554

Source: Computed by the researcher.

Table 6 presents Levene's Test for Homogeneity of Variances, which yielded a significant result (F = 4.054, p = 0.018). Since the p-value is less than 0.05, the assumption of equal variances is violated, indicating that the variability of environmental awareness scores differs significantly among the academic streams.

Table 6: Homogeneity of variances of environmental awareness among streams.

Test of Homogeneity of Variances			
Environmental Awareness			
Levene Statistic	df1	df2	Sig.
4.054	2	423	0.018

Source: Computed by the researcher.

Table 7 shows the results of Welch's ANOVA, which was used due to unequal variances across groups (as indicated in Table 6). The test yielded a statistically significant result (Welch's F = 30.749, p = 0.000), indicating that there is a significant difference in environmental awareness scores among students from different academic streams—science, arts, and commerce. Therefore, the null hypothesis (H_{03}) is rejected.

Table 7: Robust test of equality of means of environmental awareness across the stream students (science, arts and commerce).

Robust Tests of Equality of Means Environmental Awareness				
	Statistic[a]	**df1**	**df2**	**Sig.**
Welch	30.749	2	278.442	0.000

Source: Computed by the researcher.

Table 8 presents the results of the Games-Howell post hoc test, which was used due to unequal variances among groups. The test reveals that all pairwise comparisons between streams are statistically significant at the 0.05 level. Science students scored significantly higher in environmental awareness than both arts (mean difference = 9.478, p = .000) and commerce students (mean difference = 2.786, p = .033). Commerce students also scored significantly higher than arts students (mean difference = 6.691, p = .000). These results confirm that academic stream has a significant effect on environmental awareness, with science > commerce > arts.

Table 8: Multiple comparisons of environmental awareness among science, arts and commerce streams.

Stream (I)	Stream (J)	Mean Difference (I-J)	Std. Error	Sig.
Science	Arts	+9.478	1.215	0.000
	Commerce	+2.786	1.306	0.033
Arts	Science	-9.478	1.215	0.000
	Commerce	-6.691	1.311	0.000
Commerce	Science	-2.786	1.306	0.033
	Arts	+6.691	1.311	0.000

. The difference in means is statistically significant at the 0.05 level.

Source: Computed by the researcher.

5. DISCUSSION

The present study aimed to assess the environmental awareness of undergraduate students in the Medinipur district of West Bengal, focusing on three categorical variables: gender, locality, and academic stream. The findings offer critical insights into how these factors shape students' understanding and concern for environmental issues, while also aligning with or diverging from existing literature.

Gender differences in environmental awareness

The study revealed a statistically significant difference in environmental awareness between boys and girls, with female students scoring higher. This outcome aligns with the findings of Larijani (2010) and Baruah et al. (2011), both of whom reported that girls tend to exhibit stronger environmental attitudes and awareness. This may be attributed to the generally greater empathetic and nurturing disposition of females, which often translates into more pro-environmental concern and behavior (Zelezny, Chua & Aldrich, 2000). The result reinforces the need to incorporate gender-sensitive approaches in environmental education that empower both male and female students equally to act as change agents in sustainability efforts.

Locality-based comparisons: rural vs. urban students

Contrary to many previous studies (Mondal & Mete, 2010; Kaur & Kaur, 2017) that found urban students to have higher environmental awareness due to better exposure to media, resources, and school

infrastructure, the present study found no statistically significant difference between rural and urban students. This could reflect a positive shift in rural education and awareness levels, possibly due to improved internet access, digital initiatives in education, and community-based environmental programs. It may also point to a narrowing rural-urban gap in environmental literacy, suggesting the success of broad-based environmental education policies across both urban and rural settings.

Stream-wise variation in environmental awareness

The analysis indicated significant variation in environmental awareness among academic streams, with science students scoring the highest, followed by commerce and then arts students. This result is consistent with the study of Bharati et al. (2024), which highlighted that science stream students possess greater awareness, likely due to their curriculum's direct inclusion of environmental science, ecology, and sustainability topics. Similarly, Kamble and Kazi (2018) found that commerce and arts students had lower environmental scores than science students. The higher environmental literacy among science students underlines the importance of integrating environmental education across disciplines, especially in arts and commerce, where students may not naturally encounter such content in depth.

Post Hoc insights and educational implications

The post hoc Games-Howell test further confirmed that all pairwise differences between streams were statistically significant, with the largest gap observed between science and arts students. These disparities highlight a disciplinary divide in environmental understanding, which may result in unequal participation in sustainability initiatives and pro-environmental behaviors. Such differences call for curricular reforms that introduce interdisciplinary environmental education modules, as emphasized by UNESCO's Education for Sustainable Development (ESD) framework (UNESCO, 2017), which promotes environmental literacy as a cross-cutting competency for all learners, regardless of stream or background.

Contextual significance and regional relevance

This study fills an important research gap by focusing on college-level students in Medinipur district, a region largely underrepresented in environmental awareness research. The findings provide a baseline for future interventions and suggest that local context matters—policy responses should be regionally grounded, gender-aware, and academically inclusive to be truly effective. Additionally, the statistically non-significant impact of locality implies that awareness campaigns and school-level interventions in both rural and urban zones are beginning to level the playing field.

6. CONCLUSION

The study concluded that environmental awareness among undergraduate students in Medinipur district significantly varied by gender and academic stream, with girls and science students demonstrating higher awareness levels, while no significant difference was found between rural and urban students. These findings suggest that while locality no longer plays a decisive role, gender and academic exposure do influence environmental consciousness. The results highlight the need to integrate environmental education more effectively across all disciplines, particularly in arts and commerce, and to promote gender-inclusive strategies that encourage active environmental engagement among all students.

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