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Enhancing Environmental Awareness of Higher Secondary Students in Tamluk Sub-division, East Midnapore District, through Earthcomm Learning in the Geography Class

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Abstract

The research topic was on the efficacy of the Earthcomm learning model on creating better environmental awareness amongst higher secondary school students at Tamluk sub-division in East Medinipur district in West Bengal state in India. Conceptualization of environmental awareness was based on four indicators including: knowledge, attitudes, behaviours and skills in the process of environmental problems solving. The quasi-experimental design was taken in the Pre-Test and Post-Test non-equivalent control group design. The sample constituted 249 students of the six higher secondary schools were involved in the experimental and control groups. He used Earthcomm model with the experiment group to provide Geography lessons during the six weeks period compared to the Traditional classroom teaching of the control group. ANCOVA was used to analyse, the data obtained using a validated environmental awareness instrument. The findings showed that Earthcomm learning model produced significant effects on Knowledge, Attitudes, Behaviours, and Problem-solving Skills of the students on the environmental issues as compared to the control group. These findings advocate the inclusion of Earthcomm strategies in the teaching of Geography in order to enhance the environmental literacy that is taught to students at the secondary level.

Keywords: Earthcomm learning, Earth Education, Environmental Education, Earth Education as the subject of Geography, Geography as the subject of Education, Higher Secondary, East Medinipur, Tamluk Sub-Division

Introduction

A major issue that is etched in many developing nations such as India is the environmental issues. Such environmental issues are associated with factory operations and motor vehicles causing air pollution, utilization of natural resources that do not take into consideration the concept of sustainable development and the quantity of waste that is hard to process (Rathee & Thakran, 2017), a pollution of the environment accompanied by deforestation and drought (Cruz et al., 2014). The aspect of environmental problems is a challenging aspect of the government (Soni, Patil, & Argade, 2016). This can be attributed to absence of awareness to the people in preserving the environment (Desa, Abd Kadir, & Yusooff, 2012) as well as 20.5 percent of the high school students in East Midnapore District share poor environmental awareness (Kaur, 2017).

The attitude and behavior of the people who failed to endorse the program are likely to derail various programs initiated by the government. Actually, the community cannot solve the issues that emerge when the program is transferred fully to the community. There must be an effort to influence the community attitudes and behavior, particularly of school students. In turn, it is possible to develop environmental attitudes and behaviors when the instigating feelings already belong to the environment (Nazarenko & Kolesnik, 2018). Effective coaching is the kind of giving guidance ever early onset, is sustainable and is the most significant factor in both developing attitude and behavior regarding the environment (Pandey, 2014; Phan Hoang & Kato, 2016). The awareness of maintenance of a sustainable environment will be established once the attitudes and behaviors of caring about the environment grounded on knowledge have been cultivated (Mullenbach & Green, 2018).

Environmental education to students can be conducted in two ways through formal and informal education. Formal education has an organization and binding regulations like schools but informal education is education that is specific to a given area and time through the employment of technology without a firm commitment (Jurkovič, 2019). Formal education entails the application of different learning models where the learning goals can be attained easily. The implementation of a learning model which is correlated with the student conditions can augment the academic understanding of scholars (Yusnaeni, Corebima, Susilo, & Zubaidah, 2017). One such learning model is the Earthcomm learning model, which is capable of bringing the students and the teachers in direct contact with the real terms of the environment (Keeler & Mahootian, 1995). Environmental awareness can be influenced by involving the students in the process of carrying out inquiry learning in the field (Al-Balushi & Al-Aamri, 2014).

Environmental awareness is formed with concurrence of attitudes and behaviors in guarding the environment and knowledge, what is required in the management of the environment. This is because the attitude towards taking care of the environment may influence the behavior that individuals will give to the environment; this will depend on how much one knows (Meinhold & Malkus, 2005).

The three indicators relate with each other although environmental awareness demands the abilities to solve environmental problems as well (Sengupta, Das, & Maji, 2010). The literature on environmental awareness indicators has commonly been studied individually, as was the case in studies that assessed environmental awareness compared to environmental attitudes (Ajaps & McLellan, 2015; Anu, 2015; Sengupta et al., 2010), the Knowledge and attitude toward the care of the environment (Bradley, Waliczek, & Zajicek, 1999), environmental awareness in managing solid waste in Malaysia (Desa et al., 2012; Soni et al., 2016), Due to that, studies capable of investigating the entire environmental awareness in the context of knowledge assessment indicators, attitudes, behavior, and skills diagnostic in resolving environment issues are required.

Tamluk East Medinipur district of West Bengal in the coastal belt is an illustration of environmental problems such as erosion of riverbank, intrusion of salt, agricultural pollutants to the waters, and waste management. The area of use is ecologically sensitive due to the presence of the Rup Narayan River and nearness to the Bay of Bengal. Even after the great importance of the ecologic dimension, research has suggested that youth in the area has a low to moderate level of environmental awareness, especially with regards to environmental degradation and human activity strings.

Environmental awareness is one of the pivotal skills within the depth of school education which defines responsible citizenship. Nonetheless, traditional ways of teaching, which in most cases are based on textbook learning, cannot lead to thorough comprehension and behaviour. Earthcomm (Earth Science in the Community) learning model developed by the American Geological Institute can help in this particular gap as it focuses on inquiry-based, field-oriented and community-based learning.

This paper shall measure the feasibility of using the Earthcomm learning model as applicable in Geography classes to enhance environmental awareness to a large degree among higher secondary school students in the Tamluk Sub-Ddivision.

Literature Review

The learning that is executed in the classroom between the teachers and students should be structured to equip students in the face of the industrial revolution. These preparations are in the form of thinking skills, work skills, skills of using work tools, and survival skills (Chu, Reynolds, Tavares, Notari, & Lee, 2017). Besides, learning should be entertaining and engaging (Utami, Sumarmi, Ruja, & Utaya, 2016), give meaningful experiences, contribute to the process of critical and creative thinking (Puspitasari, Sumarmi, & Amirudin, 2016), and enhance problem-solving skill (Woa, Utaya, & Susilo, 2018). Community learning of earth science (earthcomm) is a learning that takes students both inside and outside the room. The benefits of earthcomm learning do not only focus on learning outcomes but also focuses on the learning process which is conducted by students. Furthermore, the goals of earthcomm learning are the following: 1) the demonstration of connection between the earth science and human

life, 2) solutions to problems faced by the community, 3) the great learning space, including subjects of the whole community, technology, and laboratories, 4) enhanced awareness of the students in their local, regional and global matter (Carpenter & Hoover, 2019; Sumarmi, 2015). Moreover, earthcomm learning demands much time to perform earthcomm learning of geography and geography as developed by American national education standards since the year 2001 (Park, 2001). The earthcomm learning stages are as follows: 1) scenario, 2) challenge, 3) assessment criteria, 4) goals, 5) think about it, 6) investigate, 7) reflection on the activity and challenge, 8) digging deeper, 9) checking of understanding and applying what you have learned, 10) preparing on chapter challenge, 11) further inquiry (Park, Yager, & Smith, 2005). Along with the fact that the environmental literacy of students can be observed through the knowledge level, it can also be observed through the attitude, the behavior, and the ability to address the environmental problems (Desa et al., 2012; Sengupta et al., 2010). Facts, concepts and the relationships to environment are the means through which students have knowledge (Fryxell & Lo, 2003). Besides this, student attitudes constitute descriptive evaluation of things or situations in terms of pledging agreement (or disagreeing) (Berkowitz & Bier, 2004). In the meantime, the attitude towards the environment on the side of students is perceived through the prism of imitation, manipulation, precision, articulation and naturalization (Krathwohl, 2002). The indicators that measure the skills of students in solving environmental problems include: the ability to set goals to be realized and mentioning of environmental issues, ability to mention different solutions, the ability to select different solutions to issues, and the ability to judge effectiveness of these solutions (Marzano, 2001). A scale is developed to assess environmental awareness of students according to the indicators of the knowledge, attitudes, behaviors and skills. Interesting student learning is that learning which draws upon context within the students. To conduct experiments, research, reflections, interviews and discussions, students become instantly involved in the learning process (Yusnaeni et al., 2017). The approach of caring towards resolving environmental issues cannot become the aspect that we can simply employ and apply traditional learning (Nazarenko & Kolesnik, 2018). The learning should avail skills to students without struggling with the understanding capability as well as capability to address environmental issues. The skills are competencies that students can acquire to keep up with the competition in the 21 st century. Learning models that enhance environmental awareness among students among others include learning based on integrating character values and critical thinking in Geography learning (Puspitasari et al., 2016), service learning models to environmental care attitudes (Kasi, Sumarmi, & Astina, 2018), project based learning model to student attitudes and behavior (Risnani, Sumarmi, & Astina, 2017), the value of the local-wisdom as a source material to develop environment-related awareness (Sumarmi, 2016), field trip According to the different types of learning models used to enhance community awareness in the environment, no researcher has adopted the earthcomm learning model where the focus integrates the process through which students undergo. Thus, the research topic focused on the use of the earthcomm learning model in enhancing knowledge, attitude, behavior and skills to solve environmental problems in high school learners was evaluated. The study outcomes were supposed to have the specifics to know about the degree of environmental awareness of high school pupils in respect of the indicators of knowledge, the notion of attitude, behavior, and sustainable abilities to address the environmental issue.

Objectives

i. To analyze the existing degree of environmental literacy amongst higher secondary school students, in the Tamluk subdivision, and the knowledge, attitudes, behaviours, and the problem-solving ability.

ii. To introduce the Earthcomm model of learning to geography classes and its outcomes in terms of environmental conscience of students.

iii. To Compare between Earthcomm-based instruction and conventional classroom delivery in terms of their relative impacts on environmental related knowledge, attitudes, behaviours, and competencies on the part of the students.

iv. To assess the incorporation of Earthcomm strategies into the geography curriculum at secondary level in learner-centered environments.

Hypotheses

i. Students that took part in a program meant to foster environmental literacy called Earthcomm show significantly better improvement in environmental cognition compared to students taught through traditional classroom-based instruction.

ii. Earthcomm participants demonstrate more positive environmental attitudes compared to their analogues received in a conventionally taught program having larger positive correlations between the exposure to the intervention and helpful environmental behaviour intentions.

iii. The learners who undergo the Earthcomm experience exhibit a much-enhanced ability in dealing with environmental issues.

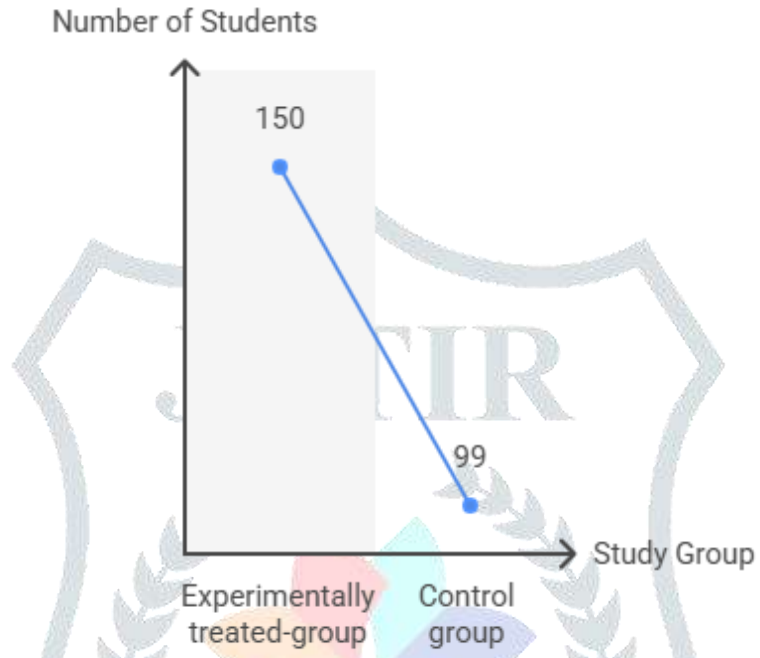
Research Design

The research involved quasi-experimental pretest-posttest non-equivalent control group study. The dependent variable was environmental awareness and the independent variable was teaching method (Earthcomm learning compared to the conventional manner of learning that is based on lectures).

Sample

The study has been made in the Tamluk subdivision of the East Midnapore (West Bengal) district. Six higher secondary schools with Class XI Geography were chosen on basis of purposive sampling so that they would represent both rural and semi-urban worlds. The students sample possessed the mean of 249:

Experimentally treated-group: 150 students



Distribution of Students in Study Groups

Attitudes (20 likert-items; appreciation, appreciation to organisation, acceptance appreciated, response; α 0.76)

Instruments

Environmental Awareness Instrument: The instrument was the modified version of previously used validated instruments in the previous studies (Desa et al., 2012; Sengupta et al., 2010), including:

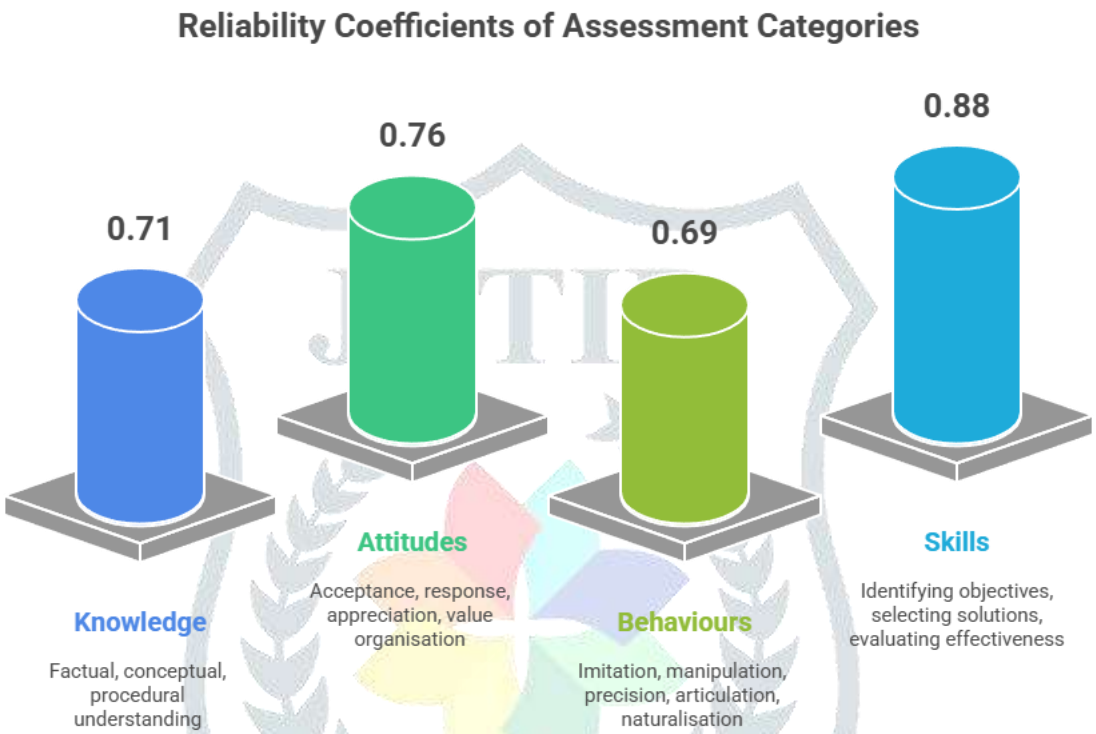
- Knowledge (Factual, conceptual and procedural; 5 open ended questions; 0.71α)

Attitudes (20 Likert-items; appreciation, appreciation to organization, acceptance appreciated, response: α = 0.76

Behaviours (imitating, manipulating, precise, articulating, and naturalising; 10 items of Likert-scale; α= 0.69)

Environmental problem-solving skills (identifying objectives/problems, identifying solutions, assessing effectiveness; 5 open ended items; 26 falling in the median of when I take environmental problems, I will need skills in modalities; 26); 1-8 α

It has been piloted to 80 students of a nearby subdivision where reliability and validity were checked.



Procedure

It was a six weeks intervention:

1. Both groups were provided with pre-test.

2. Geography instruction was carried out with experimental group with Earthcomm phases (scenario, challenge, field investigation, reflection, deeper inquiry, solution application) including teaching about dynamics of the hydrosphere, the quality of the water and interrelationship between man and environment. The presence of fieldwork was done at the Rupnarayan River whereby water quality testing was done and also interviews with the community.

3. In control group students were exposed to same contents by lectures and classroom discussion in textbooks.

4. Both groups were given the same instrument to take posttest.

Data Analysis

Data were analysed using SPSS v26.0. Normality and homogeneity were checked through Shapiro–Wilk and Levene's tests. ANCOVA was used to compare posttest scores between groups, controlling for pre-test scores.

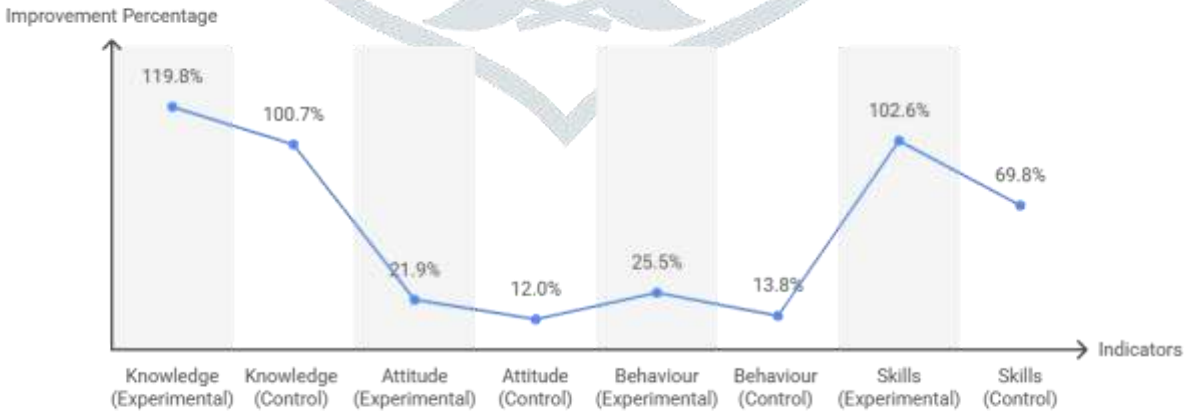
Findings

Table 1 presents the mean pre-test and post-test scores for the four indicators.

Table 1. Pre-test and post-test Scores for Experimental and Control Groups (n = 249)

Indicator	Group	Pretest (Mean)	Posttest (Mean)	Improvement (%)
Knowledge	Experimental	8.61	18.94	119.8
	Control	8.58	17.22	100.7
Attitude	Experimental	69.4	84.6	21.9
	Control	68.1	76.3	12.0
Behaviour	Experimental	30.2	37.9	25.5
	Control	29.7	33.8	13.8
Skills	Experimental	11.6	19.7	102.6
	Control	7.8	15.8	69.8

ANCOVA results indicated statistically significant differences between groups across all four indicators ($p < 0.01$), with the experimental group outperforming the control group.



Comparison of Experimental and Control Group Improvements

Discussion

The results support the possessions that the Earthcomm model does go a long way in enhancing environmental awareness in the higher secondary students in Tamluk. The greatest percentage increase was in the domain of knowledge and attitudes in line with Park and Park (2013) publication in Korea. The experiential basis and problem-solving aspects of Earthcomm also seem to be effective in skills and behaviours development to a large extent.

The coastal river line setting of Tamluk gave ample, real-life substance to the study, and this might have increased the model influence. Nonetheless, some logistical issues like securing field visitations and making available lab materials to do water test were mentioned.

Conclusion

Earthcomm learning model augers well in improving environmental awareness of the higher secondary students in the Tamluk subdivision in terms of knowledge, attitudes, behaviours, and problem-solving skills. A contextual and inquiry-based framework would fit the environmental education program conducted in ecologically sensitive areas.

Recommendations:

1. Use Earthcomm modules in WBCHSE Geography current syllabus.

2. Training of field based instructional strategies to the trainers.

3. Replicate such initiatives to other subdivisions that had environmental problems.

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