Journal of Education for Sustainable Development Studies
ISSN 3048-2054 (online) & 3048-2259 (print)
December 2025, Vol. 2, No. 2, pp. 140–145

Scientia Publica Media

Research Article

Effectiveness of the Structured Teaching Programme on Water Conservation Methods among School Children at a Selected Private School, Coimbatore

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Abstract
Water conservation has emerged as a critical global concern owing to rising demand, rapid population growth, urban expansion, and climate change impacts. India is particularly vulnerable, with many regions experiencing frequent water shortages, which underscores the role of education as a key approach for sustainable resource management. Within the framework of Education for Sustainable Development (ESD), it is essential to equip young learners with environmental knowledge, positive attitudes, and practical skills that foster responsible behaviours. The present study was undertaken to examine the effectiveness of a structured teaching programme (STP) on water conservation among school children. A pre-experimental one-group pre-test and post-test research design was employed with 100 students aged 14–16 years, purposively chosen from classes IX to X in a private school in Coimbatore. Data collection was carried out using a validated knowledge, attitude, and practice (KAP) tool comprising 15 multiple-choice questions to assess knowledge, 10 attitude statements, and 10 practice-related items scored on a five-point Likert scale. The intervention involved structured teaching sessions that combined interactive discussions, visual aids, and activity-based learning strategies. Statistical analysis was performed using SPSS version 26.0 with descriptive measures and paired t-tests. The findings demonstrated significant improvement across all domains. Knowledge scores rose from 7.5 to 12.8, attitude scores from 30.1 to 41.7, and practice-related awareness from 5.9 to 9.1, with all differences statistically significant at $p < 0.001$. Furthermore, 86% of students achieved knowledge scores above 10 after the programme, indicating effective knowledge acquisition. In summary, the study highlights that structured teaching is a valuable approach for enhancing awareness of water conservation in school settings. Embedding such interventions into the school curriculum can play an important role in advancing environmental sustainability and encouraging long-term behavioural change.

Keywords: Water Conservation, Structured Teaching Programme, Knowledge, Attitude, Practice, Education for Sustainable Development, School Children

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Received
July 18, 2025
Accepted
November 3, 2025
Published
December 1, 2025

Citation: Vadamalraj, K., Abdullah, F. B., Pandiyaraj, G. D., Prasad, G., Sabu, H. R., & Peter, I. S. (2025). Effectiveness of the structured teaching programme on water conservation methods among school children at a selected private school, Coimbatore. *Journal of Education for Sustainable Development Studies, 2*(2), 140–145.

DOI: 10.70232/jesds.v2i2.48

1. INTRODUCTION

Water is a vital natural resource that sustains life, yet its availability is under growing pressure due to rapid population growth, accelerated urbanization, industrial development, and climate change. In India, several states and districts are already categorized as water-stressed, and projections indicate that shortages may intensify in the coming decades if urgent conservation measures are not implemented (NITI Aayog, 2018). In India, nationwide campaigns such as the Jal Shakti Abhiyan (2019) have emphasized the urgency of water conservation and the need for active participation from schools and communities. Addressing this crisis requires a multi-pronged approach, in which education plays a pivotal role by promoting awareness and behavioural change at an early age.

The concept of Education for Sustainable Development (ESD) emphasizes equipping learners with the knowledge, skills, values, and attitudes necessary to make informed decisions and act responsibly for environmental protection (UNESCO, 2021). Within this framework, school children are particularly important as they represent future citizens who can influence both their peers and families in adopting sustainable practices. Schools, therefore, serve as an effective platform for cultivating environmental awareness and fostering responsible behaviours that can extend beyond the classroom into communities. The inclusion of environmental concepts in National Council of Educational Research and Training textbooks reflects national-level efforts to integrate sustainability education into early schooling (NCERT, 2020).

Structured Teaching Programmes (STPs), which follow a planned and systematic instructional approach, have proven useful in strengthening classroom-based learning outcomes. These interventions can engage students through interactive methods such as discussions, demonstrations, and activity-based learning, making them especially effective in environmental education. Although STPs have been widely used in health and academic domains, their potential to improve knowledge, attitudes, and practices (KAP) regarding water conservation in Indian school settings has not been adequately explored.

Earlier studies provide supportive evidence. For example, Lal et al. (2023) observed improvements in students' water-saving behaviours following an educational intervention, while Kaur et al. (2022) reported higher retention of environmental knowledge after structured teaching sessions. Sunila Kumari and Nayak (2023) highlighted that participatory models of education can promote long-term behavioural change. Despite these contributions, there remains a lack of empirical evidence focusing specifically on the effectiveness of structured programmes in cultivating water conservation practices among school-aged children using a KAP framework.

Therefore, this study was undertaken to evaluate the effectiveness of a structured teaching programme on water conservation among school children. The specific objectives were: (i) to assess their knowledge, (ii) to measure their attitudes, and (iii) to evaluate their practice-related awareness before and after the intervention.

2. METHODOLOGY

2.1. Study Design

A pre-experimental one-group pre-test and post-test design was employed to evaluate the effectiveness of a structured teaching programme on water conservation among school children. This design was considered appropriate as it enables the assessment of measurable changes in knowledge, attitude, and practice within the same group before and after the intervention, which is particularly suitable in school-based educational settings where randomization is often not feasible.

2.2. Participants

The study sample comprised 100 students aged 14–16 years, studying in classes IX to X at a selected private school in Coimbatore. Participants were chosen through a non-probability purposive sampling method.

2.3. Instrument

Data in the current study were collected using a structured questionnaire that was designed by the investigators after reviewing relevant literature and existing environmental education instruments. Content validity was established through expert evaluation by a panel of five specialists in community health nursing and environmental science. The tool was pilot tested among 20 students (excluded from the main study) to ensure feasibility, clarity, and reliability, yielding a Cronbach's alpha of 0.82. The questionnaire consisted of three domains: knowledge (15 multiple-choice questions), attitude (10 statements), and practice-related awareness (10 items). Attitude and practice were measured using a five-point Likert scale (Strongly Disagree = 1 to Strongly Agree = 5). Negatively worded items were reverse-scored to reduce response bias. Total

domain scores were computed by summing responses, with higher scores reflecting stronger knowledge, positive attitudes, or improved practice-related awareness.

2.4. Procedure

The intervention consisted of structured teaching sessions incorporating interactive discussions, visual presentations, and activity-based learning designed to enhance students' engagement and understanding of water conservation methods.

The study was guided by the following hypotheses:

H_0: There is no significant difference in knowledge, attitude, and practice scores before and after the structured teaching programme.

H_1: There is a significant difference in knowledge, attitude, and practice scores before and after the structured teaching programme.

2.5. Data Analysis

Data entry and analysis were carried out using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (including mean, standard deviation, frequencies, and percentages) were applied to summarize demographic and baseline data. To test the effectiveness of the intervention, a paired t-test was performed, as this test is appropriate for comparing two related samples and determining whether the mean difference in pre- and post-test scores is statistically significant. A *p*-value of less than 0.05 was considered the threshold for statistical significance.

3. RESULTS

The following tables present the findings on demographic distribution and the impact of the structured teaching programme on the knowledge, attitude, and knowledge on practice of school children regarding water conservation.

Table 1. Demographic Characteristics of Participants (N = 100)

Variable	Category	Percentage (%)
Gender	Boys	42
	Girls	58
Age	14-16 years	100
Class	9th–10th standard	100

The demographic characteristics of the participants are presented in Table 1. The sample included 100 students, of whom 58% were girls and 42% were boys, showing a slightly higher representation of female students. In terms of age, all participants were in the 14–16 years category, corresponding to students of 9th and 10th standard, which represents the mid-adolescent stage, which is a critical period for consolidating awareness and shaping sustainable behaviours.

Table 2. Comparison of Knowledge Scores Before and After Structured Teaching Programme (N = 100)

Assessment	Mean ± SD	*t*-value	*p*-value
Pre-test	7.5 ± 2.3	15.26	<0.001*
Post-test	12.8 ± 1.9		

The comparison of knowledge scores before and after the structured teaching programme is shown in Table 2. The findings revealed that the mean knowledge score increased from 7.5 (SD = 2.3) in the pre-test to 12.8 (SD = 1.9) in the post-test. This improvement was found to be statistically significant ($t = 15.26$, $p < 0.001$). These results clearly demonstrate that the structured teaching programme had a strong positive impact on students' knowledge regarding water conservation. The substantial gain in knowledge highlights

the effectiveness of interactive and activity-based teaching methods in enhancing students' conceptual understanding.

Table 3. Comparison of Attitude Scores Before and After Structured Teaching Programme (N = 100)

Assessment	Mean ± SD	*t*-value	*p*-value
Pre-test	30.1 ± 4.5	13.62	<0.001*
Post-test	41.7 ± 3.8		

The comparison of attitude scores before and after the structured teaching programme is shown in Table 3. The results show that the mean attitude score increased from 30.1 (SD = 4.5) in the pre-test to 41.7 (SD = 3.8) in the post-test. This difference was statistically significant ($t = 13.62$, $p < 0.001$), indicating a clear positive shift in students' attitudes toward water conservation. The findings suggest that the interactive teaching strategies not only improved awareness but also motivated students to develop more favourable and responsible views about sustainable water use.

Table 4. Comparison of Practice-related awareness Before and After Structured Teaching Programme (N = 100)

Assessment	Mean ± SD	*t*-value	*p*-value
Pre-test	5.9 ± 1.7		
Post-test	9.1 ± 1.3	11.74	<0.001*

The comparison of practice-related awareness scores before and after the structured teaching programme is shown in Table 4. The findings revealed that the mean score increased from 5.9 (SD = 1.7) in the pre-test to 9.1 (SD = 1.3) in the post-test. This improvement was statistically significant ($t = 11.74$, $p < 0.001$), indicating that the programme effectively enhanced students' awareness of practical water-saving behaviours. These results suggest that the structured teaching intervention successfully translated theoretical knowledge into awareness of day-to-day conservation practices, an essential step in fostering sustainable behaviour among adolescents.

As shown in the post-test results, 86% of students scored above 10 in knowledge, reflecting a strong grasp of the concepts delivered through the structured teaching programme. The intervention was effective in enhancing students' knowledge, attitudes, and awareness regarding water-saving behaviours. These outcomes are consistent with the findings of Sunila Kumari and Nayak (2023) and Lal et al. (2023), which demonstrated that school-based environmental education interventions significantly improve awareness and encourage sustainable practices. Similarly, a recent school-based WASH intervention in Madhya Pradesh, India, reported a substantial increase in germ-related knowledge from around 27% pre-intervention to over 70% post-intervention (Mushota et al., 2021), reinforcing the effectiveness of structured educational approaches. Importantly, such programmes not only strengthen understanding but also foster a sense of responsibility and promote long-term behavioural change among adolescents.

4. DISCUSSION

The findings of this study demonstrate that the structured teaching programme was effective in enhancing school children's knowledge, attitudes, and practices related to water conservation. The substantial gain in knowledge scores is consistent with recent studies such as Valenzuela-Morales et al. (2022) and Wang et al. (2024), who reported that interactive environmental education interventions significantly improved students' understanding of sustainability concepts. Similarly, Patel et al. (2019) observed that structured approaches to teaching enhanced the retention of environmental knowledge, further corroborating the present results.

The improvement in attitudes observed in this study also supports earlier work by Sunila Kumari and Nayak (2023), who emphasized that participatory and activity-based education fosters positive dispositions toward sustainability. The use of interactive discussions and visual aids in the structured teaching programme likely contributed to this attitudinal change by making conservation concepts more relatable and engaging. From a theoretical perspective, these outcomes are consistent with Bandura's Social Learning Theory, which highlights that participatory learning and observational reinforcement are critical in shaping pro-environmental behaviours.

The rise in practice-related awareness further strengthens these outcomes. Mostacedo-Marasovic et al. (2022) highlight that their research underscores the crucial role of water education in enhancing learners' comprehension and decision-making abilities about water resources, which is essential for addressing pressing water-related challenges now and in the future. Similarly, in the present study, the inclusion of activity-based learning modules may have bridged the gap between abstract knowledge and practical behaviour, highlighting the value of experiential learning in fostering environmental stewardship. These findings are also consistent with Mushota et al. (2021), who reported that school-based WASH (Water, Sanitation, and Hygiene) interventions significantly improved students' knowledge in resource-constrained settings.

Taken together, these results reinforce the effectiveness of structured, school-based educational interventions in promoting sustainable water-use behaviours. By situating water conservation education within the broader framework of ESD, the study underscores the transformative potential of embedding sustainability-focused programmes into school curricula, with implications for both individual behavioural change and collective environmental responsibility. This resonates with global reports such as the United Nations Environment Programme (2018), which emphasize the importance of strengthening water-related ecosystem education for ensuring long-term sustainability.

5. CONCLUSION

The findings of this study demonstrate that a structured teaching programme is highly effective in improving school children's knowledge, attitudes, and practices regarding water conservation. By addressing all three dimensions of the KAP framework, the intervention successfully equipped students with both conceptual understanding and practical awareness of sustainable water use. These results are consistent with earlier studies such as Sunila Kumari and Nayak (2023), Lal et al. (2023), and Mushota et al. (2021), who similarly reported that structured, school-based educational interventions significantly enhance environmental knowledge and promote sustainable practices. The findings support the integration of structured, activity-based modules into school curricula as a long-term strategy for fostering environmental responsibility and aligning with Education for Sustainable Development (UNESCO, 2021).

Despite these encouraging outcomes, certain limitations should be acknowledged. The study was limited to a sample of 100 students from a single private school in Coimbatore, which may affect generalizability. In addition, the short duration of the intervention did not permit assessment of long-term behavioural change or retention of knowledge.

Future research should consider larger and more diverse samples across varied geographic and socio-economic contexts. Longitudinal designs would be particularly useful to determine whether the observed improvements are sustained over time and translated into consistent conservation behaviours. Comparative studies across different age groups and school systems may also provide deeper insights into tailoring interventions for maximum effectiveness.

From a practical standpoint, this study highlights the value of embedding structured environmental education modules within regular classroom teaching. Teachers can adapt interactive and participatory approaches to make sustainability concepts more relatable, while policymakers and NGOs can leverage these findings to design large-scale school-based awareness campaigns. In this way, structured teaching interventions not only strengthen eco-literacy among young learners but also contribute meaningfully to India's national water conservation priorities and the global sustainability agenda.

Acknowledgment. We gratefully acknowledge our Principal, Dr. Girijakumari S, College of Nursing, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore, for her support and encouragement.

Research Ethics. This study involved a non-invasive educational intervention with school children. Although formal ethical clearance was not obtained from an institutional review board, permission was granted by the school authorities, and informed consent was obtained from all participants and their guardians. Confidentiality and anonymity were strictly maintained throughout the study.

Data Availability Statement. Data supporting the findings are available from the corresponding author upon reasonable request.

Conflicts of Interest. The authors declare that they have no conflict of interest.

Funding. This study received no external funding.

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