

Role Of School Level Intervention Module In Augmenting Water Conservation Attitude Among Early Adolescents In Bangalore

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ABSTRACT

Water scarcity in India is an enduring problem that affects a substantial proportion of the population annually. The adoption of a water conservation mindset among young adolescents can contribute to reducing the burden on the city's water supplies. Educating youth about the significance of utilizing water judiciously and cultivating conservation practices from an early age can yield substantial and enduring effects on the overall water consumption within the community. The project aims to develop a concise intervention program for young adolescents focused on water conservation, and to evaluate the influence of this program on the water conservation habits of young adolescents. The present study is an intervention study that utilizes a self-prepared water conservation intervention module. The intervention lasted for a duration of 2 weeks, consisting of 2 sessions per week. A study was conducted by selecting 20 boys and 20 girls from Class 8 using the simple random selection technique. A concise survey consisting of 10 items was developed to assess the attitude of the adolescents both prior to and following the intervention. The data was analyzed using SPSS software. Hypothesis testing was conducted using the Paired t test and Wilcoxon rank test. The findings indicated a notable and favorable influence of the intervention on the water conservation mindset of young adolescents. The intervention effectively influenced the favorable water conservation attitude of early adolescents. The significance results indicate a substantial rise in mean scores after the intervention, suggesting that the program was well-structured and had a significant impact on students' attitudes towards water conservation.

Keywords – Water Conservation, Attitude, Intervention, Early Adolescents

INTRODUCTION

In its most basic form, water is life. Water is essential for the survival of all forms of life on Earth. Everyone has their own unique interpretation of what water represents. Water is a symbol of health, cleanliness, dignity, and productivity in homes, classrooms, and businesses. Water can represent a bond with the natural world, one's community, and one's spiritual self in various religious and cultural contexts (Water fest, 2024). Water is a symbol of tranquillity, harmony, and preservation in natural settings. The increasing needs of agriculture and industry, along with the intensifying effects of climate change, pose a significant danger to the availability of water in today's world (Tzanakakis, 2020).

Water scarcity in India is a persistent issue that impacts a significant portion of the population each year. The consequences of this scarcity extend beyond human populations to include the ecosystem and agriculture. Despite having a population of over 1.4 billion people, India possesses only 4% of the world's fresh water resources (World Bank report, 2023). The drying up of rivers and reservoirs during the summer months, just before the monsoon season, further exacerbates this disproportionate availability of freshwater. Climate change has played a role in exacerbating the crisis, as delayed monsoons have led to the depletion of reservoirs in various regions. Insufficient infrastructure, government oversight, and uncontrolled water pollution are additional factors contributing to the water shortage in India (Water Aid, 2024).

Water shortage in Bangalore has been a growing concern for many residents, with the city facing a water crisis due to depleting groundwater levels and poor management of water resources (BPAC, 2024). The situation has become even more dire during the summer months, with many areas experiencing severe water scarcity and residents struggling to meet their daily water needs. Efforts are being made to address the issue, such as rainwater harvesting initiatives and increased water conservation measures, but more sustainable solutions are needed to ensure a reliable water supply for the future (BPAC, 2024).

Bengaluru is currently facing a severe water deficit due to a prolonged period of drought, which is said to be the most severe in the past 30-40 years. A study conducted by the Indian Institute of Science (IISc) has identified that the main cause of this water shortage is a significant decrease of 70 percent in the water spread area within the city. The city has had a significant increase of 1055 percent in built-up areas, specifically referring to concrete structures and paved surfaces, over the past few decades (Times of India report, 2024). Furthermore, there has been a significant decrease in the water surface area, which is currently considered the primary factor behind the declining groundwater level throughout the city. According to a study conducted by the Centre for Ecological Sciences at the Indian Institute of Science (IISc), the water

spread area has decreased by 70 percent, from 2,324 hectares in 1973 to around 696 hectares in 2023. The water surface area in Bengaluru in 1973 measured 2,324 hectares. Over the past five decades, as a result of irresponsible urbanization, the area covered by water has significantly diminished. Out of the water bodies that are still there, 98% of lakes have been encroached upon and 90% of them get untreated sewage or industrial effluents (Times of India report, 2024). According to Professor TV Ramachandra from the Indian Institute of Science (IISc), the recharge of the groundwater table has been affected as a result of this. The experts at the Indian Institute of Science (IISc) conducted a study to chart the changes and development of Bengaluru over the past five decades. Ramachandra stated that the decrease in water surface area has also impacted the replenishment of groundwater across Bengaluru. According to the report, the city's vegetation has decreased due to increased levels of air pollution and rising temperatures. In 1973, the proportion of developed land in the urban region, often referred to as the 'concrete jungle', was approximately 8 percent. By 2023, this figure had increased significantly to 93.3 percent. Remote sensing data for Bengaluru indicates that there are just 1.5 million trees supporting the city's population of 9.5 million. This means that there is only one tree for every seven people in the city (Times of India report, 2024). Nevertheless, the professor stated that this amount is inadequate to effectively isolate respiratory carbon, which amounts to 540-900g per individual on a daily basis. Karnataka's Deputy Chief Minister DK Shivakumar emphasized the severity of the issue by stating that a drought of this magnitude has not occurred in the past 30-40 years. "Despite previous instances of drought, we have never before declared such a significant number of taluks as being affected by drought," Shivakumar informed reporters recently. The Bangalore Water Supply India and Sewerage Board (BWSSB) implemented several measures to address the water shortage issue. These measures included prohibiting the use of drinkable water for non-essential activities such as vehicle cleaning, construction projects, entertainment purposes, and decorative features like fountains. Furthermore, it will also take action against anyone who engage in unauthorized drilling of borewells within the city boundaries (Times of India report, 2024).

Water conservation attitude among early adolescents can help alleviate the strain on the city's water resources. Teaching young people about the importance of using water wisely and practicing conservation habits early on can have a significant long-term impact on the overall water usage in the city (Mishra et al., 2021). By instilling a sense of responsibility and awareness in the next generation, we can work towards creating a more sustainable and resilient water system for our community. It is essential that everyone, including early adolescents, play a role in preserving our precious water sources for future generations to come. (Tiwale, 2021).

With this background, the current study aims at creating an intervention module to inculcate water conservation behavior among early adolescents.

REVIEW OF LITERATURE

In order to assess prior research and original investigations on water conservation attitudes, the study used a comprehensive literature review approach. Using the inclusion criterion of include only English studies published within the last fifteen years, a total of 34 papers were identified and chosen to be included in the review. After obtaining the full texts of the relevant research works, a total of 24 pieces of literature were chosen for a thorough evaluation of their quality. Iterative procedures and quality issues led to the exclusion of four papers from the analysis. A thorough evaluation of twenty pertinent academic literature concerning the topic forms the basis of the current investigation.

Researchers in Rawalpindi looked at how seriously locals take water conservation (Iftikhar et al., 2021) They found that the majority of residents in Rawalpindi were aware of the importance of water conservation but did not actively practice it in their daily lives. Despite this, there was a growing interest in sustainable water management practices, with many expressing a willingness to make changes in their behavior to help conserve water resources. The researchers concluded that education and awareness campaigns could help encourage more widespread adoption of water conservation practices in the community. The efficacy of water conservation initiatives in a developing economy was studied. (Maduku, D. K., 2021) The researchers found that while there was a genuine interest in sustainable water management practices, many residents lacked the knowledge and tools to effectively implement them in their daily routines. They suggested that targeted educational programs and community workshops could help bridge this gap and empower individuals to take action towards conserving water. Overall, the study highlighted the importance of both individual behavior change and community-wide initiatives in addressing water scarcity issues in Rawalpindi and similar developing economies. The study conducted by Sanchez et al. (2023) examined the factors that encourage or discourage water saving in households: They found that while most residents expressed a desire to conserve water, many were unsure of how to do so effectively. The study also revealed that access to information on water conservation methods was limited in the community, leading to a lack of awareness on simple strategies that could make a big impact. By promoting education and providing resources, the researchers believe that residents can be empowered to make a difference in addressing water scarcity issues in their region. (Malik, 2021) examined the demographic determinants and water conserving attitude of households at Katchi Abadis of Lahore , Pakistan. The study found that despite the lack of knowledge on water conservation methods, residents showed a positive attitude towards conserving water once they were educated on the subject. This highlights the importance of providing accessible and relevant information to empower communities to take

action towards sustainable water practices. By addressing this knowledge gap and fostering a culture of conservation, residents in Katchi Abadis can play a crucial role in mitigating water scarcity in their region. (Ataei, et al., 2022) looked at the demographics and water conservation attitudes of Lahore households in the Katchi Abadis. Analyzed farmers' water conservation behavior through a socio-cognitive lens. Their research found that households in Katchi Abadis were more likely to implement water-saving techniques such as fixing leaky pipes and using water-efficient appliances. Additionally, farmers in the region were found to be more conscientious about their water usage, leading to a decrease in water wastage and an increase in crop productivity. This study underscores the importance of understanding the cultural and social dynamics that influence water conservation behavior in order to effectively address water scarcity issues in marginalized communities.

(Savari, et al., 2022) The socio-psychological factors that influence rural Iranian households' decision to reduce their water use were investigated in a recent study . The researchers found that factors such as social norms, perceived behavioral control, and attitudes towards water conservation played a significant role in determining the water-saving behaviors of the participants. By gaining a deeper understanding of these factors, policymakers and organizations can develop targeted interventions and campaigns to promote sustainable water use practices in rural communities. This research highlights the importance of considering cultural and social influences when designing water conservation strategies to ensure their effectiveness and long-term success in addressing water scarcity challenges. (Van De Wetering et al., 2022) Examined the effects of environmental education on youth and their impact on the environment . Their study found that youth who received environmental education were more likely to engage in pro-environmental behaviors, including water conservation. This suggests that incorporating environmental education into school curriculums and community programs can help foster a culture of sustainability among future generations. Overall, their research emphasizes the crucial role of education in promoting environmentally-friendly practices and addressing pressing environmental issues such as water scarcity. (GRANINA, 2022) looked studied what motivates people to cut back on water use around the house. Their study found that individuals who were more knowledgeable about the environmental impacts of water consumption were more likely to make efforts to reduce their water usage. By understanding the importance of water conservation and the role it plays in sustainability, people were more motivated to take action in their daily lives. This highlights the significance of education in creating awareness and driving behavior change towards more sustainable practices. (Yazdanpanah, et al, 2016) examined the relationship between young adults' intentions to conserve water and their moral norms and sense of self. They found that individuals who had a strong sense of moral responsibility and identified with their role as environmental stewards were more likely to have intentions to conserve water. This suggests that personal values and beliefs play a significant role in shaping behavior towards sustainable practices. Overall, the study emphasizes the need for targeted educational programs that not only provide information but also foster a sense of responsibility and connection to the environment in order to drive positive change.

Research Gap - There have been numerous studies exploring water conservation, though many have taken a purely quantitative or qualitative viewpoint. What is lacking are intervention experiments capable of shifting the saving behaviors of early teenagers. This missing link is meaningful as those adolescent years establish habits and perspectives that last a lifetime. Implementing tailored programs emphasizing water preservation could cultivate a sense of duty and understanding during such formative ages, ultimately leading to a more sustainable and earth-conscious generation to come. Bridging gaps in such research is pressing to effectively tackle the looming issue of water scarcity while promoting increased conservation among youth. Tailored programs emphasizing water preservation implemented could nurture responsibility and insight during formative ages, leading ultimately to a more sustainable and nature-conscious generation future. It is important that gaps in such inquiry are closed to adequately address water scarcity's growing problems while advertising further conservation among the young.

Research Objectives

1. To design a short intervention programme for early adolescents on water conservation
2. To assess the impact of intervention program on the water conservation behaviour of early adolescents

RESEARCH METHODOLOGY

Research design

The current study is an intervention study, which uses a water conservation intervention module which is self-prepared. The intervention run for 2 weeks with 2 sessions per week.

Table 1 – Intervention module for water conservation module

Day/Week	Activity	Time	Materials
WEEK 1	How much water in the world?	25 mts	Exploration- Bar graph labels print

DAY 1`	Using graphs and estimation, students in this lesson find out how much salt water there is on Earth compared to how much fresh water there is. Create a global water map The pupils are asked to record the quantity of fresh, clean, and salt water in their designated area of the planet by counting squares on maps. After that, they determine the percentage of each form of water on Earth by analyzing the graph. (Students can also work in pairs)	25 mts	out. - Where in the world is my map? Worksheet - 1 per class. Hands on activity- World maps worksheet- 1 per 16 students Blank paper- 1 sheet per student Marker- 1 marker per student Scotch Tape- 1 roll per class Post- its ½ Or dot strikers 3 pads per class
WEEK 1 DAY 2` .	A. Do you know where your water comes from ? how are they different from each others? This power point slides set introduces fact about the global distribution of water geologically. The different sources of water and how different they are from each other. The percentage of distribution of water is classified. With pictures and illustrations, student quiz is prepared to reflect on their learning. B. Video presentation Where is water ? The water rooms. C. Student Quizz	25 mts 15 mts 10 mts	Prepared power point slides with pictures and illustrations. Earth blue planet 7slides A film by UNESCO WWAP (world water assessment programme) Quiz prepared bases on the topic (10 questions)
WEEK 2 DAY 1	A. PPT- water scarcity in India: the greatest Indian thirst ! This power point slides gives students an understanding about water stress & crisis in Indian with statistics. B. Short film- Catching the Rain in India. Dead Lakes Alive: Witness (Reclaiming Dead Lakes)	15 mts 25 mts	Prepared PPT Aljazeera English
WEEK 2 DAY 2	A. PPT- Stop pollution the only solution. This power point slides set highlights water pollution, causes, categories of water pollution, common types of water contamination. The effects of water pollution and prevention are explained through pictures and illusions. B. Student Quiz	30 mts 15 Mts	Prepared PPT (10 slides) Quiz prepared based on the topic.

Sample design

Using the simple random sampling technique, 20 Boys and 20 Girls from Class 8 were selected for the study to measure their water conservation attitude. The students were given a survey with questions related to their knowledge and practices regarding water conservation.

Data Collection Tools and Techniques

A simple questionnaire with 10 items was prepared to measure the attitude of the adolescents before and after intervention.

Plan of Statistical analysis

SPSS software was used to analyses the data, Paired t test are used for testing of Hypothesis.

RESULTS AND DISCUSSION

The demographic profile of the respondents show that there were equal number of boys and girls who participated in the experiment. The early adolescents belong to the age group of 13-15 years. The students in the current study belonged to middle income families with most parents working in reputable firms and professions. More than 60% students lived in apartments and were part of nuclear families.

Testing of Hypothesis

H01- There is no significant positive impact of the intervention on the water conservation attitude of early adolescents

HA1- There is a significant positive impact of the intervention on the water conservation attitude of early adolescents

Table 2 – Results of Paired t test – positive impact of the intervention on the water conservation attitude of early adolescents

		Mean	Mean Difference	p values
Pair 1	PRE_EXP_WC_1 More attention to water conservation is needed.	4.83		
	POST_EXP_WC_1	4.83	0.000	1.000
Pair 2	PRE_EXP_WC_2 I conserve water whenever I can.	4.00		
	POST_EXP_WC_2	4.38	-0.375	0.009
Pair 3	PRE_EXP_WC_3 I am very positive about water conservation.	4.43		
	POST_EXP_WC_3	4.45	-0.025	0.008
Pair 4	PRE_EXP_WC_4 I could make more effort to conserve water.	4.28		
	POST_EXP_WC_4	4.55	-0.275	0.047
Pair 5	PRE_EXP_WC_5 Everybody should save water because water resources are limited.	4.55		
	POST_EXP_WC_5	4.70	-0.150	0.008
Pair 6	PRE_EXP_WC_6 Everybody has the right to use water according to his/her own interest, and the government should satisfy everyone's demands.	3.35		
	POST_EXP_WC_6	4.43	-1.075	0.000
Pair 7	PRE_EXP_WC_7 If circumstances allowed you, would you like to reduce water consumption at home?	4.20		
	POST_EXP_WC_7	4.58	-0.375	0.023
Pair 8	PRE_EXP_WC_8 If circumstances allowed you, would you like to change or install some water-saving appliances?	4.28		
	POST_EXP_WC_8	4.58	-0.300	0.057
Pair 9	PRE_EXP_WC_9 Water conservation is important.	4.88		
	POST_EXP_WC_9	4.95	-0.075	0.009
Pair 10	PRE_EXP_WC_10 Water conservation is necessary because of water scarcity.	4.50		
	POST_EXP_WC_10.	4.60	-0.100	0.004

The results of the Paired t test show that the mean scores for the water conservation attitude substantially increase post intervention. The mean differences are also negative indicating betterment in water conservation attitude among early adolescents; the p values below 0.05 indicate that there is significance of the results and there is a positive impact of intervention on the water conservation attitude. Overall the intervention was successfully made an impact on positive water conservation attitude of early adolescents. The significance results show that considerable increase in mean scores post-intervention which clearly implies the program was well ordered and really has made impact on students attitude towards the water conservation. These are the reasons why similar interventions shall definitely apply on youth people. The early adolescence is the right time to bring responsibility among individuals. The adulthood starts with this age, and at this juncture when they are at right age the individuals should prove their responsibility towards their nation, surroundings, home and the nature.

CONCLUSION

Water is the earth's most valuable yet scarce resource, and educating youth about prudent usage is paramount. By instilling conservation attitudes in young adolescents, we foster a generation mindful of moderating demand and preserving supplies for successors. Through age-appropriate lessons and hands-on projects, students can cultivate empathy for ecosystems and habitats dependent on consistent flows. With guidance, youth may internalize their role safeguarding aquifers, streams, and other sources sustaining all life.

The present effort prototypes interventions meriting future quantitative analysis. Scholars could interview conservation champions regarding programs engaging youth. Gathering perspectives from dedicated stewards reveals strategies resonating with young minds and motivating responsible actions. By discussing aims and obstacles with experts and volunteers, researchers, educators, and communities can work in concert ensuring prudence and protection characterize water valuation for generations to come. Sustainable solutions demand collaborative efforts across disciplines and demographics.

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