CURRICULUM ANALYSIS FOR WASTE MANAGEMENT EDUCATION: A STUDY OF GUJARAT

Research Paper

ABSTRACT

The paper analysed waste management education delivered at Gujarat Secondary and Higher Secondary Education Board (GSEB) schools in Gujarat. Research studies indicated that 90% of municipal solid waste found its way into opendumps, with severe health hazards and environmental degradation. A set of primary data from 24 schools was collected by making use of structured questionnaires filled out by school teachers. The findings revealed that waste disposal practices at the school level, and found that 61.5% schools rely on municipal services to dispose waste generated within their premises. It also concluded and calls for increasing the strength of environmental education, upgrading the hands-on training of teachers, and implementing changes to the curriculum to mitigate these issues effectively.

Keywords: *Gujarat, GSEB, Waste Management Education*

Introduction

Waste is one of the most important inducers of environmentaldegradation, health, and ecological imbalance, wherein industrial, commercial waste, andresidential waste are the highest contributors in causing harm to the environment. In 2020, theglobal direct cost for solid waste management was estimated at USD252 billion. By 2050, the global generation is estimated to be 3.4 billion tonnes (WorldBank, 2018), and will cause significant economic challenges globally. The Sustainable Development Goals (SDGs) work towards a responsible consumption and production chain and aim to improve waste management systems and recycling, while also reducingthe amount of waste generated through education and policy changes. The problem of waste management is growing rapidly in India, and this issue has been discussed on every platform possible. The volume of municipal solid waste generated annually in India is over 62 million tonnes, and according to the Swachh Bharat Mission, it will double by 2030. Only about 75-80% of waste is collected out of it, less than 25% is processed, and the rest of the waste goes into open dump or landfills, according to the Ministry of Environment, Forest and Climate Change (MoEFCC, 2016). Results from a study show that the major issue is not waste generation but its management. Not all the measures that the Indian government has come up with have been implemented uniformly across, posing problems at local levels as well. All cities encounter challenges in the effective implementation of waste management policies, as stated in the report of the Central Pollution Control Board (CPCB, 2020).

Background of the Study

Environmental education is an essential tool for addressing environmental challenges caused by human activities and promoting sustainable development. However, its implementation in India faces challenges, despite mandates such as the Supreme Court's requirement for environmental teachings. Schools struggle to integrate these topics effectively into their overall structure, highlighting the need for active and practical engagement similar to programs like Australia's WasteWise Schools, which adopts a 'whole school' approach (Amy, 2010). While initiatives like the Clean India Mission and Swachh Bharat Abhiyan have raised environmental awareness, issues such as inadequate infrastructure, limited community participation,and insufficient teacher preparedness continue to impede effective education.Addressing these gaps requires innovative pedagogy, enhanced educator capacity, andstronger coordination between schools, civil society, and

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policymakers.

Amy (2010) reported that the Waste Wise Schools Program in Victoria, Australia, increased teacher engagement, whole-school participation, and collaboration with localauthorities. However, further research on higher-order practices like refuse, rethink, andreplant was suggested. Prakash, Yogesh, and Rajani (2013) criticized the lack ofsustainability-focused courses in traditional Indian curricula and recommended a holisticapproach, incorporating the concept of the 'triple bottom line' and aligning with frameworks such as the United Nations Global Compact and PRME. The University Grants Commission's directed to include environmental education in higher educationinstitutions which supports this approach. Jubilee and Shireesh (2015) conducted an experimental study integrating sustainable development into the curriculum, finding that students in the experimental group scored significantly higher ($p < 0.05$) on sustainable development knowledge compared to the control group, highlighting the importance of embedding sustainable pedagogy at all educational levels.

Shivika et al. (2017) reviewed urban waste management in Ahmedabad, emphasizing the environmental impacts of waste generation and forecasting patterns to 2035, stressing the need for sustainable practices to reduce greenhouse gas emissions.Suhail et al. (2017) examined global environmental education and its adaptation in India, noting the role of court directives in reinforcing EE implementation. Esha, Gayatri,and Rahul (2022) highlighted the critical role of community participation in Ahmedabad's waste management, advocating source segregation and school-based awareness programs to foster responsibility.

Rationale for the study

In India, landfills are a significant problem that affects cities and towns. The state, which produces around 10,317 tonnes of municipal solid waste per day, is Gujarat. Lack of education regarding waste segregation and waste management, coupled with barriers in public education and participation, impedes the effective resolution of the existing problem in Gujarat. If such policies from the municipal corporation are put into action, proper education drives would be strengthened.The literature demonstrates the necessity of integrating sustainability and waste management into school curricula while revealing persistent gaps, including the absence of coherent models linking theory with practical learning, inadequate teacher training, limited community involvement, and insufficient evaluation of long-term program outcomes. This study seeks to address these gaps by examining curriculum deficiencies and current waste management practices in Indian schools.

Research Paper

Objectives of the Study

1. To investigate how waste management concepts are incorporated into the curriculum of GSEB-affiliated schools in Gujarat.
2. To assess the waste handling and disposal practices followed by these schools.
3. To determine the short comings and missing elements in the existing curriculum regarding waste management education.

Methodology

The study employed a structured methodology to examine waste management practices and their integration into the curriculum in GSEB-affiliated schools across various districts of Gujarat, covering urban, semi-urban, and rural areas. A snowball sampling technique was used, with initially contacted teachers referring other eligible participants to ensure broad representation. Data were collected through a structured questionnaire administered to school teachers, combining closed-ended questions for quantitative analysis and open-ended questions for qualitative insights.Teachers were briefed on the study objectives and assured of confidentiality. This approach enabled the collection of diverse and comprehensive data on both theoretical and practical aspects of waste management in schools across Gujarat.

Analysis of Data

Data were analyzed using various graphs and diagrams to understand waste management practices in schools. This analysis helped identify patterns and trends, evaluate the effectiveness of existing initiatives, and highlight areas needing improvement. Visual representations provided a clear overview of current practices and guided recommendations for better waste management strategies.

Questionnaire Focus

Curricular content refers to the themes and concepts included in the educationalframework that guide students' learning. In this study, teachers were asked under which themes waste management education is covered in the curriculum.

From the responses of teachers, it is found that recycling is the most emphasized theme in the school curriculum,followed by environmental implications. While circular economy concepts and wastesegregation are included, they receive less attention. Moreover, it indicates a strong focus onpractical actions but a limited integration of broader sustainability concepts, highlightingthe need for a more balanced and comprehensive approach to waste managementeducation

Subjects in which waste management is taught. Around 70% of the surveyed schools include waste management in their curriculum.Among these, the majority of content appears in Science (50%), followed by Environmental Science (31.3%), Social Studies (12.5%), and General Knowledge(6.3%). It shows an intense concentration in science-based subjects, with scope forwider interdisciplinary integration.

Time Duration of Topics Taught in Curriculum

The findings revealed that most schools teach waste management once a year, followed by once per term, and less commonly once per month. Further, it suggests that although waste management is included in the curriculum, its coverage may not be frequent enough to ensure consistent understanding and reinforcement among students.

Activities Included in Curriculum

The Awareness campaigns are the most common, conducted by 37.5% of schools, focusing on educating students and staff about waste reduction and recycling. Workshops and seminars are organized by 4.2% of schools, providing more in-depth knowledge and practical skills. Community projects, involving residents in waste management initiatives, are carried out by 16.7% of schools. Both recycling projects and clean-up drives are implemented by 20.8% of schools each, offering students hands-on experience in waste reduction and actively engaging them in environmental responsibility. This distribution highlights the varied approaches schools use to promote sustainable practices among students.

Changes in Students' Behaviour

From the findings it is found that students most commonly practice better waste segregation, followed by participation in community projects, while increased recycling is still limited.These behaviors indicate that waste management education programs have positively influenced students, helping them adopt sustainable practices in their daily lives.

Proposed Modifications in Curriculum

Teachers recommended several improvements to enhance waste management education within the curriculum. They emphasized the use of creative teaching techniques, such as interactive games and projects, to make learning more engaging for students. Interdisciplinary approaches were also suggested, integrating subjects like geography and policy to provide a broader understanding of waste management.Additionally, teachers highlighted the need for continuous professional development, recommending regular training to strengthen their knowledge and teaching skills. Finally, they advised incorporating more detailed topics, including advanced concepts like the circular economy and sophisticated recycling techniques, to ensure students gain a comprehensive understanding of sustainable practices.

It is highly recommended by the teachers that the school must have more creative teaching techniques to teach waste management, followed by more topics inclusion and interdisciplinary approaches.

The findings revealed this 61.5% of schools have waste collected daily by the local municipality, while 23.1% use private waste management companies. Notably, 69.2% of teachers are unaware of what happens to the waste after collection, indicating a gap in knowledge or communication about its final disposal or recycling.

Conclusion

The study identifies significant gaps in waste management education in GSEB schools, highlighting a focus on theory over practical experience, limited student engagement, and a lack of teacher training. To promote sustainable behavior, schools should implement hands-on projects that cover segregation, recycling, waste prevention, and hygiene, while educating students on the long-term environmental, health, and economic impacts of poor waste

management. Although the study focuses on GSEB schools, further research across other boards could provide broader insights for developing universal sustainability strategies.

The Policy recommendations include instituting schoolwide waste management programs involving students in recycling and monitoring activities, collaborating with local government agencies for workshops and clean-ups, conducting awareness campaigns to foster understanding of environmental and economic impacts, and enforcing curriculum-integrated policies with regular audits. These measures aim to cultivate environmentally responsible students who actively contribute to sustainable practices.

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Research Paper

Continuation of Page 9

ATTITUDE OF HIGH SCHOOL...

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