CAG
Citizen consumer and civic Action Group

IMPACT ASSESSMENT REPORT

Pilot phase of introducing climate change as a curriculum in select schools in Chennai

February 2023

Author:

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Acknowledgements:

The author acknowledges Vamsi Sankar Kapilavai and S. Saroja for their critical review of the report and Benedicta Issac for editing the report.

Introduction

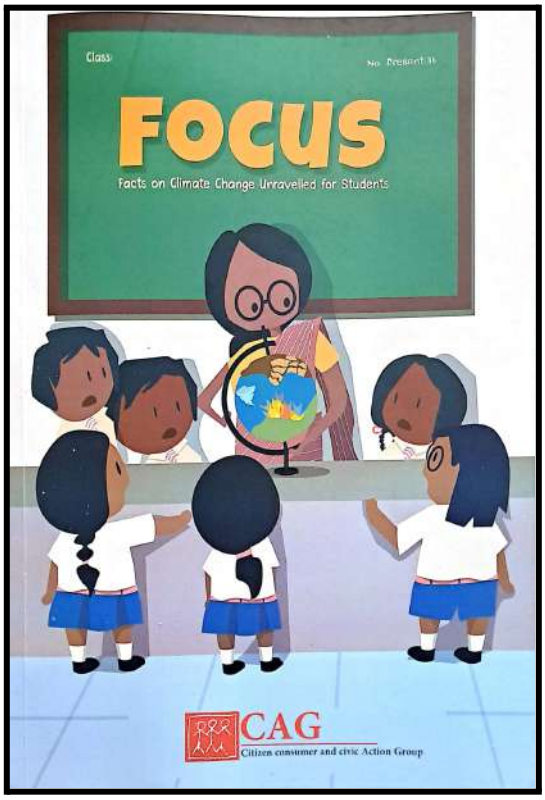
Climate change is one of the most significant challenges facing humanity today. With rising global temperatures, increasing greenhouse gas emissions, and the threat of extreme weather events, it is essential that we equip the next generation with the knowledge and skills they need to understand and address this issue. This is where education has an important role to play in preparing the next generation to address this global problem.

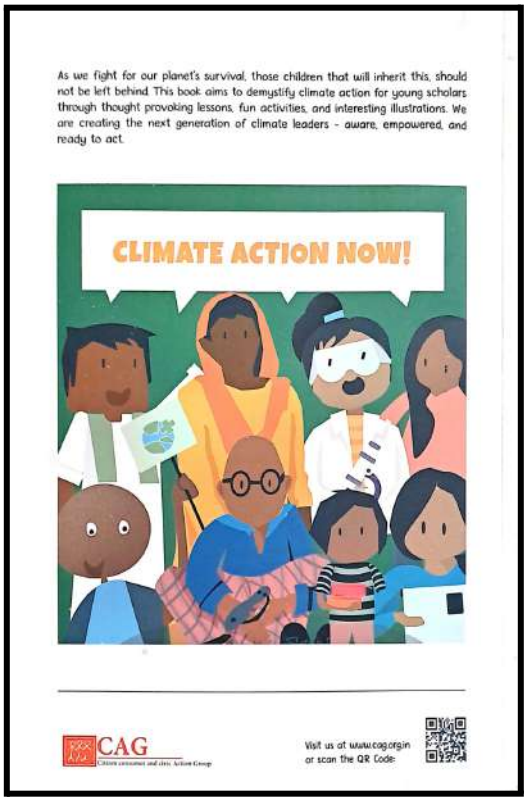
Literature Review:

A growing body of research has highlighted the importance of climate change education for middle school students, who are at a crucial stage of cognitive and social development. Effective climate change education can not only improve students' understanding of the science behind climate change but can build their knowledge of environmental issues, develop pro-environmental attitudes, and promote sustainable behaviours. Studies have shown that hands-on, inquiry-based learning experiences and the use of multimedia resources can be particularly effective strategies for teaching climate change to middle school students as it promotes critical thinking and problem-solving skills.

In this study, we sought to evaluate the impact of a new curriculum on climate change education in middle school, with a particular focus on students' knowledge, attitudes, and behaviours related to climate change. This curriculum was specially curated by CAG, involving several months of exploration on how best to break down the complex subject of climate change to middle-school children in India. The book aims to demystify climate action through thought-provoking lessons, fun activities and interesting illustrations. The intention is not to scare the next generation but to create the next generation of climate leaders - aware, empowered and ready to act. The content once researched and compiled was then sent to a team of well-experienced social science teachers across India for review of the authenticity of the content and their suggestions were incorporated. In addition to crafting the curriculum, our comprehensive approach to enhancing climate change education includes the development of a detailed lesson plan. This plan serves as a valuable resource for educators, offering step-by-step guidance on effectively imparting

the curriculum's content in middle school classrooms. By providing teachers with a structured framework, we aim to facilitate seamless implementation and ensure that students receive a well-rounded understanding of climate change. The pilot phase was implemented as a 15-hour course with 8 hours of classwork and 7 hours of homework. This phase of implementation took place in two schools in Chennai: Vidyaniketan Matriculation Higher Secondary School in Ashok Nagar and Church Park Convent, Gopalapuram (which included students from both Sacred Heart Matriculation Higher Secondary School and ST. Ursula's Anglo-Indian Higher Secondary School that falls under the umbrella of Church Park Schools). This multi-school approach allowed us to gather diverse insights and perspectives, enriching our understanding of the curriculum's effectiveness across different educational contexts and student demographics.





Research Methodology:

A 360 ° method impact assessment approach was used to evaluate the impact of the new curriculum on climate change education in middle school.

- The pilot phase was implemented in two schools in Chennai with a total of 47 students from 2 schools.
- The schools were selected in such a way that one caters to children from affluent backgrounds and the other, to kids who are first-generation learners. This was intentionally done to gauge the effectiveness of the curriculum across the socioeconomic spectrum and understand if the level of language and the delivery of the curriculum remained appropriate to all groups of children.
- The age group selected for this pilot phase was between 11 years to 14 years ranging from 6th-grade to 8th-grade students.
- Volunteer teachers from social science backgrounds with considerable teaching experience were selected for the pilot phase. Regular orientation sessions were held and training was imparted to incorporate climate literacy in the teachers themselves, along with practical tips on how to deliver the lessons, and important pointers to look out for.
- Pre-and post-surveys were administered to assess students' knowledge of climate change and to measure their attitudes and behaviours related to the environment.
- A similar strategy was adopted to assess the teachers along with semi-structured interviews to gather their perspectives on the effectiveness of the new curriculum.
- The feedback from teachers was documented at the end of every lesson to learn the effectiveness of the lesson plan and the challenges that they had to face in completing each unit.

Findings:

The analysis of the data obtained has been divided into two categories

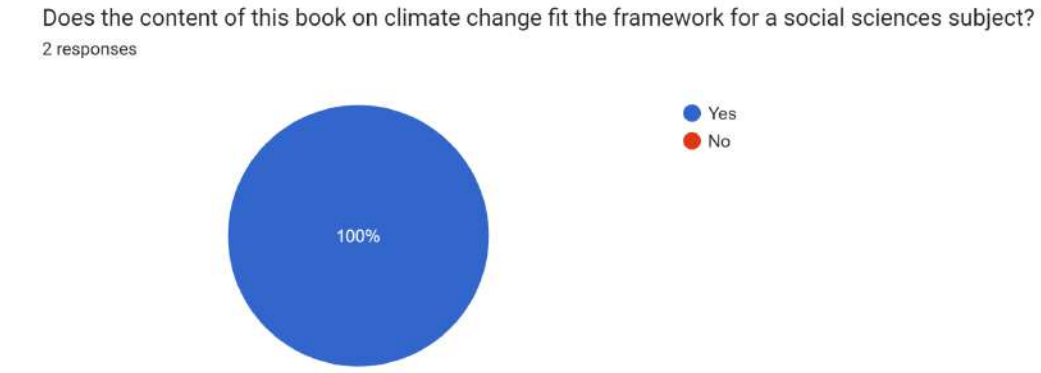
- Quantitative data was obtained from questionnaires that students and teachers had to undertake at various stages of curriculum deployment: the planning phase, implementation phase, and assessment phase.
- Qualitative data were obtained from interviews and feedback from teachers and students. Classroom observations were periodically undertaken to understand the student's response to the new curriculum

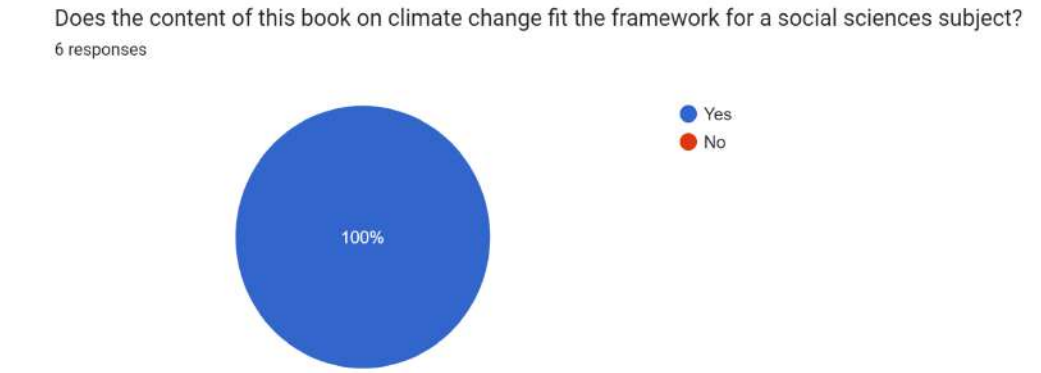
The results of the study indicate that the new curriculum on climate change has a significant positive impact on student and teacher knowledge, attitudes, and behaviours related to climate change.

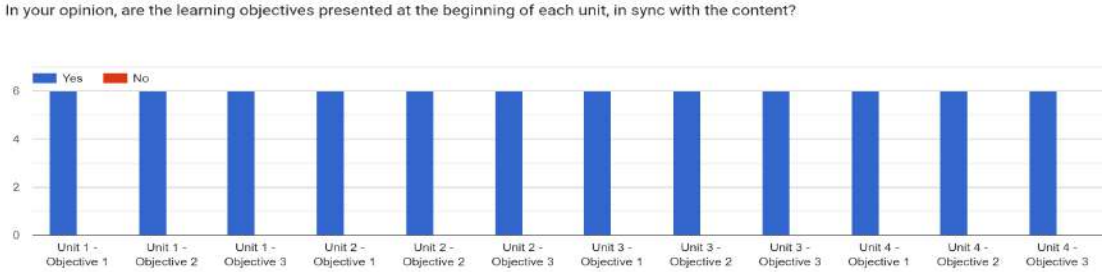
➔ Textbook content review:

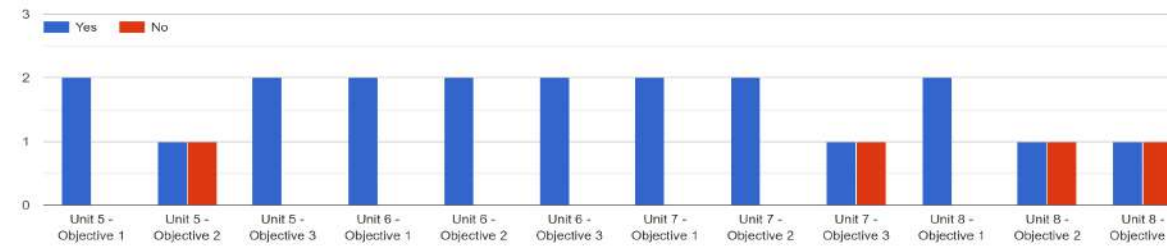
- Once the curriculum was curated, six social science teachers from all over the country were asked to review the content to confirm whether the content of the book fit the framework of a social sciences subject and whether the learning objectives presented at the beginning of each unit are in sync with the content
- Based on their response, there was a 100% consensus among the teachers that the content fit the social science framework
- With regards to whether the learning objectives presented at the beginning of each unit were in sync with the content, there were certain suggestions given by a couple of teachers to reword the objectives in a few lessons. The team reviewed it and made changes to the learning objectives accordingly.

Figure 1: Findings of textbook content review





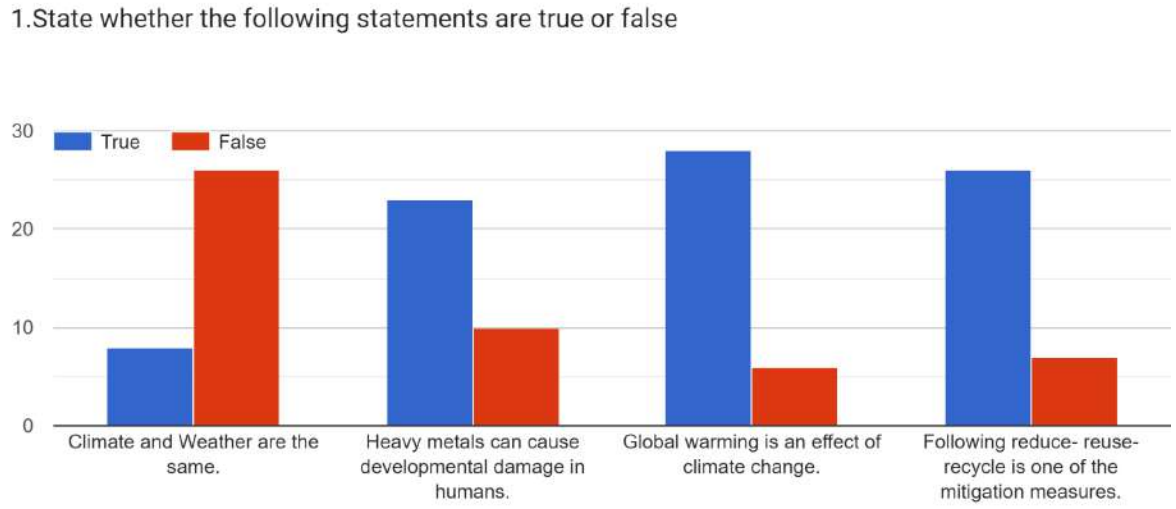


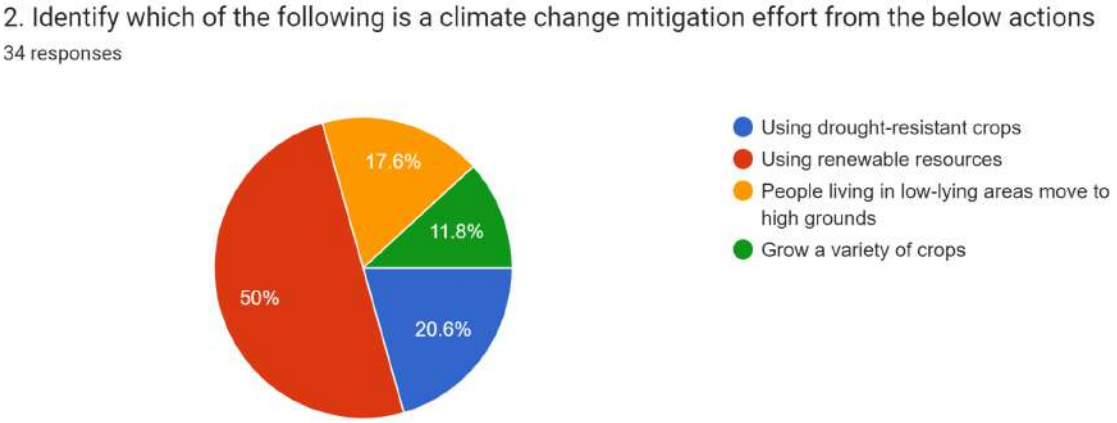


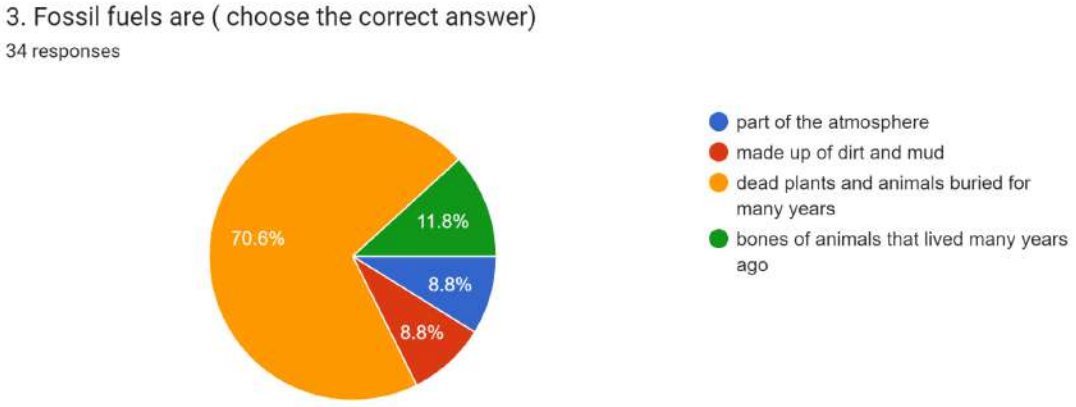
➔ **Pre - post-survey questionnaire for students:**

- Students in the intervention group showed a significant improvement in their understanding of the causes and consequences of climate change, as well as their ability to critically evaluate and analyze information related to the issue. The results of the study showed a significant improvement in students' knowledge of climate change after the introduction of the new curriculum. On the pre-test, only 55% of students demonstrated a basic understanding of the causes and impacts of climate change, compared to 75% on the post-test. The surveys also revealed a positive shift in students' attitudes towards the environment, with more students expressing concern about climate change and a greater willingness to take action to address it

Figure 2: Findings of pre-questionnaire for students

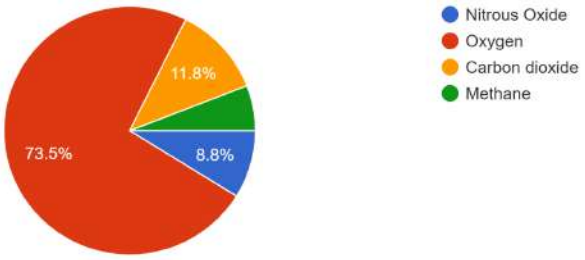






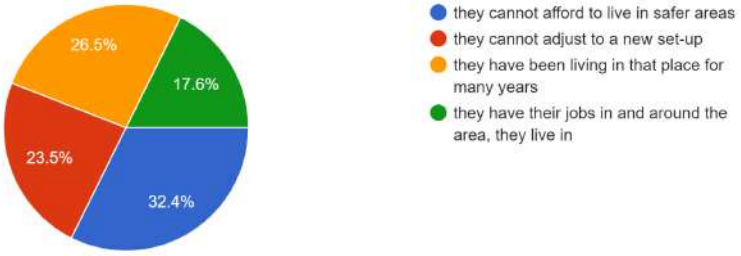
4. Identify which of the following is not a greenhouse gas

34 responses



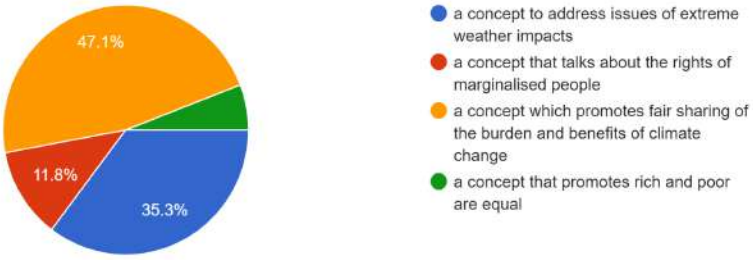
5. Vulnerable people are prone to the impacts of extreme weather because

34 responses



6. Climate justice is

34 responses



7. Science denial can be defined as

34 responses

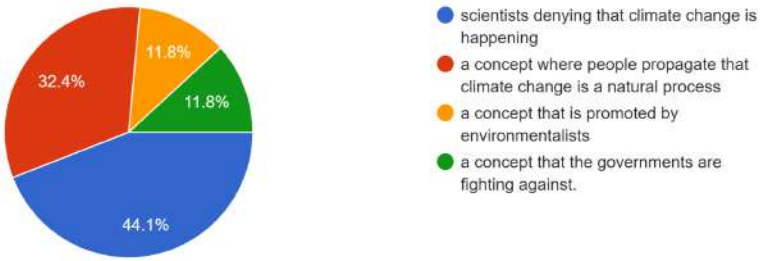
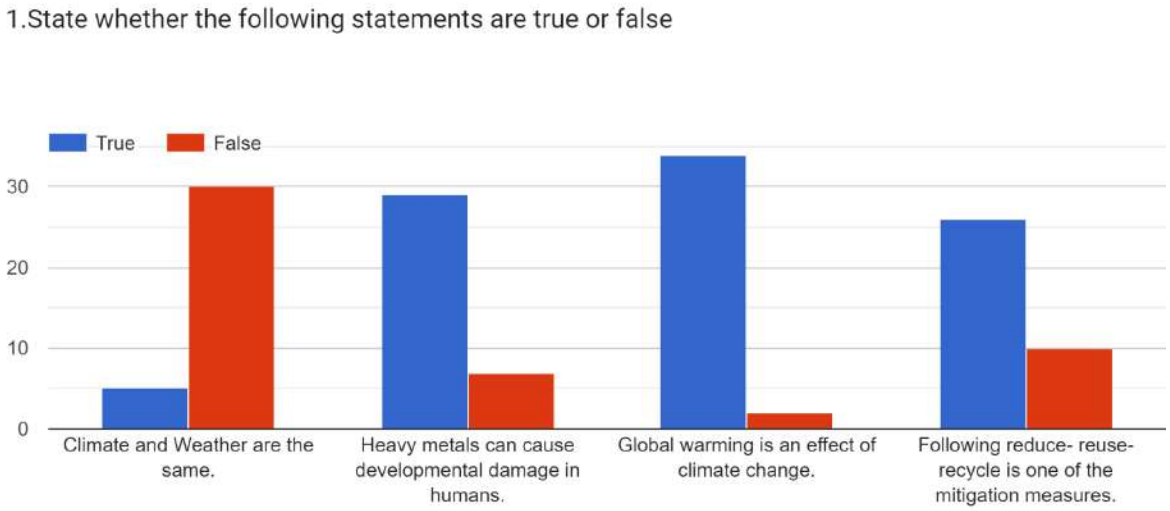
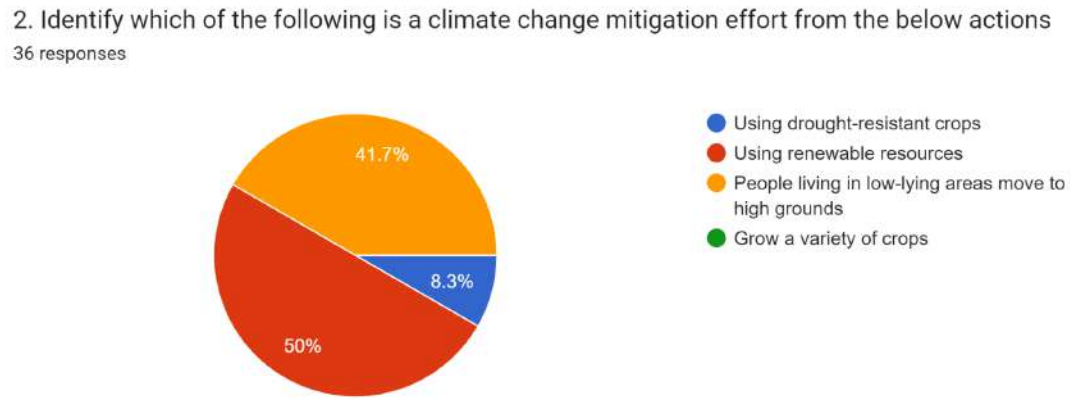
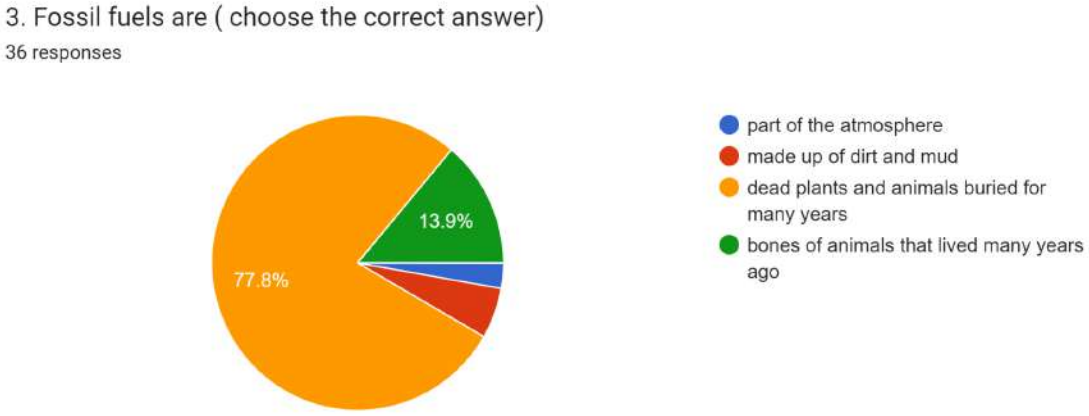


Figure 3: Findings of post-questionnaire for students

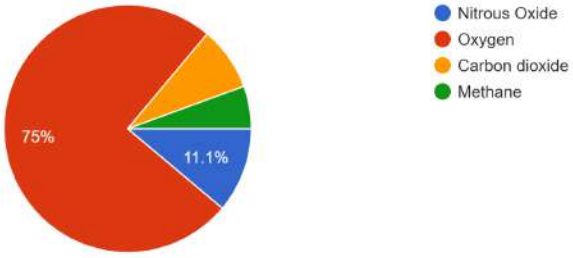






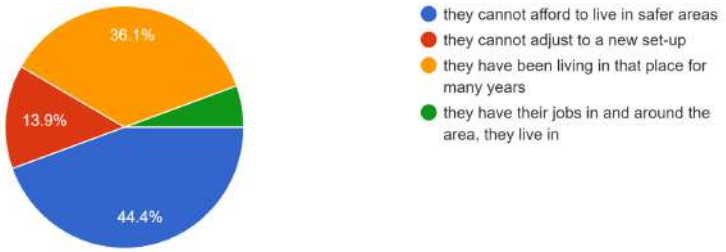
4. Identify which of the following is not a greenhouse gas

36 responses



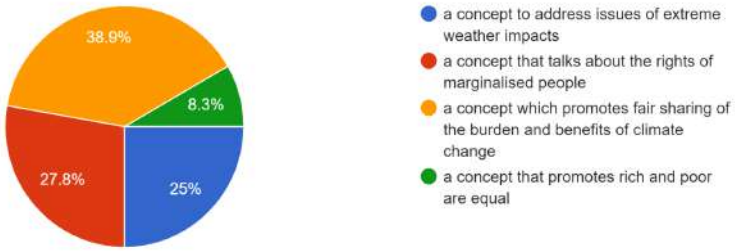
5. Vulnerable people are prone to the impacts of extreme weather because

36 responses



6. Climate justice is

36 responses



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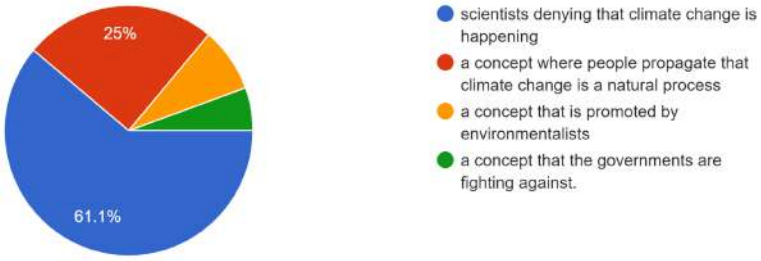


➔ **Pre - post-survey questionnaire for teachers:**

- The teachers' perception of climate change also showed significant improvement. The orientation classes provided seemed to be really useful with their basic understanding of the subject going up from 60% to 85%

Figure 4: Findings of pre-questionnaire for teachers

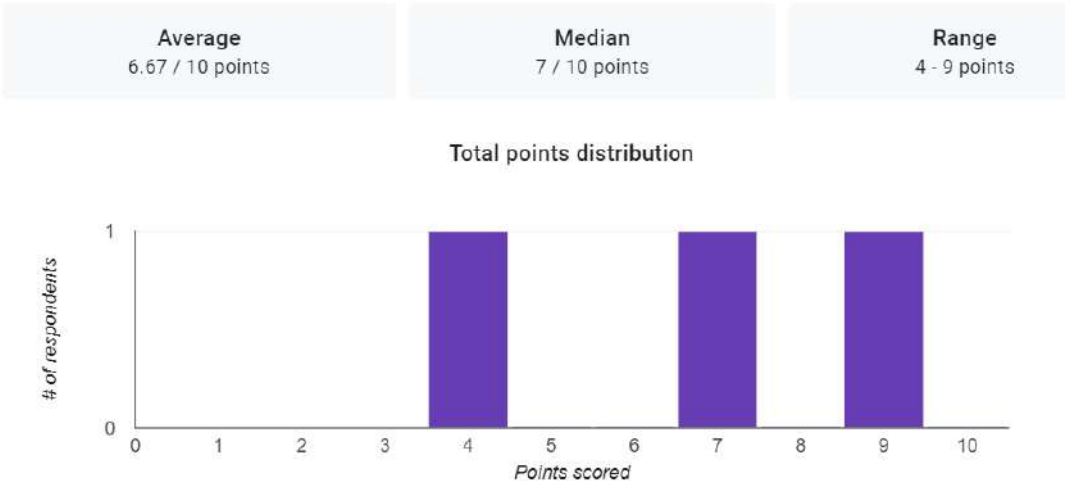
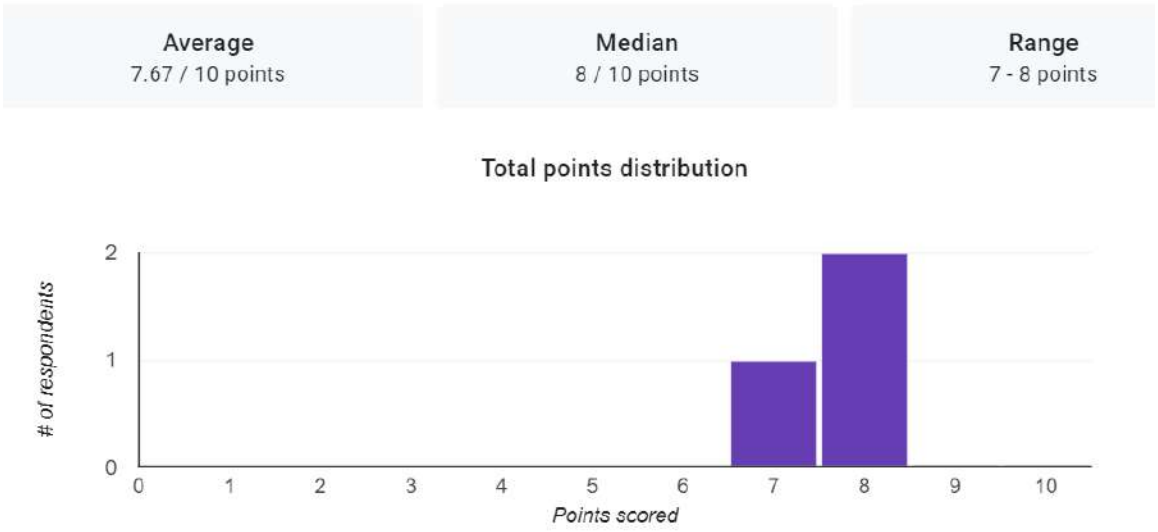


Figure 5: Findings of post-questionnaire for teachers



➔ **Teachers reflection summary:**

The teacher's opinion was sought on the completion of each lesson. According to the teacher's reflection, the curriculum was effective in terms of content, instruction, engagement, and learning outcomes. Overall, the teacher's reflection suggests that the climate change unit was successful in engaging students and promoting learning about an important topic. The feedback from the teacher's intervention group is as follows

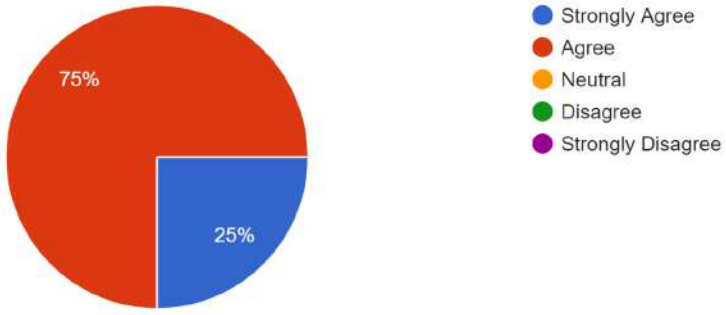
- The teachers reported feeling more confident and competent in teaching climate change topics.
- The textbook was a delight to both students and teachers, with fun activities and interesting and informative illustrations.
- The students were eager to learn and very forthcoming with answers and showed a lot of interest and enthusiasm in class
- The teachers felt that a lot of thought has been put into designing the content, activities and reflections in each lesson making it very effective.
- Content is easy to understand and appropriate for 8th-standard students' level
- Learning outcomes were achieved at the end of the lesson too.

These points suggest that the lessons were effective in terms of content, instruction, engagement, and learning outcomes.

Figure 6: Findings of teachers' reflections unit-wise

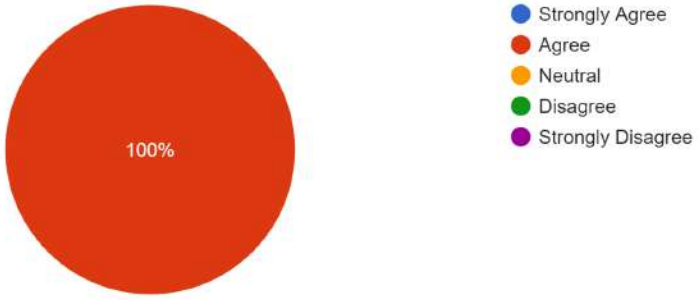
1. The content of the unit is easy to understand and is at the student's level

4 responses



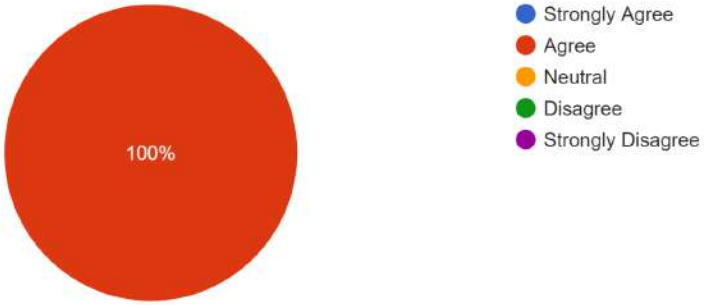
2. The lesson plan had clear instructions for teaching the lesson and conducting the activities

4 responses



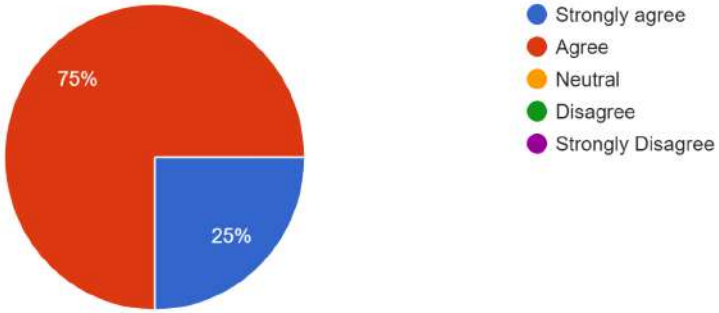
3. Time allotted for the stages of the lesson is appropriate

4 responses



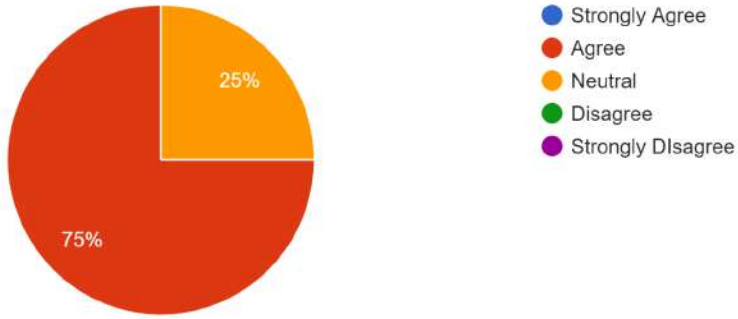
4. Students enjoyed the classroom activities

4 responses



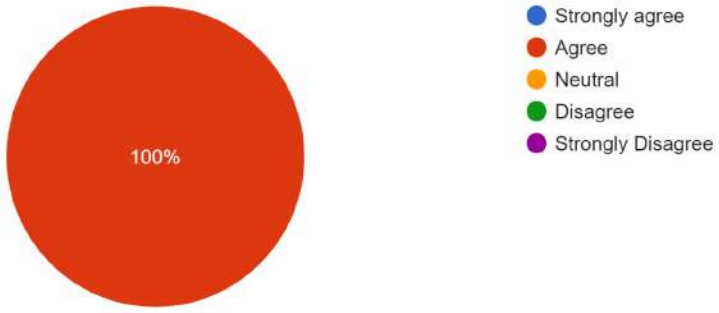
5. The lesson had opportunities for student interaction

4 responses



6. Learning outcomes were achieved at the end of the lesson

4 responses



The analysis of the aforementioned data led to the compilation of results, revealing the following key findings:

Figure 7: Summary of findings of teachers' reflections survey

PARAMETERS	RESPONSE FROM TEACHERS
1. The content of the unit is easy to understand and is at the student's level	Strongly Agree - 21% Agree - 70% Neutral - 6%
2. The lesson plan had clear instructions for teaching the lesson and conducting the activities	Strongly Agree - 29% Agree - 71%
3. Time allotted for the stages of the lesson is appropriate	Agree - 50% Neutral - 13% Disagree 33% Strongly Agree 4%
4. Students enjoyed the classroom activities	Strongly Agree - 29% Agree - 71%
5. The lesson had opportunities for student interaction	Strongly Agree - 46% Agree - 54%
6. Learning outcomes were achieved at the end of the lesson	Strongly Agree - 29% Agree - 64% Neutral - 4%

➔ **Classroom observations:**

Periodical classroom visits were undertaken during curriculum deployment and the following observations were made

- Students were actively engaged in the new curriculum. They were inquisitive, participated in discussions and enthusiastically completed tasks given to them.
- Students were generally excited to discuss what they had learned and shared memorable topics and projects of particular interest to them.
- Grade 8 students were more forthcoming with answers compared to Grade 7 and Grade 6 students
- Some students seemed to have clear ideas about how to take action and expressed feelings of hope and empowerment when describing their collective 'climate solutions which were very encouraging

Limitations:

Based on the above reflections, some of the limitations were:

- There are variations in student level of learning, with certain content being relevant for 7th and 8th standard students but difficult for 6th standard students. Hence the 6th-grade students found the curriculum difficult to grasp.
- The teachers observed that the first generation learners faced difficulties in understanding the content due to their limited proficiency in English, which posed a challenge for them. Consequently, they required assistance from the teachers who had to explain the concepts using their native language. In contrast, the students who came from affluent backgrounds found it relatively easier to comprehend the concepts.
- The lessons engaged the students and were very interactive but left very little time for discussion due to the time restrictions allotted per class. The lesson about adaptation and mitigation and climate denial was very interactive but required more time for the students to grasp the concepts properly.

Apart from the above points, other general limitations include

- Small sample size. As the study involves a small number of participants it may not be representative of the broader population, making it difficult to generalize the findings.
- Short-term evaluation: As the impact study is conducted over a short period of time, it may not capture the long-term effects of the new curriculum.
- Teacher variability: The curriculum was implemented by different teachers with varying levels of experience and training, the impact of the curriculum may vary based on the quality of the teaching.

Recommendations:

Overall, the study suggests that the curriculum is engaging and interactive for students, but adjustments may be needed to better accommodate varying levels of learning and to allow for more time and activities to reinforce understanding of complex concepts. However, implementing the pilot phase closer to the end of the academic year has affected the dedication of the students to a certain extent as they were preoccupied with exams and assignment commitments. Hence it will be better if the curriculum is implemented at the beginning of the academic year. The study also recommends increasing the duration of the course and providing additional training and orientation to the teachers for effective implementation of the curriculum. The study further provides evidence for the effectiveness of a comprehensive and interdisciplinary approach to climate change education at the middle school level. Additionally, the study underscores the importance of translating the textbook into Tamil, as this would enable the curriculum to reach a broader spectrum of students across the state, thereby fostering increased awareness and understanding of climate change.

Overall, the study findings confirm the importance of introducing a new curriculum on climate change in middle schools. The results show that a well-designed curriculum can significantly increase student knowledge, motivation, and engagement, and contribute to positive social impacts.

Conclusion

Climate change is a critical issue that affects everyone on the planet, and it is important that future generations are equipped with the knowledge and skills to address it. Middle school students are at an age where they are developing their critical thinking and decision-making abilities, and introducing them to climate change education can help them understand the impact of human activities on the environment and develop a sense of responsibility towards sustainability. The study recommends that policymakers and educators prioritize the integration of climate change education into the curriculum at all levels of education so that future generations are aware, empowered and ready to act.