



CAG

Citizen consumer and civic Action Group



IMPACT ASSESSMENT REPORT

Pilot phase of introducing climate change as a curriculum in five Government schools in five districts in Tamil Nadu

March 2024

Author:

Mala Balaji (Researcher, Environment and Climate Action, CAG)

Acknowledgements:

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

The author extends sincere gratitude to Mr. Jayakumar, Joint Director of Vocational Training, DOE, for his invaluable contribution in allowing us to conduct the pilot study in select government schools in different districts in Tamil Nadu. Without his assistance, this endeavour would not have been possible.

The author further extends sincere appreciation to Ms Kavitha Krishnakumar, education consultant for the project, for being an integral part of the pilot study. The author also expresses her heartfelt gratitude to the head teachers of the selected Government schools for their gracious participation in the pilot, and to the dedicated trainer teachers for investing significant time and effort to ensure its success.

Disclaimers:

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Design:**Cover photo:**

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, we must 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.

Last year, a pilot study was conducted in English to assess the effects of a new curriculum on climate change education in middle school. This year, the textbook has been translated into Tamil to expand its reach to a broader audience, with this pilot study designed to evaluate its impact on students' knowledge, attitudes, and behaviours concerning climate change. This curriculum was specially designed 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 aimed to demystify climate action through thought-provoking lessons, fun activities and interesting illustrations. The intention was 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 experienced social science teachers across India for review of the validity and reliability of the content and their suggestions were incorporated. In addition to crafting the curriculum, our comprehensive approach to enhancing climate change education included 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 teacher's plan was modified from the feedback received in the English curriculum pilot and the duration of the course was increased accordingly. The pilot phase in Tamil was implemented as a 24-hour course with 16 hours of classwork and 8 hours of homework. This phase of implementation took place in five schools across five districts in Tamil Nadu:

- Government Girls Model Higher Secondary School, Avadi, Thiruvallur District
- Government Girls Higher Secondary School, Krishnagiri District
- Government (ADW) Higher Secondary School, Tirunelveli District
- MPL Government High School, Tambaram, Chengalpattu District
- Panchayat Union Middle School, Pazhankovil, Thiruvannamalai District

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.

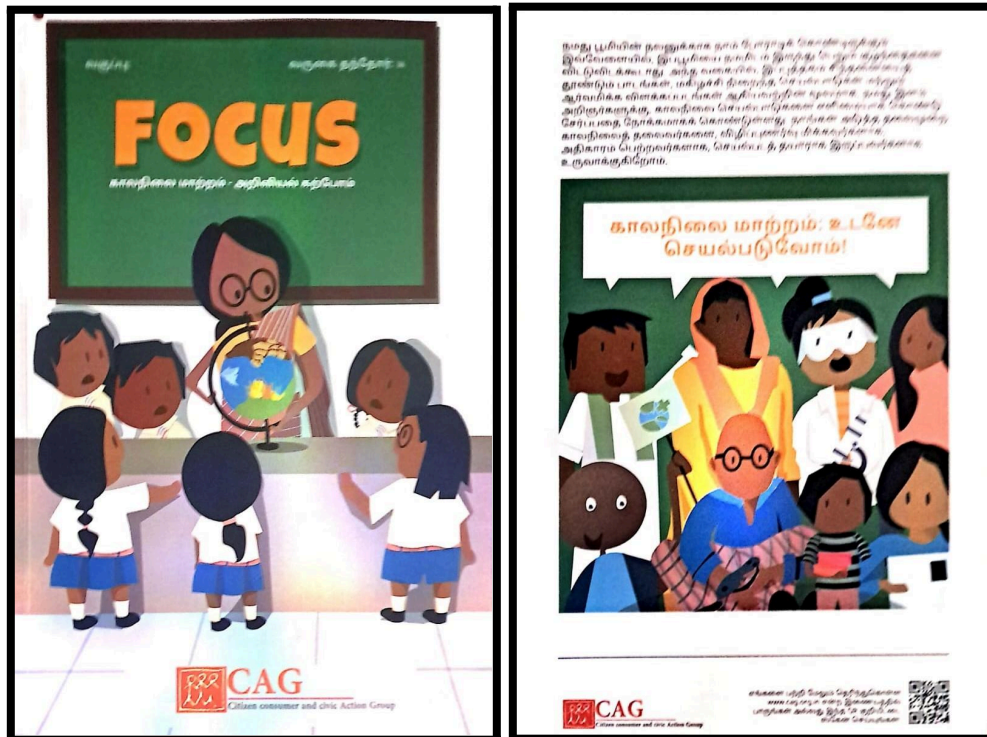


Image 1: Focus textbook cover pages

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 Tamil pilot phase was implemented in five schools in 5 districts in Tamil Nadu with a total of 157 students from 5 schools.
- Government schools were selected across 5 districts in Tamil Nadu so that curriculum deployment could be done across the state
- The age group selected for this pilot phase was between 13 years to 14 years ranging from 7th-grade to 8th-grade students.
- Social science and science teachers with considerable teaching experience were selected for the pilot phase. Regular orientation sessions were held and training was imparted to incorporate climate literacy to 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 had a significant positive impact on student and teacher knowledge, attitudes, and behaviours related to climate change.

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 analyse 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 40% of students demonstrated a basic understanding of the causes and impacts of climate change, compared to 80% 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.

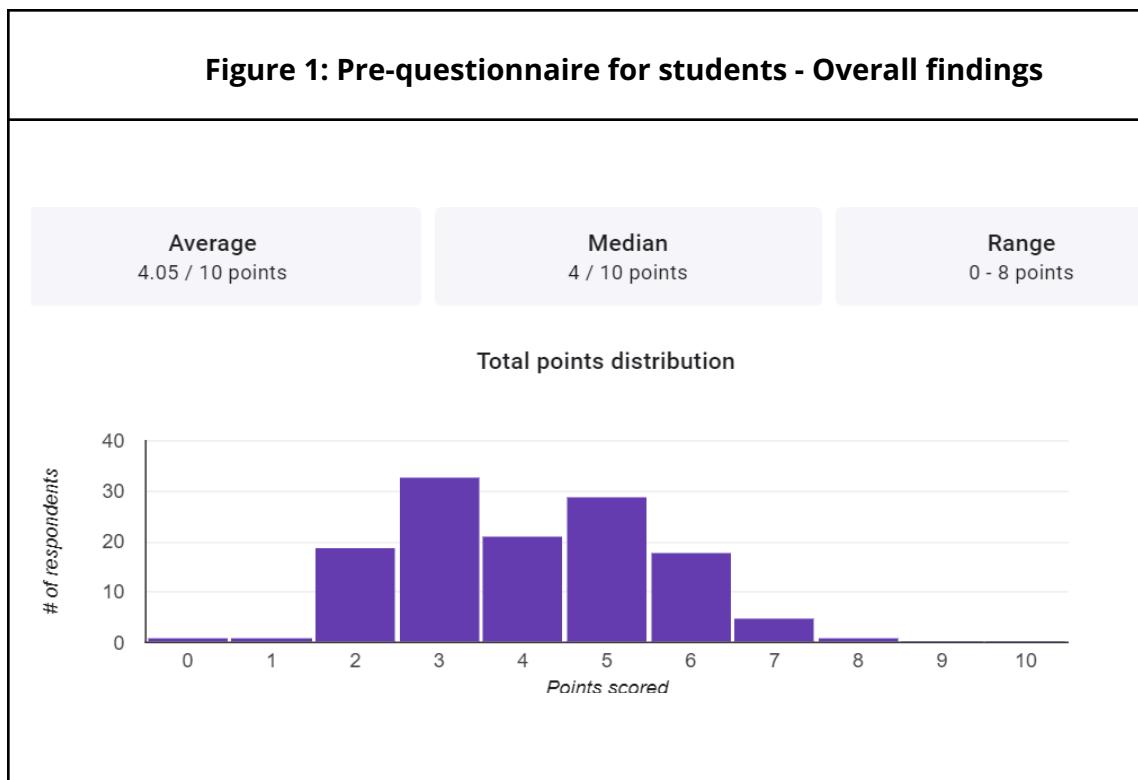
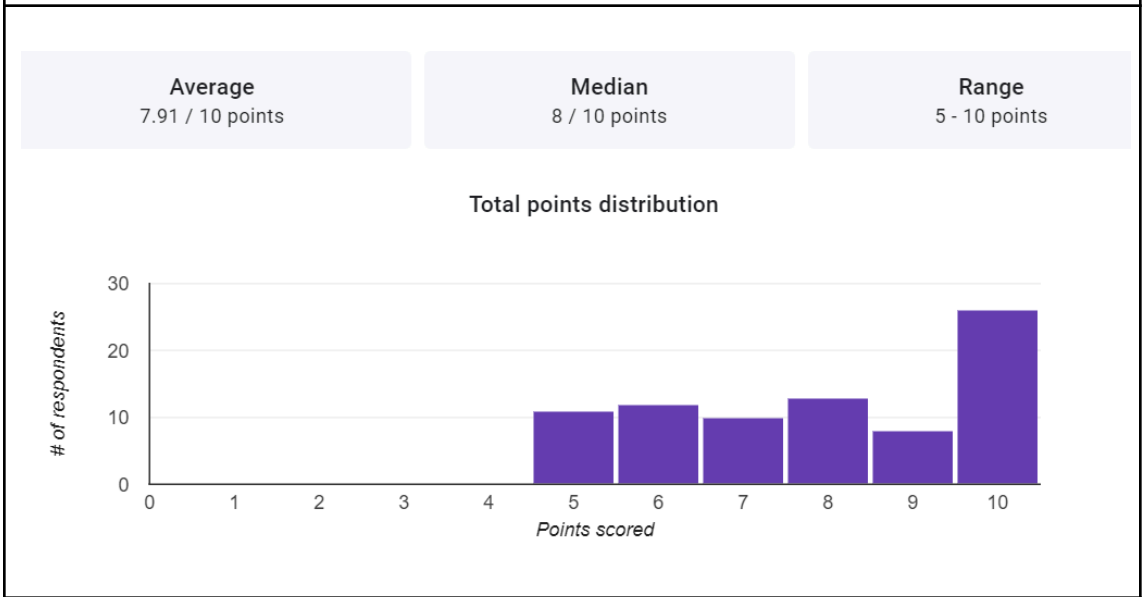
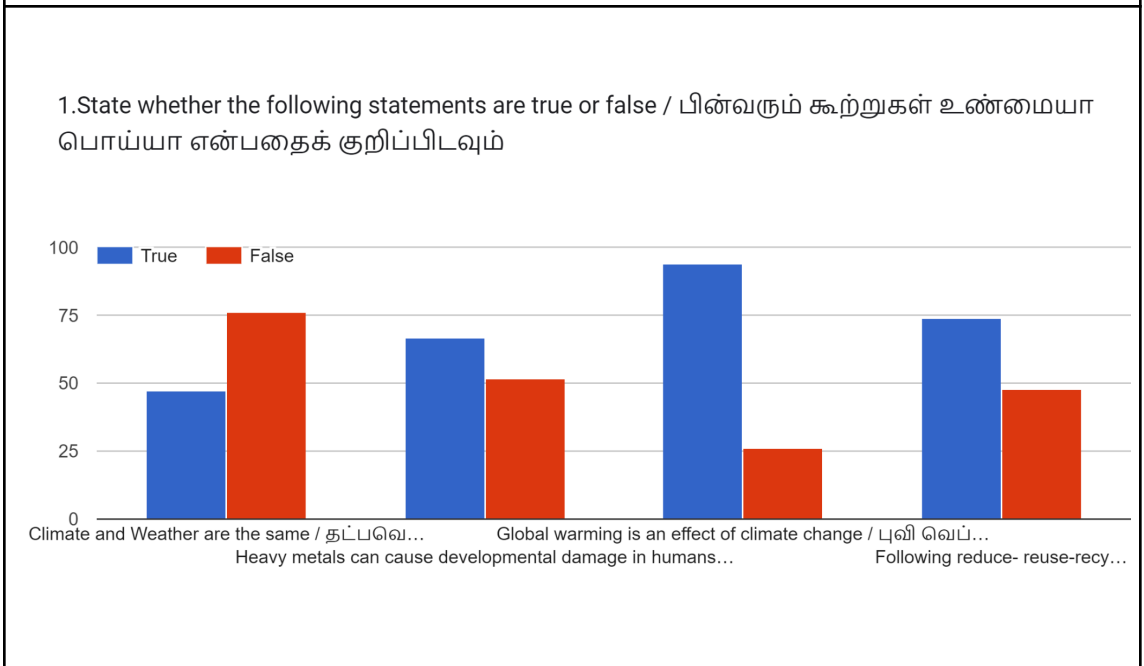


Figure 2: Post-questionnaire for students - Overall findings

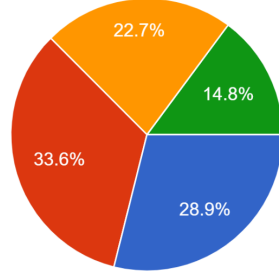


**Figure (Set) 3: Findings of pre-questionnaire for students
(Question-wise breakup)**



2. Identify which of the following is a climate change mitigation effort from the below actions / கீழ்க்கண்ட செயல்களில் இருந்து காலநிலை மாற்றம் குறைக்க எது என்பதைக் கண்டறியவும்

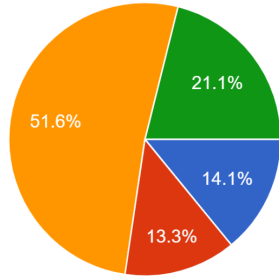
128 responses



- Using drought-resistant crops / வறட்சியைத் தாங்கும் பயிர்களைப் பயன்படுத்துதல்
- Using renewable resources / புதுப்பிக்கத்தக்க வளங்களைப் பயன்படுத்துதல்
- People living in low-lying areas move to high grounds / தாழ்வான பகுதிக... விதவிதமான பயிர்களை பயிரி...
- Grow a variety of crops / விதவிதமான பயிர்களை பயிரி...

3. Fossil fuels are (choose the correct answer) / புதைபடிவ எரிபொருள்கள் (சரியான பதிலைத் தேர்ந்தெடுக்கவும்)

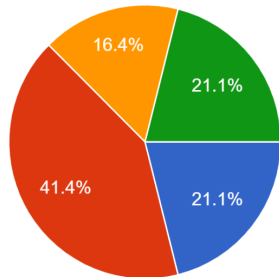
128 responses



- part of the atmosphere / வளிமண்டலத்தின் ஒரு பகுதி
- made up of dirt and mud / அழுக்கு மற்றும் சேற்றால் ஆனது
- dead plants and animals buried for many years / இறந்த தாவரங்கள் மற்றும் விலங்குகள் பல ஆண்டு...
- bones of animals that lived many years ago / பல ஆண்டுகளுக்கு முன்பு வாழ்ந்த விலங்குகளின் எலும்பு...

4. Identify which of the following is not a greenhouse gas / பின்வருவனவற்றில் எது பசுமை இல்ல வாயு அல்ல என்பதைக் கண்டறியவும்

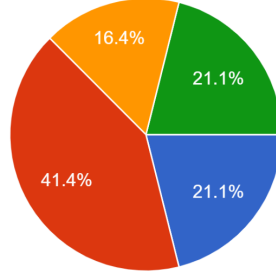
128 responses



- Nitrous Oxide / நைட்ரஸ் ஆக்சைடு
- Oxygen / ஆக்ஸிஜன்
- Carbon dioxide / கார்பன் டை ஆக்சைடு
- Methane / மீத்தேன்

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128 responses

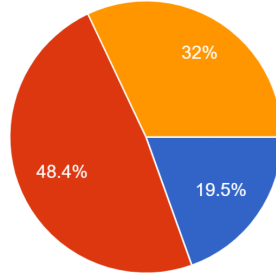


- Nitrous Oxide / நைட்ரஸ் ஆக்சைடு
- Oxygen / ஆக்ஸிஜன்
- Carbon dioxide / கார்பன் டை ஆக்சைடு
- Methane / மீத்தேன்

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

/ பாதிக்கப்படக்கூடிய மக்கள் தீவிர வானிலையின் தாக்கங்களுக்கு ஆளாகிறார்கள்

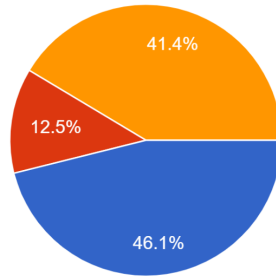
128 responses



- they cannot adjust to a new set-up / அவர்களால் ஒரு புதிய அமைப்பைச் சரிசெய்ய முடியாது
- they have been living in that place for many years / அவர்கள் அந்த இடத்தில் பல ஆண்டுகளாக வசித்து வருகின்றனர்
- they have their jobs in and around the area, they live in / அவர்கள் வசிக்கும் பகுதியிலும் அதைச் சுற்றியுள்ள பகுதிகளிலும் தங்க...

6. Climate justice is / காலநிலை நீதி என்பது

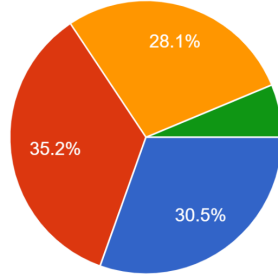
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- a concept to address issues of extreme weather impacts / தீவிர வானிலை பாதிப்புகளின் பிரச்சினைகளுக்கு தீர்வு காண்...
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7. Science denial can be defined as / அறிவியல் மறுப்பு என்பதை எப்படி வரையறுக்கலாம்

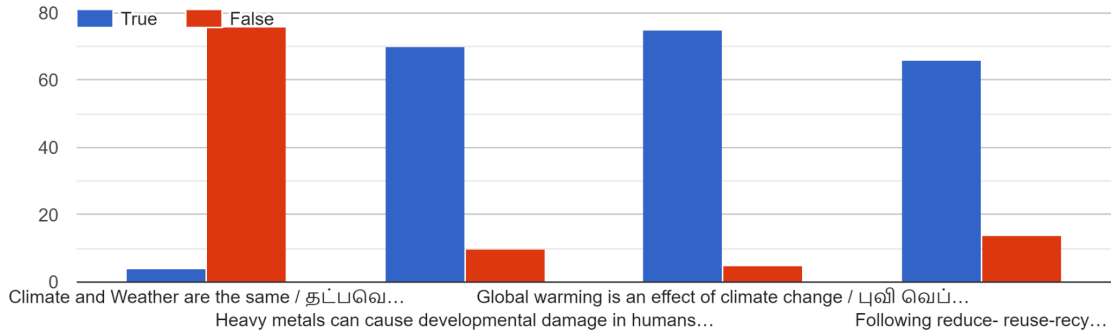
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- scientists denying that climate change is happening / காலநிலை மாற்றம் ஏற்படுவதை விஞ்ஞானிகள் ம...
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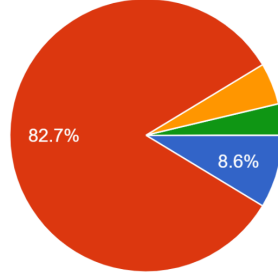
Figure (Set) 4: Findings of post-questionnaire for students (Question-wise breakup)

1.State whether the following statements are true or false / பின்வரும் கூற்றுகள் உண்மையா பொய்யா என்பதைக் குறிப்பிடவும்



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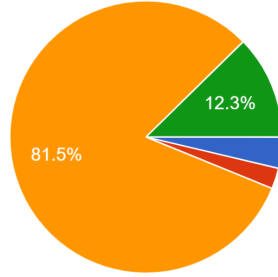
81 responses



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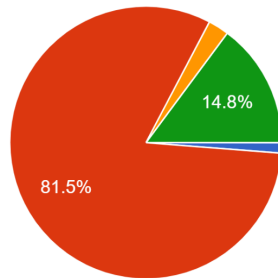
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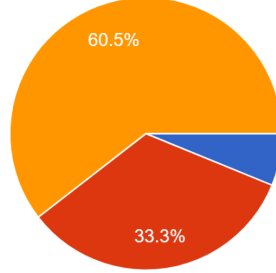


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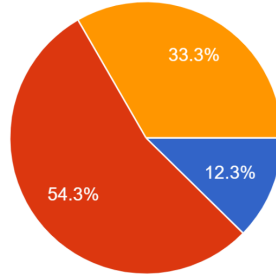
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81 responses

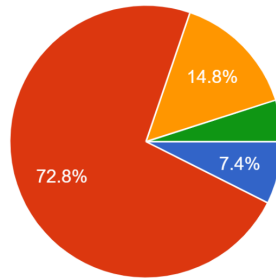


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7. Science denial can be defined as / அறிவியல் மறுப்பு என்பதை எப்படி

வரையறுக்கலாம்

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- scientists denying that climate change is happening / காலநிலை மாற்றம் ஏற்படுவதை விஞ்ஞானிகள் ம...
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- a concept that the governments are fighting against / அரசாங்கங்கள் எ...

Survey questionnaire for teachers:

The teachers' perception of climate change also showed significant improvement. The orientation classes provided seemed to be useful with their basic understanding of the subject going up from 70% to 90%

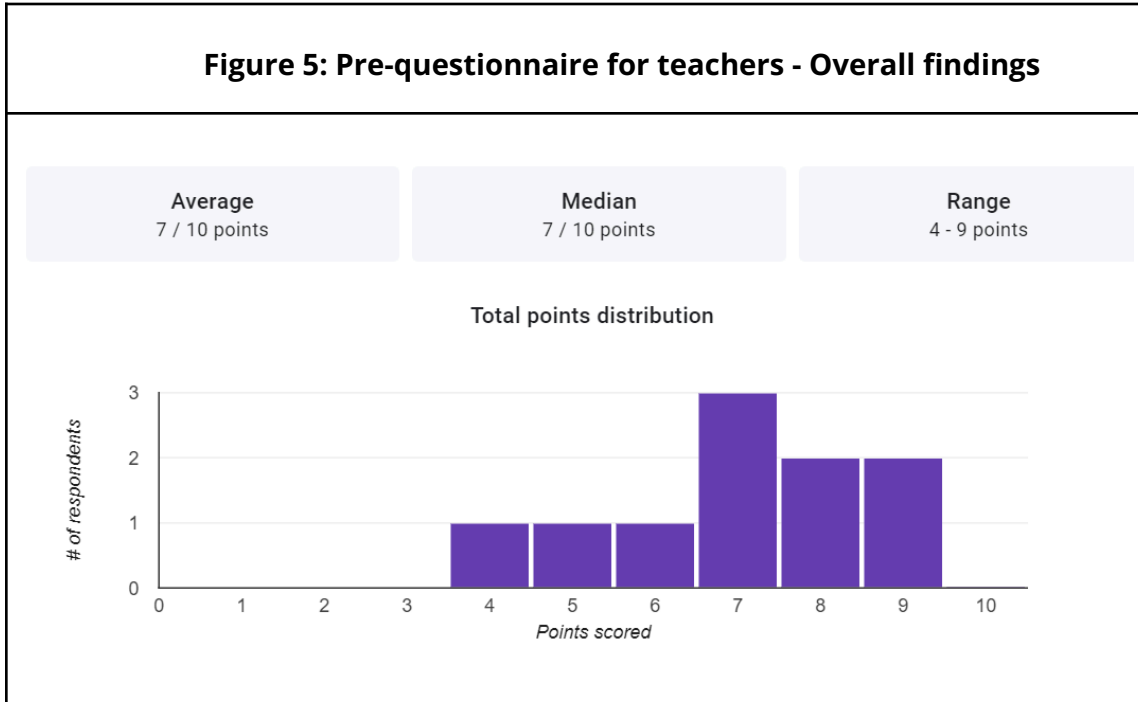
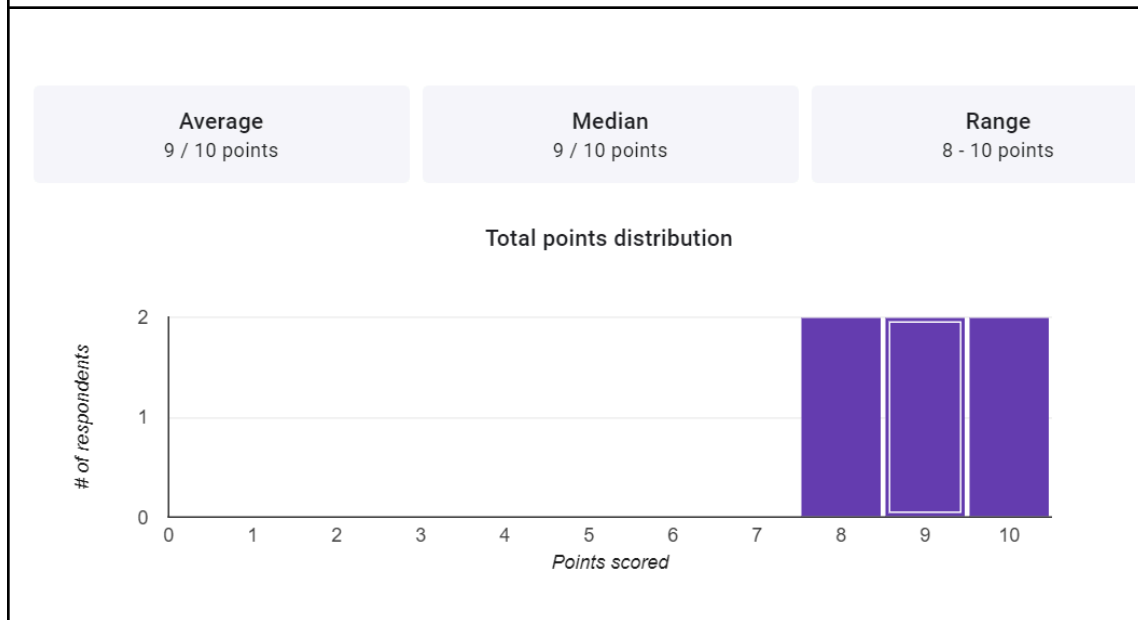


Figure 6: Post -questionnaire for teachers- Overall findings



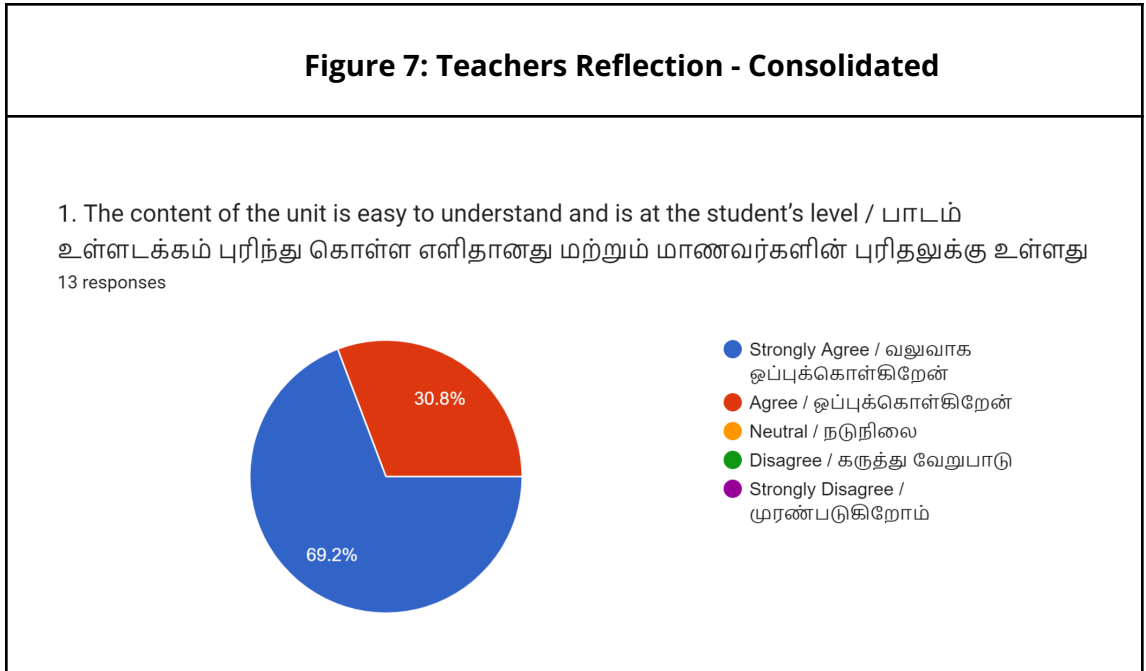
Teachers’ Reflection

The teachers’ opinion was sought on the completion of each lesson. According to the teachers’ reflection, the curriculum was effective in terms of content, instruction, engagement, and learning outcomes. Overall, the teachers’ reflection suggests that the climate change unit was successful in engaging students and promoting learning about an important topic. These points suggest that the lessons were effective in terms of content, instruction, engagement, and learning outcomes.

PARAMETERS	RESPONSE FROM TEACHERS
1. The content of the unit is easy to understand and is at the student’s level	Strongly Agree - 69% Agree - 31%
2. The lesson plan had clear instructions for teaching the lesson and conducting the activities	Strongly Agree - 54% Agree - 46%

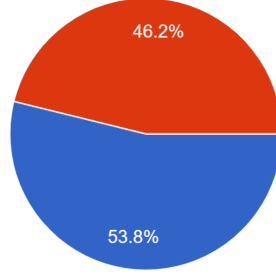
3. Time allotted for the stages of the lesson is appropriate	Strongly Agree - 62% Agree - 38%
4. Students enjoyed the classroom activities	Strongly Agree - 62% Agree - 38%
5. The lesson had opportunities for student interaction	Strongly Agree - 77% Agree - 23%
6. Learning outcomes were achieved at the end of the lesson	Strongly Agree - 77% Agree - 23%

Table 1: Teachers Reflection Summary



2. The lesson plan had clear instructions for teaching the lesson and conducting the activities / பாடம் கற்பிப்பதற்கும் செயல்பாடுகள்...டத்தில் தெளிவான வழிமுறைகள் இருந்தன

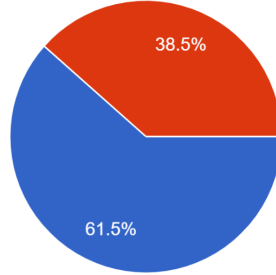
13 responses



- Strongly Agree / வலுவாக ஒப்புக்கொள்கிறேன்
- Agree / ஒப்புக்கொள்கிறேன்
- Neutral / நடுநிலை
- Disagree / கருத்து வேறுபாடு
- Strongly Disagree / முரண்படுகிறோம்

3. Time allotted for the stages of the lesson is appropriate / பாடத்தின் உள்ளடக்கத்தை புரிந்துகொள்வதற்கு போதுமான நேரம் ஒதுக்கப்பட்டது

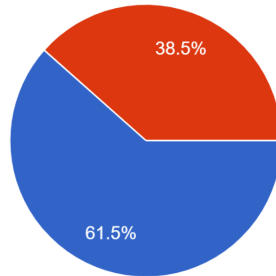
13 responses



- Strongly Agree / வலுவாக ஒப்புக்கொள்கிறேன்
- Agree / ஒப்புக்கொள்கிறேன்
- Neutral / நடுநிலை
- Disagree / கருத்து வேறுபாடு
- Strongly Disagree / முரண்படுகிறோம்

4. Students enjoyed the classroom activities / மாணவர்கள் வகுப்பறை செயல்பாடுகளை வரவேற்றனர்

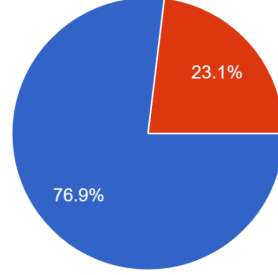
13 responses



- Strongly Agree / வலுவாக ஒப்புக்கொள்கிறேன்
- Agree / ஒப்புக்கொள்கிறேன்
- Neutral / நடுநிலை
- Disagree / கருத்து வேறுபாடு
- Strongly Disagree / முரண்படுகிறோம்

5. The lesson had opportunities for student interaction / பாடத்தில் மாணவர்கள் கலந்துரையாடுவதற்கு வாய்ப்புகள் இருந்தன

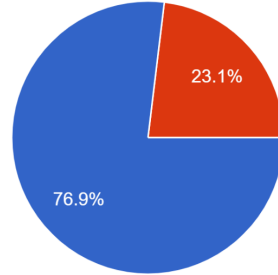
13 responses



- Strongly Agree / வலுவாக ஒப்புக்கொள்கிறேன்
- Agree / ஒப்புக்கொள்கிறேன்
- Neutral / நடுநிலை
- Disagree / கருத்து வேறுபாடு
- Strongly Disagree / முரண்படுகிறோம்

6. Learning outcomes were achieved at the end of the lesson / பாடத்தின் முடிவில் கற்றல் முடிவுகள் எட்டப்பட்டன

13 responses



- Strongly Agree / வலுவாக ஒப்புக்கொள்கிறேன்
- Agree / ஒப்புக்கொள்கிறேன்
- Neutral / நடுநிலை
- Disagree / கருத்து வேறுபாடு
- Strongly Disagree / முரண்படுகிறோம்

Findings: In the teachers' reflection summary, it is noteworthy to mention that while responses in the English pilot varied from **Strongly Agree** to **Neutral** to **Disagree**, indicating a mixed response, the responses in the Tamil pilot consistently ranged between **Agree** and **Strongly Agree**. This uniform positive feedback from teachers demonstrates our effective incorporation of feedback from the previous pilot, contributing to the resounding success of this project.

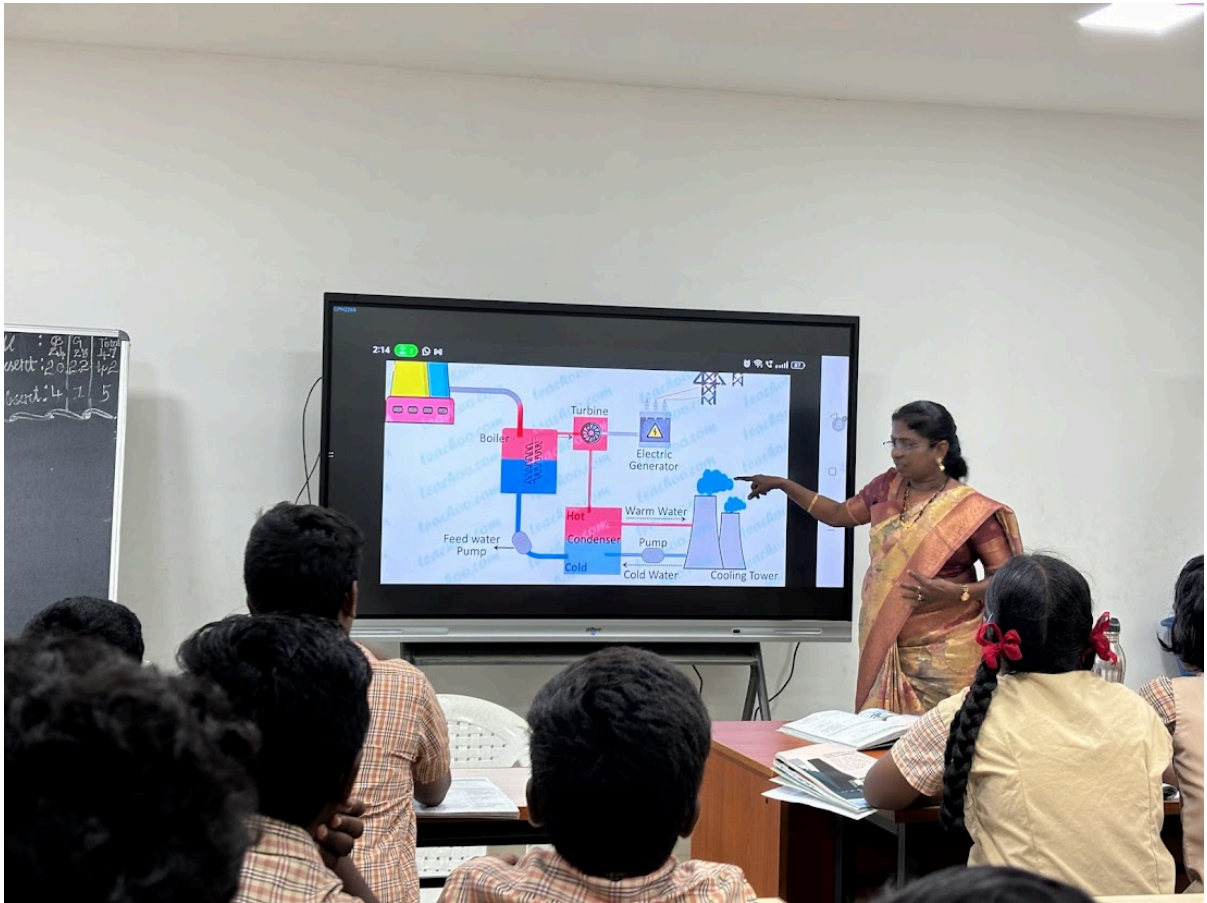


Image 2: Generation of electricity being taught in class.

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

- 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



Image 3: Students excited to get their copy of Focus textbook

Teachers' and students' feedback on the curriculum.

- **Engaging Content:** The book's content was praised for its ability to capture students' attention and maintain their interest throughout the learning process. The material was presented in a way that was accessible and relatable to the students, making learning enjoyable and effective.
- **Interactive Activities:** Schools appreciated the inclusion of interactive activities that not only reinforced learning but also encouraged students to actively participate in the learning process. These activities were noted for their ability to

stimulate students' imagination and curiosity, making the learning experience more dynamic and engaging.

- **Effective Teaching Resources:** Teachers found the accompanying teacher's manual to be comprehensive and valuable in facilitating effective lesson delivery. The manual provided teachers with the necessary support and guidance to implement the curriculum effectively, ensuring that learning objectives were met.
- **Impactful Learning:** The book successfully conveyed the importance of environmental issues and prompted students to take action. Through the lessons, students gained a deeper understanding of sustainability and were motivated to adopt sustainable practices in their daily lives, reflecting a genuine concern for the well-being of the planet.
- **Translation Quality:** The quality of translation was praised for ensuring that the content was accessible to all students, regardless of their language proficiency. This contributed to inclusive learning environments where all students could fully engage with the material.
- **Practical Application:** Schools observed tangible changes in students' behaviour following the lessons, such as increased energy conservation and reduced plastic usage. Students demonstrated a commitment to environmental activism, indicating that the lessons had a meaningful impact on their attitudes and actions.
- **Self-Learning Support:** Features such as glossaries and reflection sections provided valuable support for self-learning and reinforcement of concepts. These tools enabled students to review and consolidate their understanding independently, promoting deeper learning and knowledge retention.
- **Length of Lessons:** The length of lessons was considered appropriate, allowing for seamless integration into the curriculum without causing disruption. This ensured that the material was effectively delivered within the context of the overall curriculum, maximising its impact on student learning.
- **Attractive Design:** The book's attractive design, including colourful pages and illustrations, enhanced its appeal among students. The visually engaging layout captured students' attention and contributed to a positive learning experience, making the material more accessible and memorable.
- **Long-Term Value:** Schools expressed confidence in the long-term value of the book, anticipating its continued use and impact on future generations. The lessons

learned from the book were seen as foundational for students' ongoing development and their ability to contribute positively to society and the environment.

Overall, the Tamil curriculum pilot was a grand success, surpassing expectations and demonstrating significant improvements over previous initiatives. With no suggestions regarding areas of improvement reported by students and teachers, the pilot stands as a testament to effective curriculum development and deployment strategies. It sets a promising precedent for future educational endeavours, ensuring a positive impact on generations to come.

Recommendations:

In summary, the deployment of the Tamil curriculum has yielded remarkable success, affirming the significance of introducing climate change education in middle schools. The study underscores the effectiveness of the curriculum in enhancing student knowledge, motivation, and engagement, while also highlighting its potential for fostering positive social impacts. Furthermore, the findings emphasise the necessity of implementing the curriculum at the beginning of the academic year to maximise student dedication and learning outcomes. The success of the Tamil curriculum underscores the importance of providing comprehensive training and orientation to teachers for effective implementation. Additionally, translating the textbook into Tamil has proven instrumental in reaching a broader spectrum of students and fostering increased awareness and understanding of climate change.

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 prioritise 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.

Appendix

I. TESTIMONIALS

1. Government Girls Model Higher Secondary School, Avadi, Thiruvallur district

"This was a great book! The children enjoyed every activity and learnt so much from it. The teacher's manual was useful and thorough. We need more books like this in our curriculum"

2. Government Girls Higher Secondary School, Krishnagiri district

"The book's name FOCUS is befitting the content. The beautiful images and colourful pages will be treasured and used by the children for years to come. We did not have to force the students to learn facts and figures - the cartoons, and thoughtful exercises stimulated their imagination and curiosity. Most importantly, I've seen the children already use the 3R's and energy conservation in their daily lives. Thank you to CAG!"

3. Government (ADW) Higher Secondary School, Tirunelveli district

"This was an attractive and easy to use book. The children loved the illustrations and activities. The glossary and reflection at the end were especially helpful for self-learning. Most importantly, we could see that the children were more consciously sustainable in their everyday lives, after the lessons."

4. MPL Government High School, Tambaram, Chengalpattu district

"The language and content of the textbook was perfect for the children. The translation is excellent. The activities kept children actively engaged with the lesson. The book was successful in conveying concern and action - not just facts. The lessons were perfectly timed."

5. Panchayat Union Middle School, Pazhankovil, Thiruvannamalai district

“Many thanks to CAG for helping our children become climate crusaders! Since the lessons, they turn off lights and fans when not in use; they have replaced a plastic container in class with a cardboard one; they have promised to plant trees in their homes, and not use plastic. We can tell that our children are genuinely concerned about the well-being of the planet, and how they can leave it a better place for future generations.”

II. QUESTIONNAIRES.

TEACHERS:

1. Teachers pre-questionnaire
2. Teachers post-questionnaire
3. Teachers Reflection

<https://bit.ly/4djid0l>

STUDENTS:

4. Students pre-questionnaire
5. Students post-questionnaire

<https://bit.ly/3UByPxU>