

Grassroots Innovations from Youth

MAPPING ZERO WASTE CHALLENGES WITH MIDDLE SCHOOLS STUDENTS IN BRAZIL AND CANADA

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1. INTRODUCTION

One of the main challenges in cities today is solid waste and its inadequate management, along with the consequences of this mismanagement for citizens. Additionally, urban areas face numerous other waste-related challenges that must be addressed. Urban sustainability hinges on effective solid waste management, particularly in light of the growing generation of plastics, population expansion, and increased consumption. Moreover, there are significant bottlenecks in waste governance, such as the absence of fiscal incentives and the lack of selective waste collection programs (Alfaia et al., 2017; Pacheco et al., 2012). These challenges have further increased by the surge in waste volumes since the pandemic (Forlani & Njie, 2022).

Climate change and accelerated urban growth can complicate the organization of our waste systems and exacerbate the problems associated with mismanagement. For example, inadequate waste collection services and facilities can lead to the clogging of urban drains during heavy rain episodes, causing flooding scenarios. The population is also more susceptible to diseases linked to waste exposure, such as Leptospirosis, cholera, and other infectious diseases. Lack of waste collection and littering cause environmental pollution, negatively impacting society, which is further aggravated by inequality (Owusu-Sekyere, Attakora-Amaniampong, & Aboagye, 2016). Selective waste collection, on the other hand, prevents the spread of diseases and ensures that waste is disposed of correctly, promoting a more circular economy and decreasing greenhouse gas emissions. Thus, improving solid waste management in our cities enhances the quality of life for all citizens, especially those in vulnerable situations.

Involving youth in the development of urban waste management policies is crucial for several reasons. Young people are future inhabitants and stewards of urban environments, making their engagement essential for sustainable solutions that directly affect them. Their fresh perspectives and innovative ideas inject vitality into policy discussions, driving initiatives that promote recycling, reduce waste generation, and advocate for responsible consumption (Marchezini & Trajber, 2016). Additionally,

empowering youth in decision-making processes fosters a sense of ownership and responsibility towards their communities, leading to more creative and effective strategies.

Ultimately, by including youth in policy design, cities can harness their energy, enthusiasm, and insight to create greener, cleaner, and more livable urban spaces for all (Kallio et al., 2013; Kallio et al., 2014; Kraftl, 2018; Walker, 2019; Driskell, 2017). Rather than merely observing their living conditions, children and youth can and want to contribute to changing their urban environment and actively engage in their community (Kania et al., 2020; Trajber et al., 2019). It's important to recognize the potential of young people's perspectives in driving changes in public policy (Walker, 2019).

Based on this context, our research explores ideas of zero waste with grassroots actors and youth in São Bento do Sapucaí (São Paulo), Gonçalves (Minas Gerais), Brazil, and Victoria, Canada. The study engages students aged between 12 and 14 years old, using participatory research methods, including community mapping, group discussions and workshops to capture their perceptions of waste issues in their environments. While there are some studies available on schools and food waste, there is a gap in the literature on the generation of household waste on school premises and their surroundings, recognizing the potential of students as innovators to address this issue. The aim of our study is to develop proposals for improving waste management in the study region. This article discusses initial results obtained from the interviews with teachers in Canada and Brazil and from the student engagement on the topic in Canada, highlighting the emerging innovative ideas.

2. ZERO WASTE AS A DRIVER FOR GRASSROOTS INNOVATION

The concept of Zero Waste serves as a catalyst for the design and management of products and processes and aims at systematically minimizing the volume and toxicity of waste materials, especially plastics (Zaman, 2022). It embodies a visionary approach encouraging individuals to alter their lifestyles and practices to prevent waste generation, while ensuring that all discarded materials are

designed to be utilized as resources for future purposes (Tamminen & Lobin, 2022). Zero Waste fundamentally challenges the notion that waste is inherently valueless and an inevitable byproduct of consumption.

Zero Waste is an aspirational goal and serves as a catalyst for enhancing waste management by addressing the escalating waste volumes and advocating for policy reforms. It also means dedicating resources to environmental education and training, raising awareness and fostering research to drive behavioral and consumption changes (Gutberlet, 2016). Many cities and educational institutions around the world are already embracing these principles; and the city of Victoria in Canada is a good example for the growing awareness about the need to change consumption and discard habits (City of Victoria, n. d.).

Youth participatory action research emerges as a potent strategy to amplify the voices of young people. Recent studies exploring geographical knowledge within urban environments have engaged children and youth, whose perspectives offer valuable insights into tackling complex challenges such as climate change, disaster risk reduction, and resource security, while also proposing effective solutions (Marchezini & Trajber, 2016). According to Trajber et al. (2019), the knowledge and perspectives of young people are often disregarded despite their disproportionate vulnerability to socio-environmental impacts. Working with social actors, that may have been previously outside the policy process, such as youth and grassroots organizations can fill in missing links in promoting waste reduction and resource diversion into the Circular Economy (Carenzo, Juarez & Becerra, 2022).

Therefore, fostering youth participation is crucial for achieving sustainable household waste management (Naldi, 2023, Perera, 2016, Pulubuhu & Alhaqqi, 2019). Meaningful engagement with youth requires a space to learn about these critical issues, and capacity building that supports youth as resilient innovators and champions.

3. PROJECT STEPS

The project envisages several steps, as outlined in Figure 1, to learn from youth and grassroots actors about waste challenges and zero waste perspectives.

At the outset of the research, we conducted a bibliographical and documentary review on household waste management issues related to the study areas. We identified and mapped zero waste initiatives in the study region, building a database. Once we identified the schools to work with, we presented the project to the school coordinators and teachers and planned the interviews with the teachers responsible for the grade 7 classroom. Next, we present our initial results from the engagement with the teacher and the students at Monterey Middle School in Victoria. The project received approval from the UVic Research Ethics Board (Protocol # 21-0406).

We conducted four 2-hour meetings and a final 1-hour meeting with the students from this classroom. The first meeting involved an introduction to the topic and group discussions to brainstorm on the challenges that come with waste and the perceptions of zero waste.

During the second meeting we applied the dynamic group discussion format of the “world café”, to develop an

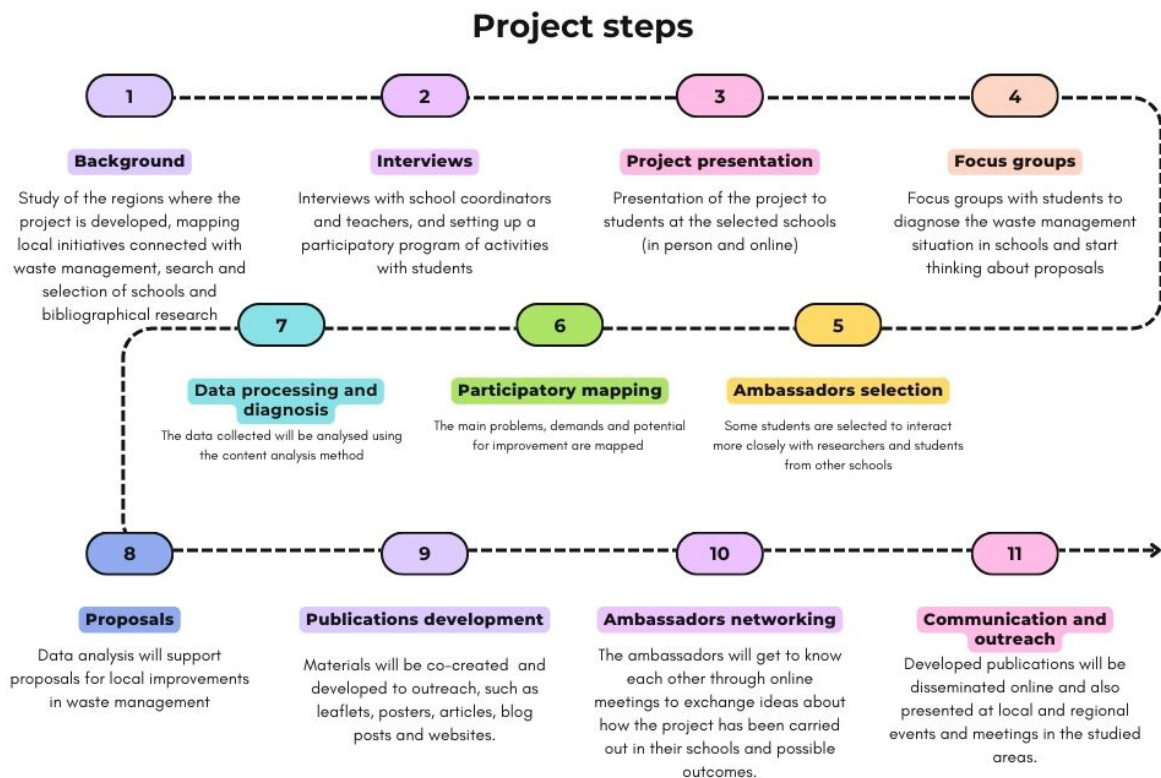


FIGURE 1: Flowchart of research steps (Source: the authors).

action plan with the students. They also identified students to act as ambassadors for the project, who would collaborate closely with the UVic team and future student ambassadors in Brazil. The third meeting exposed the students to a simulation on cooperative recycling in Brazil, supported by Virtual Reality (VR), to educate the students on participatory and grassroots initiatives in waste management. Additionally, a participatory mapping activity was conducted where students marked on a printed map of the school and its surroundings the main issues discussed in focus groups. During the fourth meeting we provided feedback on the mapping activity with the key findings. The students then collectively constructed a 'Dream Tree' (see Figure 2), where they wrote or drew their aspirations for a zero-waste future on a leaf which was glued to the tree. We also applied a questionnaire with 7 open ended questions and provided the students with 15 to 20 minutes to conclude this exercise. In our last meeting, the ambassadors presented their action plan to the classroom, and we finished with a presentation answering the question: where does our waste go? A similar research process will be applied over the next months in the schools identified in Brazil. In the following section we will discuss the findings from the interviews with teachers in both countries and from the interventions in the classroom in Victoria, Canada.

4. SOME INSIGHTS FROM TEACHERS AND STUDENTS IN MIDDLE SCHOOLS IN CANADA

Text The interviews with school coordinators and teachers in Brazil reveal limited knowledge about Zero Waste within schools. However, the interviewees expressed sig-

nificant concern about current waste management practices. It was noted that there is a need to replace the school's trash bins and ensure that they are placed in appropriate locations. Motivating students to reduce waste and use bins correctly appears to be a significant challenge, highlighting the necessity for initial education and awareness efforts. Another issue raised was the wastage of materials such as paper and notebooks. Furthermore, the thought seems to prevail that if rubbish is produced, it guarantees the jobs of the cleaners; thus, it is not perceived as an issue to change.

Another complex notion to work on is proper waste separation. When asked to segregate in too many categories, it seems to make the task to sort more difficult for the students. There have been lectures on selective waste collection, but as they are infrequent, the students end up forgetting the lessons. In other words, there is no continuity in promoting best practices. According to the coordinator of one of the schools, it is necessary to reinforce the theoretical part and find ways to turn theory into action.

At Monterey Middle School, interviews with two teachers revealed inconsistencies in waste management practices, a lack of information for both teachers and students regarding consumption/waste behaviour, and a general unfamiliarity with the concept of Zero Waste among school members. While students engage in discussions about social justice and environmental issues, including climate change, they struggle to connect their personal actions with broader environmental impacts. Specific concerns were raised about soft plastics from wrappers and snacks brought from home. The interviews suggest a need for



FIGURE 2: Collective construction of the 'Dream Tree' for zero waste (Source: the authors).

developing a comprehensive waste management plan tailored to the school's needs, which could serve as a model for other schools as well.

During the group discussions in the second workshop with the students, we asked the following questions:

i. How is waste currently taken care of in your school? What problems do you find? List the problems.

ii. How should the school deal with its waste (e.g., paper, plastics, food waste)? How could students, teachers and staff contribute to a better waste management?

iii. What could help schools in Victoria to become zero waste? What could you specifically contribute? What products could be created by your class to help change the situation?

The questions helped us gain insights into the primary waste management issues at Monterey school from the students' perspective, as well as generated ideas for solutions and awareness-raising initiatives (see Figure 3).

With the participatory mapping activity, we were able to locate the hotspots related to waste generation and accumulation in the neighbourhood. This information will help prioritize actions for a co-created waste management program for the school. Using these maps, students can pinpoint priority issues and show the real demands of the school.

The various other classroom interventions contributed to identify strategies for addressing the key waste-related issues and to generate suggestions for interventions both within and beyond the school. For example, students advocated for reducing paper and tape usage and suggested that teachers utilize more digital resources and print only when necessary. They also highlighted plastic tape as a significant contributor to the problem due to its non-biodegradable nature. Furthermore, students emphasized the importance of shifting perceptions around waste management. Currently, cleaning up garbage is often employed by the teachers as a punitive measure. The students propose a paradigm shift: promoting waste sorting through positive reinforcement rather than punishment.

Lastly, student ambassadors have committed to creating a poster and a presentation to disseminate information about Zero Waste in other classrooms. Their aim is to raise awareness among students about the issue and encourage sustainable practices.

5. FINAL CONSIDERATIONS AND NEXT STEPS

Based on first research findings, there is an urgent need to educate both students and staff on the importance of effective solid waste management within schools and their

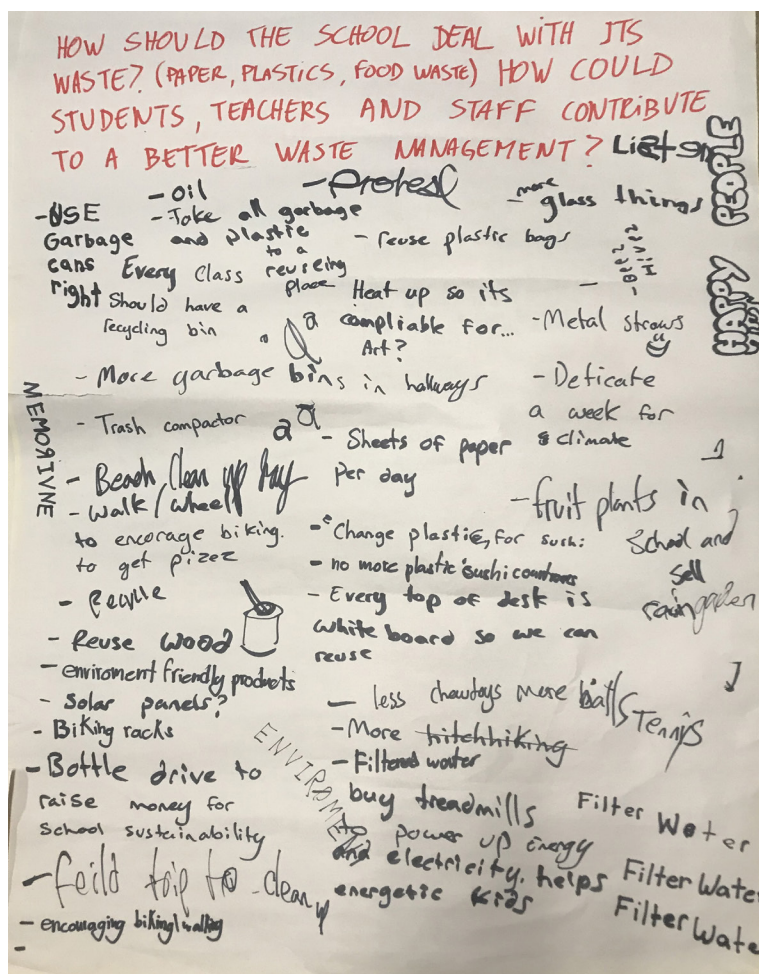


FIGURE 3: Group discussion sheet with students' perceptions (Source: the authors).

surrounding neighborhoods. This education should include teaching proper waste separation methods, assessing the types of waste generated, understanding the associated issues and implications within the school environment, and collaboratively developing an action plan for efficient and effective waste management.

The next steps in this project involve finalizing participatory activities in schools in both countries, completing the final products for each class (in the case of Monterey school the outreach material such as a presentation and a poster), and disseminating the project's results and products.

In Victoria, the plan is to distribute the final products to other schools, sharing acquired knowledge and promoting the necessary measures for transitioning to more efficient waste management in schools, raising awareness about waste challenges in urban settings. In Brazilian cities, the goal is to disseminate the produced materials to other schools, contributing to citizen education toward achieving Zero Waste goals and to also specifically target the semi-urban and rural areas adjacent to the towns under study.

Finally, we can already conclude that youth, as grassroots innovators, play a pivotal role in driving societal progress through their creativity, resourcefulness, and passion for change. Unlike established institutions, youth bring a fresh perspective unencumbered by traditional norms, allowing them to identify unconventional solutions to pressing challenges. By harnessing their skills and innate curiosity, youth innovators not only develop novel solutions but also inspire others to actively engage in problem-solving activities. Our research findings, so far, suggest that young people play an important role as grassroots innovators and providing them with the necessary support and giving them autonomy, they engage in promoting collective actions for change, particularly if these actions are supported by their teachers and can be followed up in the classroom.

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