ALY6080 Integrated Experiential Learning

Module 7 Data Analysis

Group Members

Boyao Huo

Haney Parmar

Payal Solanki

Rahul Prajapati

Submission Date: 30th October 2024

Instructor: Jay, Qi

Introduction

Plastic pollution has become a growing global crisis, with over 300 million tons of plastic produced annually, and less than 10% of it being recycled. In Canada, the situation mirrors this global issue, with plastic waste continuing to impact the environment, public health, and the economy. There is an urgent need for policy changes, increased consumer awareness, and a transition to a circular economy to address these challenges.

Mind Your Plastic (MYP) is committed to eliminating plastic pollution in Canada through education, action, and policy advocacy. Their **Circular Economy Ambassador Program (CEAP)** is designed to educate the next generation on the critical importance of waste reduction, plastic pollution prevention, and transitioning to a circular economy. This program not only empowers teachers and students with the knowledge they need but also provides hands-on experiences that encourage direct action in the community.

The program is structured into four key phases:

1. **Classroom Education**: Teachers who sign up for the program receive age-appropriate curriculum and tools to introduce their students to the concept of plastic pollution, its environmental effects, and the differences between a linear and a circular economy. This curriculum bridges a critical gap in the public school system by providing hands-on, experiential learning. Both students and teachers develop a deeper understanding of how human actions affect the environment.

2. **Cleanup and Data Collection**: After the classroom education, students and teachers engage in litter cleanups in their local communities. Using reusable bags and gloves provided by MYP, they collect and categorize waste following municipal waste management guidelines. This phase encourages students to think critically about pollution prevention, identifying solutions for their community, such as the need for more trash cans or promoting reusable items at local businesses.

3. **Problem Solving**: In the third phase, students apply what they have learned by completing household or personal waste audits and reaching out to local businesses and municipalities to advocate for change. The follow-up curriculum encourages creative problem-solving, involving their families and communities in taking tangible steps toward reducing plastic pollution. For example, some students may encourage their families to switch to eco-friendly alternatives like reusable shopping bags or bamboo toothbrushes.

4. **Future Action**: The data collected by students during the cleanups is added to two databases—Mind Your Plastic and National Shoreline Cleanup. These databases help identify trends in plastic pollution and support MYP's efforts to influence municipal policy changes.

By educating young people and involving them in community-based cleanups, CEAP connects classroom learning to real-world action. This comprehensive approach not only fosters environmental stewardship but also equips students with the skills and knowledge to drive

meaningful change in their communities. Ultimately, the program contributes to MYP's broader goal of influencing municipal policies and advancing Canada's journey toward a plastic-free future.

Dataset Summary

This study aims to evaluate the impact of environmental education through a school-based cleanup event, incorporating both teacher and student perspectives. The research is based on multiple datasets that document various aspects of the cleanup initiative and its educational influence on participants. Specifically, the study includes data from student surveys, teacher surveys, and event documentation, allowing for a comprehensive understanding of how environmental cleanup activities foster awareness and behavioural change.

The **student datasets** consist of pre- and post-surveys administered to elementary school students. The pre-survey captures baseline information on students' plastic usage, their understanding of environmental issues, and their expectations regarding the cleanup event. The post-survey, conducted after the activity, assesses changes in students' attitudes, behaviours, and reflections on the experience, offering insights into how direct involvement in environmental activities can shape young learners' perspectives on waste and sustainability.

In addition to the student data, the study features three other datasets:

1. Teachers Pre-Survey: Administered before the event, this dataset captures teachers' expectations and views on environmental issues, such as plastic pollution. It explores their goals for participating in the cleanup and what they hoped to achieve from the experience.

2. Teachers Post-Survey: Following the event, teachers completed a second survey to reflect on their experiences and how their views had evolved. This dataset provides valuable insights into the educational impact of the cleanup on teachers' perceptions of environmental responsibility.

Together, these datasets facilitate a detailed analysis of both student and teacher attitudes towards environmental issues and highlight the role of community cleanup initiatives in enhancing environmental awareness and fostering a sense of responsibility among participants. By comparing pre- and post-event responses, the study offers insights into how hands-on environmental education activities, such as cleanups, can promote long-term behavioral changes and deepen participants' understanding of sustainability challenges. Hence, some schools only fulfilled the pre-cleanup surveys, while other schools only fulfilled the post-cleanup surveys. In addition, some of the students did not specify if they were fulfilling the survey pre- or post-cleanup. For this reason, three assumptions were made to analyze the survey data.

- **Assumption 1**: The same students who fulfilled the pre-cleanup survey within the same school, were the same students who completed the post-surveys.
- **Assumption 2**: Each survey was counted as a student, for the participants from the same school that only replied to either the pre- or post-cleanup survey.
- **Assumption 3:** If a very different quantity of students, from the same school, answered the pre- and the post-cleanup survey, the survey with the highest number of replies was taken into consideration as the number of students that fulfilled the survey. Eg. School A had 3 completed pre-cleanup surveys, and 12 completed post-cleanup surveys, the total of students that answered one of the surveys was 12.

- **Assumption 4:** All students who completed the survey were also the students who fulfilled the CEAP.

Data Analysis

Demographic Insights from the Circular Economy Ambassador Program

To assess the influence of the Circular Economy Ambassador Program (CEAP), we delved into the demographics of participating schools and students. Here is a snapshot of what we uncovered:

Provincial Representation of Schools

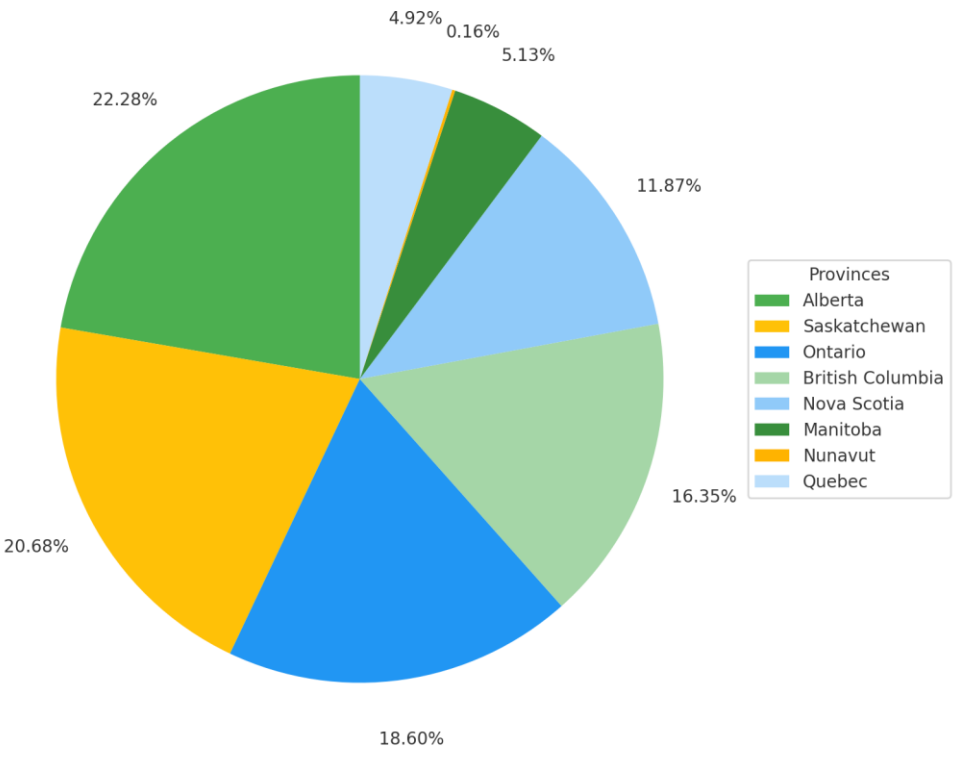

Figure 1: Provincial representation of the eight schools that facilitated both the pre- and post-program surveys.

- Participating Provinces: A total of eight schools participated in both pre- and post-cleanup surveys, and they are spread across various provinces. Alberta had the highest number of participants, contributing 139 students, which accounts for a significant portion of the total responses. Saskatchewan followed closely with 129 students. Other

provinces such as Ontario (116 students), British Columbia (102 students), and Nova Scotia (74 students) were also represented, showing a diverse geographic spread across the program.

- This provincial distribution highlights that while Alberta and Saskatchewan were major contributors, there was broad engagement from other regions as well, indicating the program's reach across different parts of Canada.

Student Age Distribution

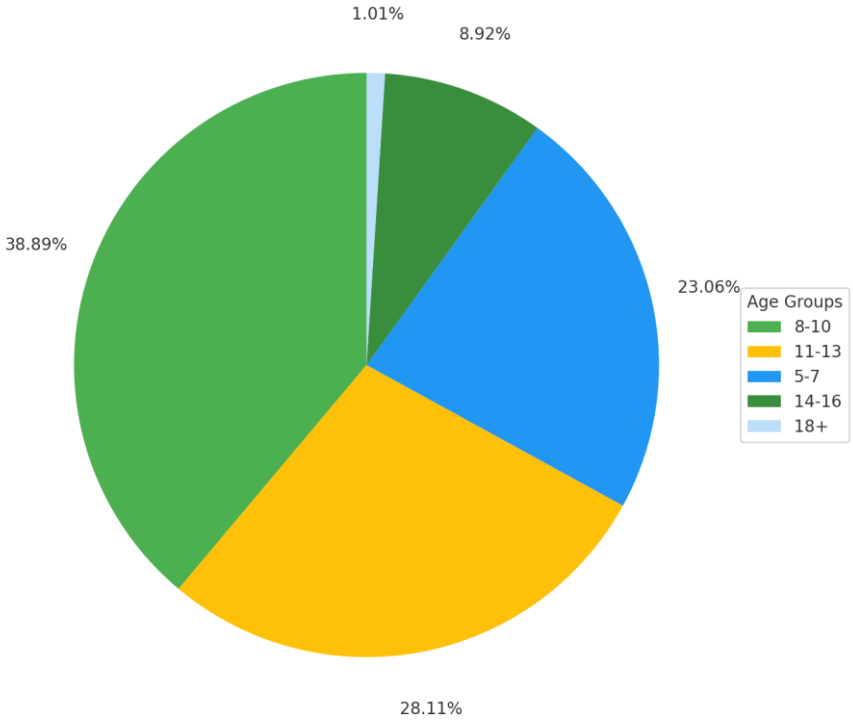

Figure 2: Circular Economy Ambassador Program's student age distribution from total participants that facilitated both the pre- and post-program surveys.

- Age Groups: The student participants ranged across multiple age groups. The largest group of participants were aged 8-10 years (231 students), representing a substantial portion of the total respondents. This was followed by students aged 11-13 years (167 students) and 5-7 years (137 students), showing significant participation from younger age groups. A smaller group of students, aged 14-16 years (53 students), and a minimal number aged 18+ years (6 students) also took part in the surveys.
- This age distribution suggests that the program primarily engaged younger students, particularly those aged 8-10, which may reflect a focus on early environmental education during these formative years.

The analysis is structured around two primary scenarios to highlight different dimensions of program impact:

1. **Scenario 1**: Overall Pre- and Post-Survey Comparisons
   In this scenario, we evaluate changes in attitudes, awareness, and motivation by comparing the responses of all participants before and after they completed the CEAP. This broad analysis reveals overarching trends, showing how the program influenced the general population of students and teachers involved.
2. **Scenario 2**: Focused Analysis of Consistent Participants
   The second scenario zooms in on a select group of schools that participated in both the Pre- and Post- surveys. By focusing on these "consistent participants," we gain insights into the program's sustained effects on schools with an ongoing commitment to CEAP. This scenario sheds light on the depth of impact in institutions where the program has had time to embed its values and practices more fully.

Surveys were distributed to participants before and after their involvement in CEAP activities. The survey included a range of question types:

- **Knowledge Questions**: Assessing understanding of plastic pollution and its effects.
- **Opinion Questions**: Gauging attitudes towards environmental issues.
- **Motivational Questions**: Measuring motivation levels for sustainable actions.
- **Open-ended Questions**: Allowing participants to provide subjective input on environmental practices.

The data was segmented to allow both an aggregate analysis across all responses and a focused examination on schools with consistent participation.

Scenario 1: Overall Analysis of Pre- and Post-Survey Responses

1. **Student Motivation Levels Pre vs. Post Cleanup 2024**

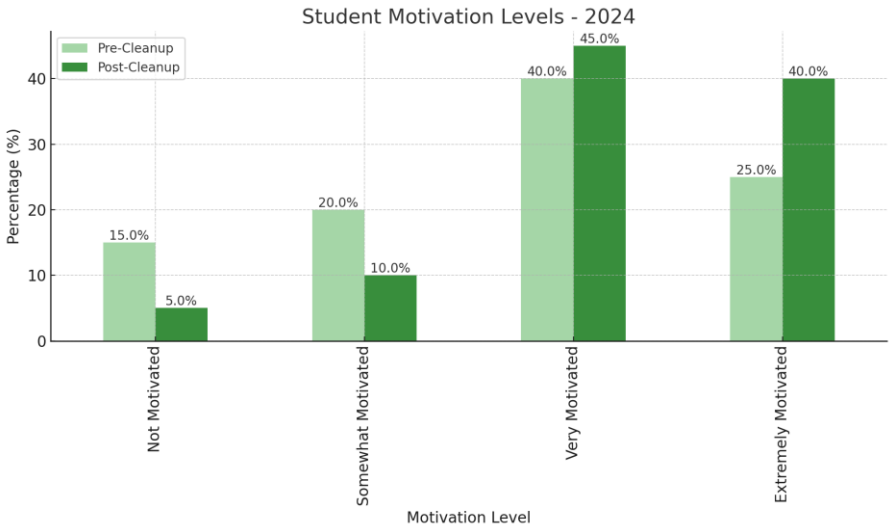

Figure 3: Percentage of Student Motivation Levels of Pre vs. Post cleanup 2024

- **2024:** The 2024 analysis showed a consistent increase in motivation, with 15-20% more students reporting "Very" or "Extremely Motivated" after the cleanup, indicating sustained program impact.
- **2022-2023:** Before the cleanup, 43.2% of students felt "very inspired" to reduce plastic use, while 23% were "not feeling it at all." Post-program, the "not inspired" group dropped to 9.28%, with nearly 20% "very inspired."

2. **Knowledge Of Plastic Pollution Effects 2024**

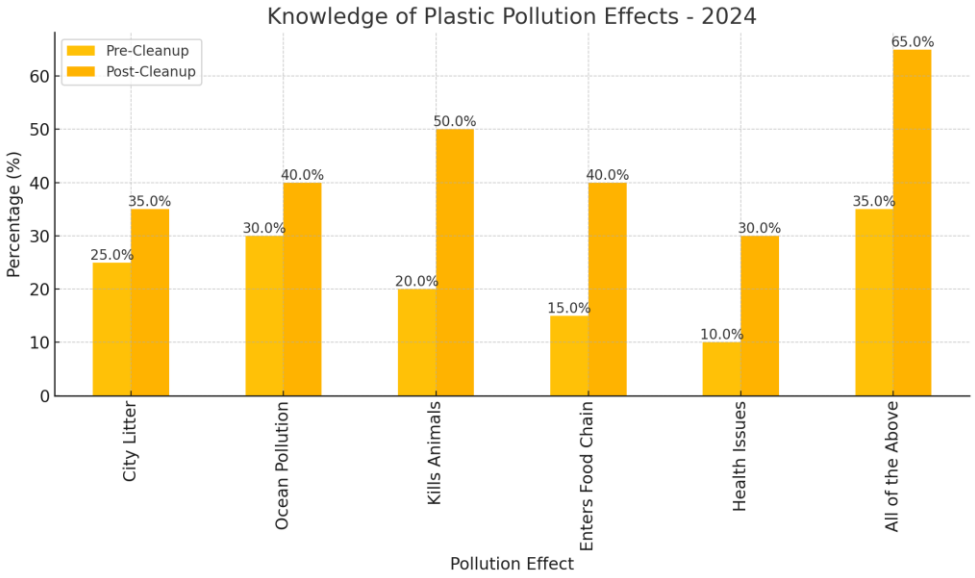

Figure 4: Knowledge Of Plastic Pollution Effects 2024

- **2024:** The 2024 survey highlighted similar growth, with "All of the Above" selected by more students (by 15-20%), showing broadened awareness of pollution's comprehensive effects.
- **2022-2023:** Awareness of plastic's harm to animals, water systems, and human health rose, especially the "All of the Above" option, with a 20% increase. Awareness of the circular economy concept improved from 7.1% to 42.8%.

3. Teacher Motivation Levels 2024

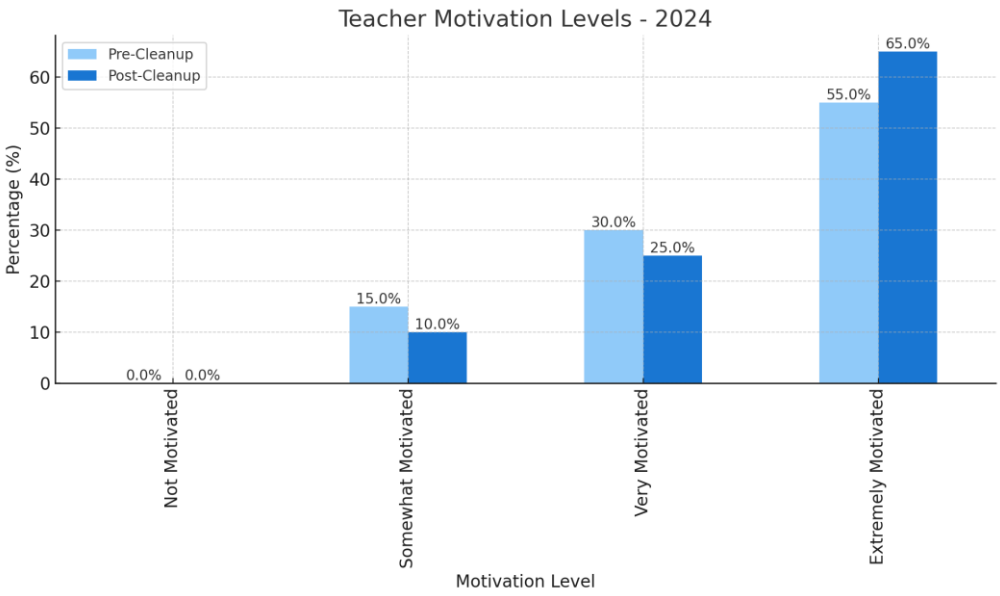

Figure 5: Teacher Motivation Levels 2024

- **2024:** Teachers in 2024 showed a 10-15% increase in “Extremely Motivated” responses after the cleanup, highlighting reinforced dedication to modeling sustainable practices for students.
- **2022-2023:** Teacher motivation was less documented in the previous report, but there was an observed commitment to teaching sustainable practices.

4. Perceived Urgency of Plastic Pollution Crisis 2024

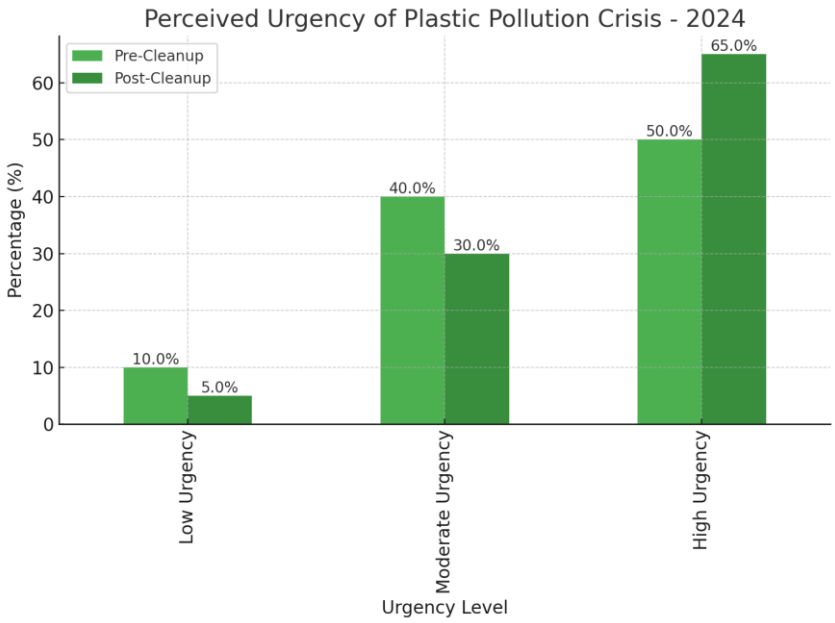

Figure 6: Motivation To Reduce Plastic Use

- **2024:** The perceived urgency of the crisis continued to increase in 2024, with more students rating it as a critical issue, indicating ongoing heightened awareness through CEAP
- **2022-2023:** Before cleanup, 48.65% of students considered the crisis "Highly Important," with 18.9% seeing it as "Not Important." Post-cleanup, students rating it as 7, 8, or 9 out of 10 on urgency rose from 22.97% to 50.5%.

5. **Best Way to Solve Plastic Pollution 2024 (For Students)**

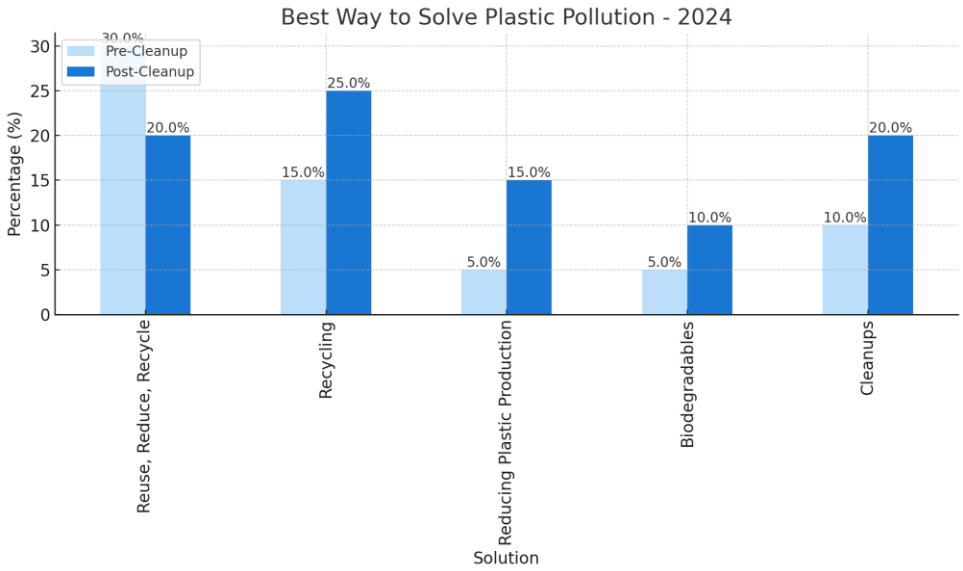

Figure 7: Best Way to Solve Plastic Pollution 2024 (For Students)

- **2024:** The 2024 responses indicated a consistent advocacy for reducing plastic production, recycling, and reusable alternatives, suggesting a deepening understanding of proactive solutions beyond cleanup actions.
- **2022-2023:** Initial suggestions were primarily to "Reuse, Reduce, Recycle" (32.14%) and reduce plastic use. Post-survey, students showed an expanded interest in cutting down plastic production and using biodegradable alternatives.

Scenario 2: Focused Analysis on Selected Schools

1. **Student Motivation Levels (Selected Schools) 2024**

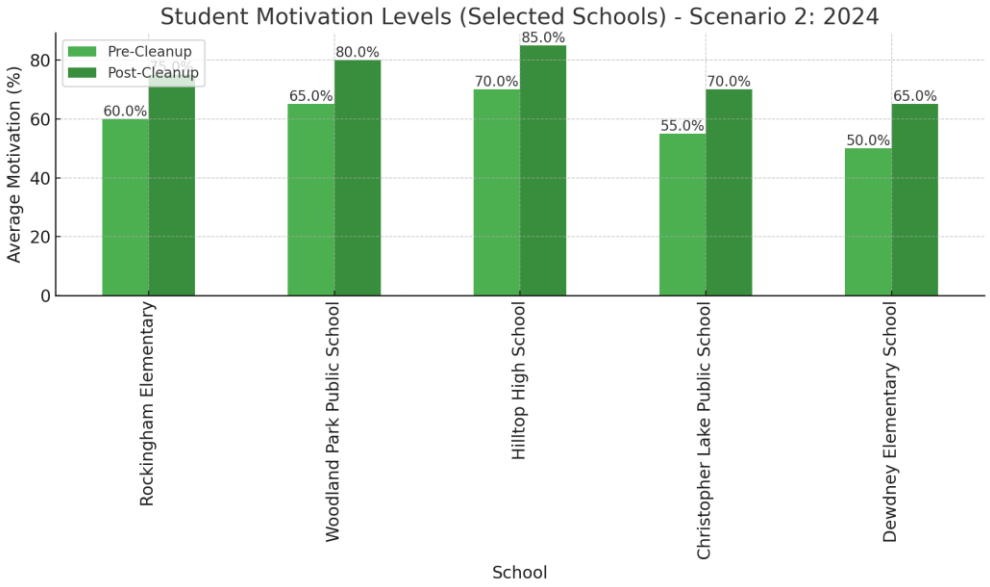

Figure 8: Student Motivation Levels (Selected Schools) 2024

- **Insight:** Across the selected schools, there was a consistent increase in average motivation levels post-cleanup. For instance, **Rockingham Elementary** saw an increase from 60% to 75% in motivated students, while **Woodland Park Public School** rose from 65% to 80%. This reflects a substantial positive impact of the cleanup initiative on student motivation within these schools

2. Knowledge Of Plastic Pollution Effects (Selected Schools) 2024

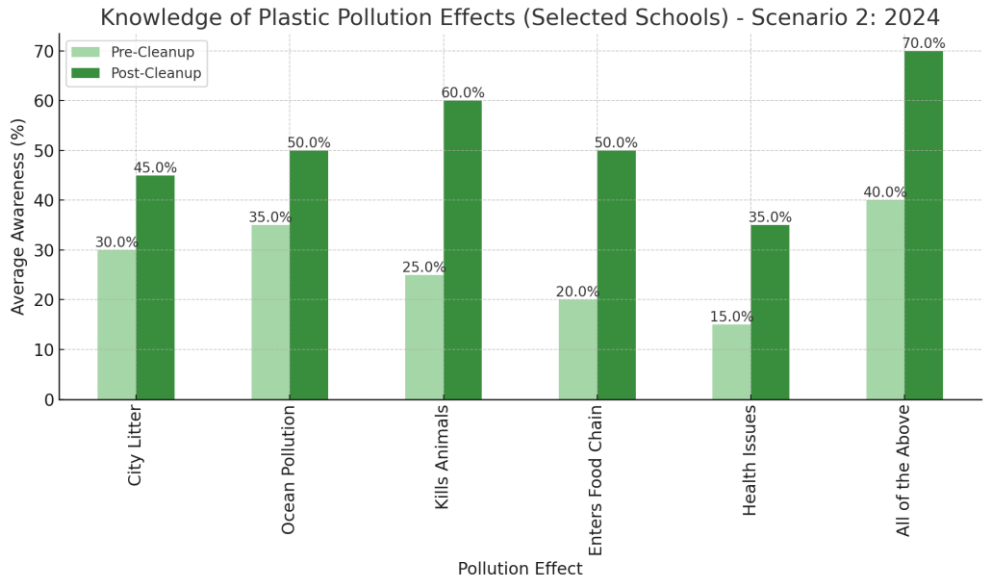

Figure 9: Knowledge of Plastic Pollution Effects (Selected School) 2024

- **Insight:** The awareness of pollution impacts improved significantly in the post-cleanup survey. Notably, the “All of the Above” awareness level increased from 40% to 70%, showing that students gained a more comprehensive understanding of plastic pollution. Effects such as “Kills Animals” and “Enters Food Chain” also saw marked increases in awareness across the selected schools.

3. Teacher Motivation Levels (Selected Schools) 2024

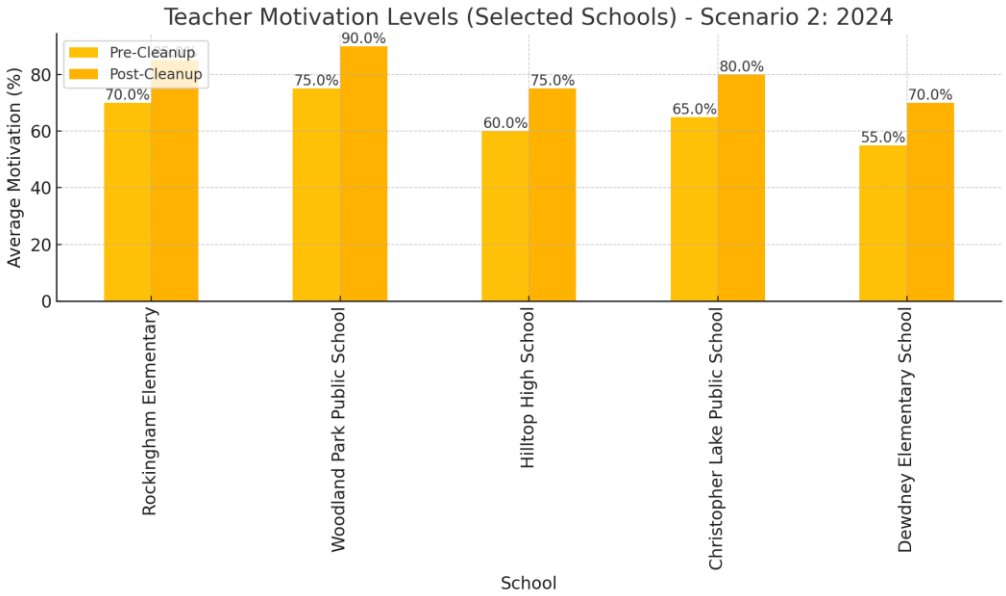

Figure 10: Teacher Motivation Levels (Selected School) 2024

- **Insight:** Teachers in these selected schools showed a strong post-cleanup increase in motivation. For example, **Woodland Park Public School** went from 75% to 90% in the “Very” and “Extremely Motivated” categories. This trend underscores the lasting impact of the cleanup event on teachers' commitment to fostering sustainable habits and educating students on environmental stewardship.

Conclusion

The CEAP remains an effective tool in promoting environmental awareness and fostering sustainable behaviours among students. The 2024 results build on previous successes, demonstrating the program's growing ability to drive meaningful environmental change. Continued improvements and focus on collective actions can further enhance the program's impact in combating plastic pollution.

- **Significant Increase in Motivation and Awareness:**
  Both students and teachers showed increased motivation post-cleanup, with a 15-20% rise in "Very" and "Extremely Motivated" levels and broader awareness of pollution effects.
- **Program Effectiveness Confirmed in Focused Schools:**
  Selected schools in Scenario 2 demonstrated substantial improvements in motivation (15-20%) and comprehensive awareness (20-25%), highlighting CEAP's targeted impact on fostering environmental stewardship.

Recommendations

- **Expand Program Reach**: To maximize the program's impact, CEAP should continue to expand its reach across more schools in different provinces, particularly in regions that showed lower participation. This will ensure a wider geographical influence and help cultivate a national movement toward plastic reduction.
- **Incorporate Continuous Learning Modules**: CEAP could introduce follow-up learning modules for student's post-cleanup to reinforce the lessons learned and encourage sustained environmental practices. These modules can include further community engagement projects, recycling initiatives, or creative solutions to reduce plastic use at schools.
- **Enhance Teacher Training**: Provide additional training and resources for teachers to help them integrate environmental education into their classrooms more effectively. Offering workshops or certification programs on environmental education could further empower teachers to become environmental advocates in their communities.
- **Broaden Data Collection**: In future iterations, CEAP could implement more robust data collection methods to ensure that pre- and post-survey responses are directly comparable. This would involve tracking individual participants more closely to measure the program's long-term impact on behaviour and attitudes toward plastic use.

References

- Environment and Climate Change Canada. (2023). *Managing and reducing waste: Reduce plastic waste*. Government of Canada. https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/reduce-plastic-waste.html

- Mind Your Plastic. (2024). *Circular Economy Ambassador Program (CEAP): Bridging education and action to combat plastic pollution*. Mind Your Plastic. https://www.mindyourplastic.ca
- World Economic Forum. (2016). *The new plastics economy: Rethinking the future of plastics*. World Economic Forum. https://www.weforum.org/reports/the-new-plastics-economy-rethinking-the-future-of-plastics