

12-2019

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Hayley E.R. Frost Rubino

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Recommended Citation

Frost Rubino, Hayley E.R., "Gnome Waste Warriors: Waste Reduction through Sustainability" (2019).
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Gnome Waste Warriors: Waste Reduction through Sustainability
Hayley Frost-Rubino
California State University Monterey Bay

Abstract

The focus of this Capstone Project was on how waste and waste reduction could positively impact a community. Waste reduction is an important issue because the negative impacts of waste affect the whole planet. By educating Monterey Gnome School (MGS) about waste, changes in daily habits are intended to result in lasting change. An evidence-based argument is offered that waste is a global issue that negatively impacts the earth's landmasses, oceans, and human health. Both MGS staff and students were interviewed and surveyed, as their perspectives provide unique aspects of thinking about waste issues. The themes that emerged from an analysis of the data indicated that labeling bins, composting and food waste, education with accountability would address the causes of waste on campus. These findings led to an action plan that helped stakeholders address waste reduction and make sustainable practices available at MGS. Labeling bins in order to sort waste, recycling, and other bins properly is argued to be the most effective way to achieve the goal of a waste reduction based school.

Gnome Waste Warriors: Waste Reduction through Sustainability Education

It was the tallest tree in my yard; the branches thick enough to climb and support my weight. I would pull myself through the leaves and branches, getting scrapes and scratches. It was all worth it, to reach the top. I would suddenly surpass the canopy of redwoods and touch the sky. Being free in the woods was everything to me as a child. As I looked around at the top of the tree, I saw every shade of green bursting with life. Life was so still there. My home town in the woods was teeming with life and was the most peaceful, healthy place I knew. I lived deep in the woods and nature was a sanctuary. I was a child and did not know the impacts I personally created every day on this magical place I held so dear.

As the years passed, that tree grew older with me. It became bigger while I became an adult, but eventually, that tree grew sick and weak. The stream that flowed by the base of the trunk and fed the roots, would have less water flowing in it due to less rainfall each year. Since there was less rainfall, the trees near my home suffered; many died or fell. When I was 13, a storm hit the little California town I lived in. It raged on for two weeks and after passing, left the town saturated. However not just with rainwater, since the stream was full of garbage and waste that has washed down the mountain and off the streets. There were dead fish and other life floating down the stream, swirling with a rainbow oil slick on the top. Our little stream fed into the San Lorenzo River, which leads to the Santa Cruz coast. The waste that entered those waterways traveled out to sea. After a few days passed my father had to trim the redwood, along with other trees, I would climb as a child. It was not healthy and looked like it was growing smaller. After that storm, my family and I would constantly clean up our part of the river. I always asked myself, "*Why do I have to clean up other people's messes?*" For years, the waste I noticed everywhere bothered me greatly which lead me to look for the cause of the problem. Through Girl Scouts and other charity organizations, I participated in many road river cleanups, field trips to wastewater treatment centers, landfills, and other places where waste went.

By my senior year of high school, I was appalled and panicked. Appalled by the way our world lived in such a consumer culture that reeked of instant gratification. Everything is easy and convenient. From the packaging of our food to the way we travel; convenience always before the health of the earth. I was panicked because the world I lived in was dying due to waste. Every plastic wrapper I had ever thrown away, was still on the planet. I still today wake up from nightmares of me drowning with fish in the sea, not from water but because we are enveloped in plastic and garbage. But I was young and felt like I had no power to make a change in the world.

Years later, my fears started to avail themselves in movies and media. Advertisements for being more sustainable or "go green" bombarded me. People are

obsessed with plastic straws and small solutions to a much bigger problem. The conversation had finally begun globally. From The Great Pacific Garbage Patch, collecting debris in the North Pacific Ocean, to the tree in my parents' yard that I loved so much. My heart was so heavy and I felt hopeless. For example, images of children in India and all over the world scavenging through dumping grounds filled with waste. My brain could not comprehend how big this issue even was, because this problem was so much larger than just me. But I wanted so desperately to do something to save my planet.

One day, I was walking through a new place and everything changed. A sign hanging in the window of a local coffee shop in Germany where I had just moved to, caught my eye. It translated to “Act Local, Think Global”. The sign resonated deeply with me and I started to make changes in my own life that day. I stopped buying things with large amounts of packaging and refused plastic everywhere. I never thought that I could make a difference before. My efforts were small, but I had realized in order to make a difference, I had to start somewhere.

Now I have continued in my journey more concentrated to be zero waste. I am focused and passionate about how I want to change my personal habits to make the world a better place. Challenging myself over the last three years to become waste-free has made a difference. I constantly educate the people around me about their own waste consumption. By making my community stronger and sharing knowledge on how to live more sustainably, I can make an impact. By acting local, I have the power to make a difference globally. I intend to help spread sustainable education in my own classroom and with every student I work with as a teacher. Through my Capstone project, the students and I can make real impacts on their campus through awareness and action.

Literature synthesis and integration: Waste is Everyone's Issue

Since waste affects us all, we all have to do something about it. The consumption of products that are not sustainable, the footprint left behind is forever. (EPA, 2015, 2016, 2017, 2018) According to the Environmental Protection Agency (EPA), in 2015 about 137.7 million tons of Municipal Solid Waste (MSW) were landfilled. Landfills are where waste is placed into the land. Landfills usually have safeguards to prevent polluting the groundwater. The EPA states that MSW, “more commonly known as trash or garbage—consists of everyday items we use and then throw away, such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries” (EPA, 2015, MSW). However, landfills are not a finite solution to what we throw away in bins. The problem is the things we throw away are not meant to be put into landfills. For example, plastic does not degrade, and plastics accounted for 19 percent of total MSW in the United States (EPA, 2015). What consumers use does not just go away after it has been thrown away. The impacts made with waste are having consequences for the earth and our health.

At the end of the day, the problem being faced is waste made and the global impact it has. Moreover, people may not know the influence their choices have on the environment. Students, for example, may not know the changes they can make in their lives to make long-term sustainable choices. These choices can spread further than just them individually, but to their communities and further. Since the problem also includes a lack of education and understanding of why waste is an issue, the next step is to look at the issues waste creates.

Why is it an issue?

Every day the global climate crisis increases with waste production and global warming that is harming the planet earth. So large scale, the issue of waste is causing environmental destruction. The amount of carbon put into the atmosphere because of plastic waste alone is staggering. According to the 'Impacts of Mismanaged Trash' by the EPA (2017), this transfers through the water cycle, affecting land masses as well as the ocean. Besides the effects of CO₂ emissions on the environment, waste products are also littering (pun intended) on our planet. The oceans are filled with floating plastics and other waste that is leaching into the water and aquatic life. While the amount of waste that we throw away does affect the planet, there is more to this issue (EPA, 2017). The real issue is that this is happening everywhere and affecting the global environment. This waste problem ends up in our food and then our bodies and this eventually leads to a decline in human health.

Habitats, biological life, and full landfills are why it is an issue. To look at this issue a little smaller scale than the whole globe, habitats are being bombarded with plastic and other waste. Biological life is at risk of waste through toxic debris and the breakdown of waste. Even when plastic breaks down, "... plastic does eventually almost biodegrade, but it will temporarily break into smaller fragments, which then produce so-called 'microplastics'. These have a specific and significant set of impacts." according to the European Commission of Science for Environmental Policy (2011). Waste is an issue for landfills and other places where waste disposal happens because the earth is our home and it is littered. Landfills are not a complete solution and the planet is running out of space to use as waste dumps. When waste is not disposed of properly or how it is created in the first place, it even becomes more of an issue. Greenhouse gas emissions show that plastic and other waste have a carbon impact for example. "Dumping, incinerating, recycling and composting (for certain plastics) all release carbon dioxide ... emissions from plastics in 2015 were equivalent to nearly 1.8 billion metric tons of CO₂." according to research done by the University of California Santa

Barbara (2019). Just another part of impacts to consider in the creation of plastic and other waste. This leads directly to human impacts and health.

The issues of waste involve participation. Issues are only issues when a whole group does not abide by the idea. When issues like waste consciousness are addressed, sometimes participants feel that the weight is solely on their shoulders. An example is in the Australian Waste Wise Program. The Waste Wise Schools program in 2010 was operating in over 50% of Victoria's schools as well as hundreds of schools in other Australian states and territories. (Cutter-Mackenzie, 2010, pg.16) According to Sustainability Victoria, key focuses for schools participating in the program are to reduce waste and the costs associated with it, access to resources to specialized advice, growth through widespread usages and public perception, recognition, rewards for achievements, use of the "Waste Wise" logo, and improved compliance with responsibilities of the environment as well as contributions to a sustainable future. (Sustainability Victoria, 2008). The program allows schools and staff to have a clear plan for waste education. Though the program has grown since its beginnings, barriers have been reported in existing research, particularly regarding issues of lack of teacher and administration management commitment, lack of time, and overcrowded curriculum. (Cutter-Mackenzie & Smith, 2010) If the programs are not being used to their full potential, then the education and practice may go to the way-side.

Schools, such as in the UK, are finding out how much their students know about waste and waste solutions. In the *Journal of Teacher Education for Sustainability* (2015), a survey was given to students to see what concepts of sustainability they understood or never heard of. As seen in Table 1, this survey shows student's knowledge when it comes to waste in English schools. The results showed a small example of what students understood with different ways to dispose of waste. This kind of information can be hugely beneficial for teachers and staff to use while making decisions on how to teach these concepts. (Kolbe, 2015) Examples like this give a view of small scale understanding of the waste issue at hand.

Table 1

Percentage of Students who had Heard of the Named Concepts, had not Heard of the Concepts or Knew what They Meant

	Have never heard of it		Have heard of it/ don't know what it means		Have heard of it/ know what it means		Missing answer	
	Grammar school	Comprehensive school	Grammar school	Comprehensive school	Grammar school	Comprehensive school	Grammar school	Comprehensive school
Recycling of paper	0.0	3.5	0.9	1.4	99.1	95.1	0.0	0.0
Kerbside collection	0.0	4.9	10.9	21.0	89.1	74.1	0.0	0.0
Composting	0.0	5.6	1.8	18.9	98.2	74.8	0.0	0.7
Incineration	0.9	11.2	19.1	26.6	80.0	61.5	0.0	0.7
Landfill	1.8	15.4	13.6	24.5	84.6	59.4	0.0	0.7

Notes: Kolbe K. D. (2015). Knowledge, Attitudes and Behaviour regarding Waste Management in a Grammar and Comprehensive School in England-Results from School Questionnaire. *Journal of Teacher Education for Sustainability*, 17 (1) 58-71.

The issue that can be understood here is that people may not be taking this kind of education seriously or understanding why it is important. By taking a look at how well people know how to treat waste, the information sheds light on the issue of education. Since waste is a larger issue, there are many ways it is negatively impacting the planet and in many venues.

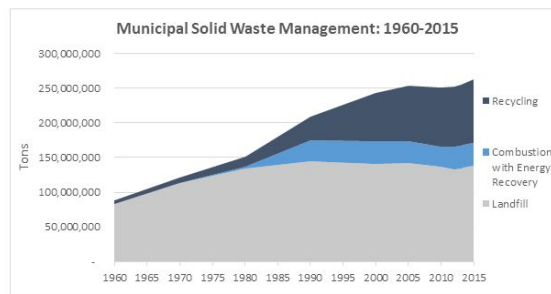
Waste and waste reduction is not just an issue at schools; it is inside homes, businesses, and worldwide. The issue that the world faces with waste already affects us all. "Problems and issues related to the environment... not only turn the world into an uninhabitable place but also intimidate human existence. Could be possible through environmental education" (de Kumar 2004) By helping citizens realize the seriousness and need for immediate action for the situation without promoting any panic, change can remedy these issues. The main hope for sustainable education and waste reduction is to raise awareness of the issues and solve them before it is too late. Education about these issues is needed in order to save the planet and people on it, large and small scale.

What Should Be Done?

Since the problem is a lack of understanding of waste issues and how to better educate the masses on how waste affects the planet, then the solution is education. Worldwide there needs to be changes made to everyone's habits. When everyone tries to be zero waste, if not reducing waste, solutions and alternatives can be found and practiced. Many things have to be done to remedy unsustainable practices. Sangwon Suh, a professor at UC Santa Barbara's Bren School of Environmental Science & Management, understood the changes need and stated, "If we truly want to limit global

mean temperature rise from the pre-industrial era below 1.5 degrees Celsius, there is no room for increasing greenhouse gas emissions.” Suh goes on to discuss ways to transition to reduced emissions through 100% renewable energy. Yet, often when solutions are found, they do not address the real issue; lack of understanding of the issues that arise from waste. Solutions like education are to cut out, cut back or disincentive. (Zheng, 2019) The education of waste does not always work since convenience leads to bad habits when talking about waste. By making waste about confidence, being mindful and making changes to waste habits is disincentivized.

Though organizations like the EPA (2015) report each year on waste management, landfills are still filling up. These reports clearly state the mismanagement of trash, recycling, and other debris. The EPA also spearheads thinking beyond waste. Sustainable Material Management (SMM) reduces waste while reusing resources and minimize environmental impacts. Below is a Waste Management Hierarchy that encourages how to use the waste from most preferred to least preferred methods of sustainability. By focusing on the reduction of waste and reusing when waste is made, the hierarchy plan ensures more sustainably outcomes from waste.



Notes: On left: EPA’s integrated waste management hierarchy preferred disposal and use. On right: Municipal Solid Waste Management from 1960-2015.

Large scale, these efforts hope to reduce waste by less consumption of plastics and the creation of CO₂. The desire is worldwide changes like those would solve many environmental impact issues. However smaller, more local scale changes must be made as well. ”To move the agenda forward on prevention, particular emphasis on behavioral change must be done starting from young ages. “ (Zorpas, 2017) By encouraging the whole community participation, education and implementation of waste reduction will spread. Students are in a position where they can implement lasting change when it comes to waste. There are many organizations worldwide that focus on sustainable education for schools and homes. The hope is that when students become more aware of

these issues that waste causes, they will bring the conversation home.

An example of one organization is The California Department of Resources Recycling and Recovery who created the Zero Waste International Alliance. It is a practice to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use. Implementing zero waste will eliminate all discharges to land, water, or air that are a threat to planetary, human, animal, or plant health (CalRecycle, 2019). When schools and the surrounding communities committed to making changes to waste habits, taking notice of the problem, community members can lead the discussion. Interaction between students in and outside the classroom also will spread these changes.

The United Nations Conference on Environment and Development (UNCED) spoke during the conference, “education is critical for promoting sustainable development and achieving environmental and ethical awareness, values and attitudes, skills and behavior consistent with sustainable development and for effective public participation in decision making” (Zorpas, chapter 36 of Agenda 21, 2017). Even the United Nations sees education as a primary way to solve the negative impacts on the environment. By raising awareness and changing habits, anyone could make a difference in the waste problem in the world.

Conclusion

Since there is no “Planet B” and we have this one earth to live on, everyone must make changes to their waste management. It is vital that the world make changes now to remedy the problems waste makes. By better educating the world, everyone can make choices that will lessen those negative impacts. By implementing better practices of composting and recycling, less waste will enter the landfills and be lost in the oceans. This will lead to environmental awareness as well and hopefully lessen the CO₂ in the atmosphere that is warming the planet. When everyone tries their best to be as least wasteful as possible, that is when real change happens.

Methods

Waste is changing the planet as we know it. Educating our children and families can positively impact the waste reduction of a community. This Capstone Project research investigated this issue and how the Monterey Gnome School (MGS) made a difference. With the Buddy class of second and eighth-graders at MGS, the goal of this project is to shed light on the waste impacts the school makes. By conducting a before and after survey created by these students and using them campus-wide, the students will lead the project and determine how it proceeds. Implementing composting bins in

each classroom and doing waste audits will give time for the campus to make a lasting change that can be kept up after the completion of the project. By creating sustainable practices for the students to take charge of, the project will be sustained as well.

Context

Located in the hills of Pacific Grove, MGS has a little bit of everything. Foggy and moist mornings followed by comfortably dry afternoons and sometimes a rainstorm. The trees grow throughout the campus and are the main focus on the playground. The school serves as a second through eighth public school. Founded in 1998, MGS is guided by the Core Principles for Public Waldorf Education and is a member of the Alliance for Public Waldorf Education. There are outdoor workshops for gardening, animal work, blacksmithing, and outdoor games. Recess is spent in the woods, swinging from tire swings, on a blacktop area with basketball, simple climbing bars or in a large field of grass. The buildings are humble, yet homey. Each classroom is set up in Waldorf fashion; lightly painted, colorful walls with chalkboards. The school hosts two classes of each grade second through eighth.

Participants and Participant Selection.

I invited 26 2nd grade and 24 8th grade students to participate in this study. This group of prospective participants were gathered to participate because they have relevant experience and influence as students on campus. Students are invested in the future of their campus since they are students there. By working with their peers, students influence the campus's waste behaviors and changes.

Researcher

The planet is my home. The environment is impacted by our waste and we have to change our habits. I try to live my own personal life as waste-free as possible. This concern is personally meaningful to me because I hope to reverse the negative effects of waste through waste reduction in all venues of my life; school, work, and travel. I believe that the environment is everyone's responsibility. When we educate others about this issue, we empower them to make a difference. I want to teach in a world where sustainability comes first. I have been living with less waste and plastic for three years now. During this journey, I have tested many different ways to do this. With my knowledge of the impacts of plastics and waste on the planet joined with my efforts of personally trying to be waste-free, I can carry out this project. I have strong skills in communication as well as group work through my time in Girl Scouting (19 years) and teaching science for Santa Cruz Children's Museum of Discovery. I am confident in working with children and enjoy projects with the community in mind. Since I am

familiar with methods of waste-free living that I have worked on over the years, I may have trouble being able to see from a stance where waste is not understood yet. I am different from the people I am working with at MGS in that I have been implementing these lifestyle changes for a while. In comparison, these might be completely new ideas for students or staff. It will be an interesting learning curve and I will have to focus on my non-judgmental thoughts and support their own journey to waste reduction. I want to create a space where curiosity and no judgments are implemented so students feel safe. This way exploration of waste reduction can be communal and comfortable, where no one is shamed and everyone is supported.

Informants

Teresa Grape is one of the Directors of MGS. After 20 years of teaching in both traditional and alternative educational programs, she joined the MGS staff.

Tess Writer is the Pedagogical Director at MGS. She had spent many years in teaching and school administration, as well as earning her Waldorf teaching certificate.

Jan Nacarrot teaches second grade at MGS as well as co-teaches the buddy class of her second and the eighth-grade class. With her travels all over the world, she has had the opportunity to gain a global perspective through teaching. She integrates this into her own classroom and encourages students awareness

Lavi Marigold teaches eighth grade at MGS as well as co-teaches the buddy class of her eighth and the second-grade class.

Semi-Structured Interview and Survey Questions

Faculty and Teachers

1. What do you see as the problem with waste reduction at MGS?; or What are you concerned about when it comes to waste reduction at MGS?
2. What is currently being done to improve waste reduction at MGS- by whom - and what do you think about these efforts? Why?
3. What kinds of changes in practices would you like to see that would lessen the waste on campus?
4. What do you think should be done about waste reduction that could involve students as educators?
5. What do you think are the obstacles to changing waste reduction on campus?

6. Is there anything else that you would like to say about waste reduction and/or the improvement of waste reduction education at MGS?

Student Survey:

Hello Gnome Waste!

This questionnaire will help you work out what your school is already doing well, and what you can do to become even better at caring for the environment.

Questions	YES/NO	Explain why Yes or No...
Do Gnomes use the waste bins properly? *Only for one-time use items		
Does every classroom have a scrap paper drawer so that pupils and teachers can <u>reuse</u> paper?		
Does every room have a paper <u>recycling</u> container that is used properly? *Not crumpled up papers, both sides used, recyclable items only		
Does the school have a compost bin for recycling fruit and vegetable waste?		
Does the school encourage children to have packed lunches without throw-away packaging?		
Does every Gnome understand WHY it is important to recycle and reduce waste?		

Next, you will need to talk about how you're going to make these things happen.

You'll need to decide **who** is going to make these changes?

When they are going to do them?

How you are going to **check** that your plans are working?

Remember to write down what you decide – this is called an **Action Plan**.

Action Plan

Who:

When:

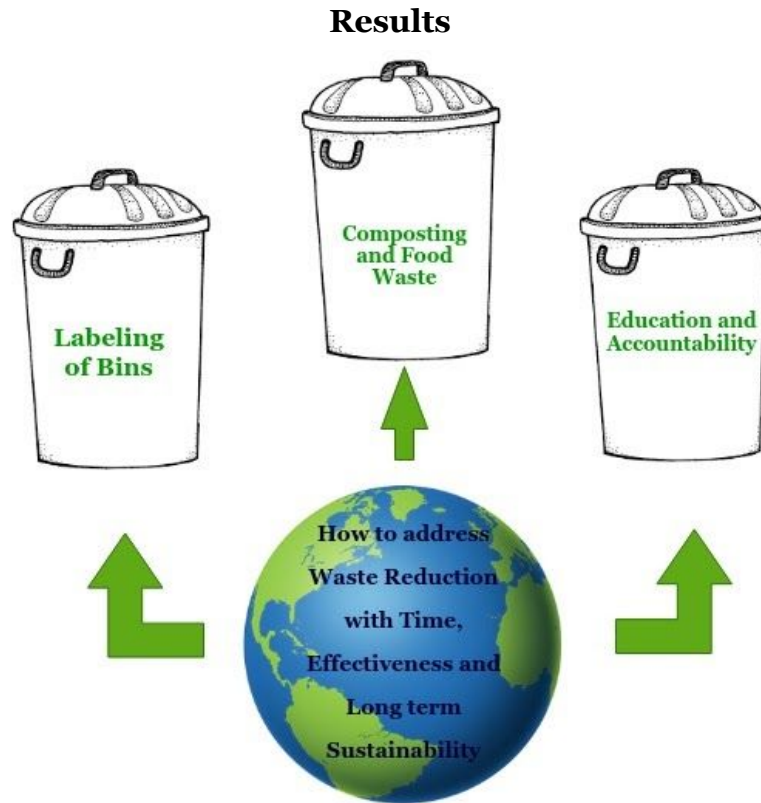
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Procedure

Participants were interviewed. All interviews were done individually with the leaders of the school (Principal and Director) and the teachers of the Buddy class (second and eighth grade). Face-to-Face interviews took less than 45 minutes and took place on the Monterey Gnome School School campus. Semi-structured interview formal questions were used for face-to-face interviews, to allow for follow-up questions that were unclear, interesting or unexpected responses and outcomes. All interviews/surveys were scheduled at the convenience of the interviewee through email prior to the interview.

After interviews were completed, the completion of the student survey by the buddy class took place. Based on the results, an action plan took place, led by these students.

(Survey above)



For this Capstone Project, Monterey Gnome School staff, teachers and students were interviewed to see what they think could be done to improve waste impacts at their school. This is important because we are responsible for waste and the negative impacts it has on the earth as we know it. Based on an analysis of the data and the relevant research literature three themes emerged (see Table 1). Evidence-based decision making required evaluating each potential Action Option by the following criteria: Time, effectiveness, and long term sustainability. Time is how much arranged time is allotted or needed for the given project. It is important because time is something all projects need and require, however it sometimes can be limited. Effectiveness reflects how successful something is and whether the desired results were achieved. To be effective, the action will reduce waste and create waste consciousness. Long term sustainability requires the project to address the issue at hand over time while changing appropriately in order to continue addressing the issue. The hope would be to sustain ending waste issues well into the future and beyond the implementation of the action. Based on the evaluation of each Action Option an action will be recommended and justified.

Table 1

Evaluation of Action Options

	Time (Amount of Time Spent Implementing)	Effectiveness	Long-term Sustainability
Labeling Of Bins	Low	Medium	High
Composting of Food Waste	High	High	Medium
Lesson Plans and Accountability	High	Medium	Medium

Labeling of Bins: Option 1

Waste at MGS is a mixture of garbage and recycling that is not sorted well. Buddy teams of students from MGS responded to the Gnome Waste survey question, ‘Do Gnomes use the waste bins properly?’ and nine out of 22 said “no.” Additionally, 5 of those students commented that the issue was sorting waste from recycling. Another question they answered was ‘Does every room have a paper recycling container that is used properly?’ and 18 out of 22 responded “no” while leaving a comment about improper sorting. One of the directors of Monterey Gnome School, Teresa Grape, said during her interview that students struggle with sorting bins because they did not know what items go into which bin. Grape stated, “I don't think students use recycling well yet either. The garbage and recycling cans are kind of mixed often too” (T. Grape, personal communication, September 12, 2019).

Labeling of bins would involve creating a sign for each bin around the Monterey Gnome School (MGS) campus and classrooms. The signage made would have to appear on the surface of the bin, to always be visible to users. Words used would be simple and clear, in order for all ages to see and understand. Often, bin labeling involves images of commonly tossed away items of the given bin, in order to help students associate the bin with the appropriate content. The EPA states that MSW, “... garbage —consists of everyday items we use and then throw away, such as product packaging, grass clippings,

furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries” (EPA, 2015, MSW).

Since the organization of bins and use of them is affected by the lack of knowledge of how to use them, then labeling could be a solution to waste. If students know how to sort waste, then not much time is needed to remedy the waste problem if bins are labeled well. This could lead to the lessening of waste since most waste is not garbage according to my interview with Jan Nacarrot, one of the buddy class teachers. Then labeling bins would also be effective and long term sustainable. By creating habits through proper signs stating where designated garbage goes, teachers would not have to be solely responsible for the effectiveness of bins, so it would be medium effectiveness. Possibly, labeling bins could better the use of waste bins leading to long term changes in waste consumption and creation as well leaving the long term sustainability as a high option.

Composting of Food waste: Option 2

Composting food waste would address a large amount of the waste made at Monterey Gnome School. Through interviews with staff and students, this theme arose as an issue to be addressed at MGS. Composting would involve having a separate bin for only compostable items. A large compost bin would also have to be present on campus for all the smaller bins to empty into. Having compost bins would require a contract with the local waste pickup to be assigned to it for pickup weekly. The responsibility would be on the staff and students to ensure proper use of composting bins, as well as the janitorial staff. Tess Writer, a director at MGS, mentioned during her interview that there had been an initiative that failed with composting on their campus, “A few former board members try to do composting here on campus. We had to get rid of it because of vermin.” (T. Writer, personal communication, October 2019). Composting needed to be taken off-campus to ensure proper and professional use. Writer later said that she really believed that composting would lead to other sustainable practices outside of the school as well, like in homes of the students. This would lessen waste brought to campus.

Since the responsibility of waste would end up on teachers who have limited time, composting should be a shared responsibility. Students responded to their survey question “Does the school have a compost bin for recycling fruit and vegetable waste?” with 19 out of the 21 groups surveyed saying “no”. Teresa Grape, another director at MGS said, “... encouraging students to work with their parents to be more waste-free will also help waste made on campus. If the individual classrooms are responsible for their composting other bins then there's more likely for follow-up”. Grape was referring to the use of their recycling and garbage bins already. By implementing compost, Grape believes other waste on campus will lessen and practices in place will better. In order to have change on the campus, MGS has to begin with the students, “To move the agenda

forward on prevention, particular emphasis on behavioral change must be done starting from young ages. “ (Zorpas, 2017) By encouraging the whole community participation, education and implementation of waste reduction will spread through everyone, not just teachers. Removing food waste from garbage and recycling could be extremely effective in changing waste practices and waste impacts. Long term sustainability would involve the upkeep of the compost bins and practices after the initial implementation.

Lesson Plans and Accountability: Option 3

Waste education is important in understanding the problems of waste and how it is created. Accountability through education would ensure responsibilities taken by all of Monterey Gnome School, hand in hand with teaching students about waste to spread to the wider community. Education would come in the form of lesson plans. In my literature synthesis, I noticed patterns of lack of education and explaining why waste is an issue. In the *Journal of Teacher Education for Sustainability* (2015), a survey was given to students to see what concepts of sustainability they understood or never heard of. The results showed a glimpse of the issue of waste is a need for education. Through my interviews with staff and students, there was a general consensus that learning about waste was not currently happening. Many students commented on the question ‘Does every Gnome understand why it is important to recycle and reduce waste?’ with a lack of understanding of what waste actually is. A few others even responded with a comment about the need for education. In similar alignment, the interview with Lavi Marigold, the eighth-grade buddy teacher, responded to the question ‘What do you see as the problem with waste reduction at MBCS?’; or ‘What are you concerned about when it comes to waste reduction at MBCS?’ she responded by stating, “Education. Lack of acknowledgment and care, and student buy-in” (L. Marigold, personal communication, Oct 3, 2019). For Marigold, her students needed to be invested in the problem, in order to care and do something about it. By being more educated about the issues of waste, students may be more willing to do something about it.

Through education, students would be able to engage with waste on a different level through understanding it is a problem. In the student survey, students responded to the question, “Does every Gnome understand why it is important to recycle and reduce waste?” with 20 out of 21 stated yes. In the comments, students wrote about the environment, landfills, pollution, and lack of understanding of what happens to waste. By helping everyone at MGS realize the seriousness of waste and what it does through the form of lesson plans, it could make a difference. This would take time and action from the staff and student body. If the students took lead on accountability, education about waste would be effective. The last hope would then be that this could be self-sustaining throughout time if students are responsible for continuing Lesson Plans and Accountability of waste on their campus.

Recommendation

After noticing themes in analyzed data, research literature and interviews, the best recommendation for Monterey Gnome School is option 1, labeling bins. Labeling bins would limit the time spent by staff and students to have to sort bins properly and lead to future sustainability efforts. By having clearly labeled bins available with the corresponding images to inform the users effectively will reduce waste at MGS. Labeling bins will lead to future changes and projects to cut out waste, such as options like composting and education. Beginning with bin clarity will provide opportunities to better waste practices before adding more layers to waste reduction.

Concession

By choosing the labeling bin option, there are concessions that take place. A sacrifice made by choosing this option over composting of food waste and Lesson Plans and Accountability is that it is a limited choice. By only labeling bins, the potential to expand the project is small in reach. That is, by focusing only on one aspect of waste issues, the improper use of bins, the project may not involve a great change in the amount of actual waste made. The option of composting food waste would make an actual visible difference and keep the MGS accountable.

Limitations

By limiting this recommendation to labeling bins, the waste reduction at MGS will happen slowly. The implementation of waste management and education is important as well, but would be time-consuming and may lead to more confusion of the waste issues currently at hand. Since the main issue involves using bins incorrectly with garbage and recycling, adding more work, student involvement, and responsibility can be overwhelming as well as time-consuming.

Potential Negative Outcomes

A potential negative outcome is that labeling bins may not be effective in sorting waste at MGS. When waste is not sorted properly, then items that could potentially be recycled may end up being mixed in. This is already the case at this school, so by better labeling bins, students and staff will be more clear about what waste items should go where.

Conclusion and Related Outcomes

In conclusion, the best recommendation according to time, effectiveness and long-term sustainability for MGS would be labeling bins. By doing this, students and staff may change habits of waste and then be able to adopt other waste-conscious practices. Another related outcome may be the spread of waste reduction efforts in the surrounding communities. Since students and staff belong to other organizations and households, minimizing waste practices may spread. For example, if a student feels inspired by their waste efforts at school, they may bring this information home. The

hope is that by labeling bins, sustainable implementations will continue with waste knowledge and education and composting at a later time. When beginning with waste management, the possibilities are only to get better about waste!

Action Documentation and Critical Reflection

The focus issue of this project is how waste and waste reduction could positively impact a community. Waste reduction is an important issue because the negative impacts of waste affect the whole planet. After interviewing the director, pedagogical director, second and eighth-grade teachers, as well as surveying their students three themes emerged to address the waste issue at MGS. Labeling waste bins, composting food waste, and lack of education, as well as accountability, were noticeably mentioned throughout speaking with these stakeholders. I believed labeling bins to be the most efficient based on time, effectiveness and long term sustaining for MGS. Because becoming waste-free does not happen overnight, starting with waste consciousness and proper use of waste management that already is in use is productive. By labeling bins, students and staff can learn to use the garbage and recycling available on campus more effectively. This may lead to the other two options for action in the future, composting and education.

Action Research Project Documentation and Reflection

Because I am going into the teaching field, working directly with students in their school was the only way to encourage solving waste issues. Students and staff have to feel passionate about the effects of waste habits in order to make a change in them. Simply said, if someone cares about something, they do something to change it and make it better. After discussing with the buddy class teachers Jan Nacarrot and Lavi Marigold, we noticed the students wanting to participate in the solutions for waste issues at MGS. With the buddy class of second and eighth-graders, we created effective labeling of recycling and garbage bins by hand.

I went through a garbage and recycling bins contents with them and discussed what were some items tossed commonly on campus. As a group, the buddy class then split themselves into smaller groups of two to four people (at least one second and one eighth-grader). In these groups, with recycled paper, they each made recycling and garbage labels. (see images 1-4)

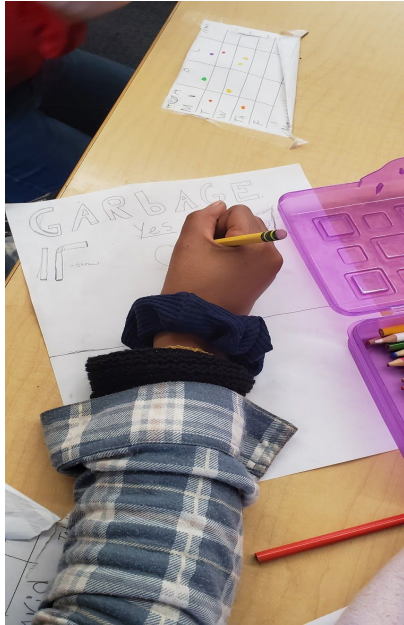


Image 1

Second and eighth-grade students work together in their buddy class to create the bin labels

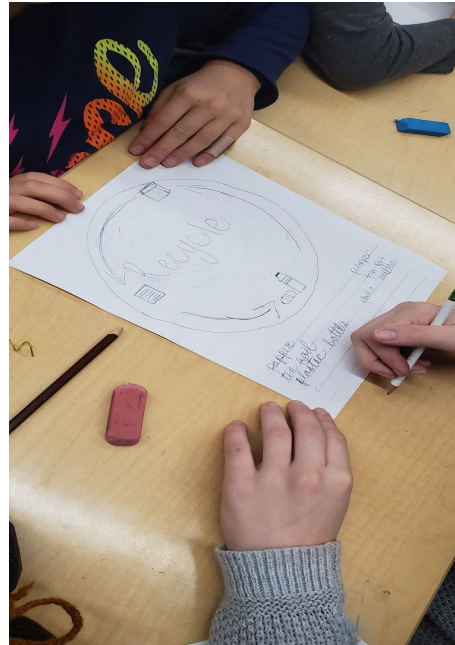


Image 2

Second and eighth-grade students use recycled paper to create bin labels for recycling and garbage bins around their campus.

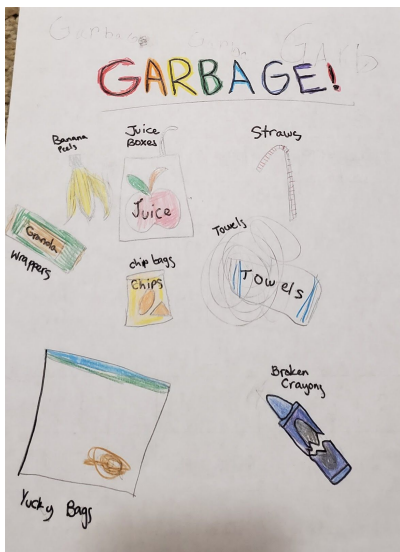


Image 3

Buddy class students completed work, before implementing them around campus.

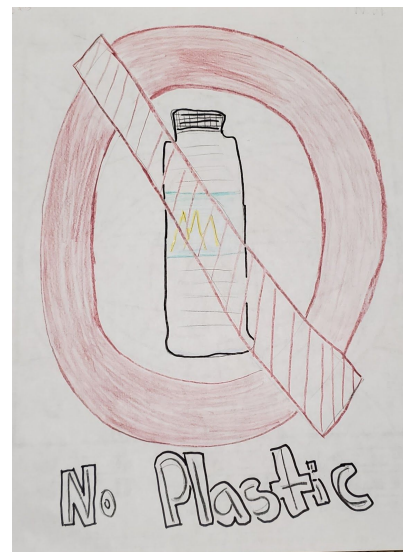


Image 4

Poster inspired by a student's desire to encourage students to bring non-plastic water bottles to campus.

The Gnome Waste Warriors, or buddy class, had not like the idea of working with waste in the beginning but came to love having such an impact on their school. I knew when starting their project that students love to be involved in change. What I did not know was that if given the proper direction, students can be an effective force for change. When these students realized their individual impacts their waste made, each one wanted to make changes. These changes started with themselves and moved outward to their campus and communities surrounding them.



Image 5

Labeling of a recycling bin after students implementing it.



Image 6

A second and eight-grade buddy group after implementing one of their bin labels.

As the buddy class finished their posters, we made a list of the recycling and garbage receptacles around the Monterey Gnome School. The following meeting, I split the groups up once more and sent them to place their bin labels on specific bins around campus. The students re-convened and we discussed what our hoped

outcomes where. Many students hope to continue their own work in their homes and make signage for their own bins.

Only after one week of implementing the labeling of bins at MGS, a student approached me and told me of her own initiative at home to cut back waste. She had labeled her garbage and recycling bins and encouraged her parents to think twice before throwing something away. I had always hope that this project would continue to grow and expand outside the classroom. Little did I know, it would happen so quickly. I was surprised by these student's initiatives and passion for bettering their environment and sustainable practices.



Image 7

Me working with the second and eighth-grade buddy class to decided on images to draw on our bin labels that would be appropriate

If I had had more time to work with the buddy class, Gnome Waste Warriors, I would have liked to make a plan for more change to happen. We would have set up a timeline of what changes they would have like to have seen and when. For example, having a plan in place for how much the school could cut back in waste by the end of the school year. I learn that you can never be too organized and have more planned when it

comes to working with so many students. Since everyone works at different paces, having different projects to work on that all make up one outcome could be effective. As a teacher, I will need to have something in my back pocket for my students to work on, as to keep everyone engaged.

Synthesis and Integration

As I make my way through my education path towards becoming a teacher, I have been able to develop many valuable skills. Major Learning Outcomes (MLO) that are integrated into course work, as well as campus life at Cal State Monterey Bay, have helped me to refine my expertise. MLO 1: Developing Educator, shaped me to “think, write, and speak critically about the general knowledge, skills, dispositions, and responsibilities of a California public educator in the classroom, school, community, state, and national contexts.” Through this major learning outcome, I was able to complete my coursework and use my knowledge gained from it to create a final Action Research Project I was passionate about. An introduction to pedagogical skills guided me in developing professional practices that I now adopt as my own. Each step of the Capstone project from beginning to end helped me to shed light on my own knowledge of the issue I was researching. The course requirements aided in diving in even further as well since it required collaboration with “stakeholders to advocate for access, equity, and justice in public education and other societal institutions.” (MLO 4 Social Justice Collaborator) The point my capstone was always to better my community and make the world a better place. By working with stakeholders, I can ensure I worked on valid issues that affect them and represent their needs. And finally, by completing the Capstone and Action Research Project, I was able to address MLO 5, Subject Matter Generalist. By completing the work required and successfully demonstrating knowledge in the issues of waste through my work, I now know my subject matter as a California public educator. As an educator, many basic skills are required. However, the capstone project gives the opportunity to become an expert in something a person is passionate about outside of education. The project and coursework also create a chance to take those passions and involve them in educating work. In my professional development, this work in hand with MLOs gives me the ability to expand my basic knowledge; making me a more well-rounded educator. By developing my skills and learning to work well in many settings, academic, social, and professional, I become a better asset to the teaching field. Through these possibilities, I have been both challenged and humbled to learn more about myself as an educator.

The next steps I need to take in order to become the professional that I imagine to be are to complete my teaching credential program through CSUMB’s Integrated Teaching Education Pathway and work solely in my field of study. In the credential program, I will be able to have time working in one classroom five days a week. This will

focus my energy and test my abilities as well as the knowledge I have been working on for years. While doing this, I hope to only be working in education, so I can immerse myself in the teaching world. I cannot wait to implement and encourage sustainable practices in my teaching to tie in my passion for waste-free living. By completing this Capstone project, I now know that it is possible!

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Appendix A

Data Analysis from Interviews and Surveys:

KEY
Yellow- food waste
Blue- Proper bin use/sorting/ management
Green-labeling of bins
Red-Education
Purple- Compost

*H represents Hayley Frost-Rubino, the interviewer.

Interview with Tess Writer and Teresa Grape the Directors at Monterey Gnome School:

H: What are your concerns with waste reduction at Monterey Gnome School?

Teresa Grape: I think that Monterey Gnome School is already pretty knowledgeable about waste. However, we could get much better. I think a lot of the waste issues we have have to do with food. In the past, we have had parents come and try to create programs to be more conscious about Waste Management.

Tess Writer: often when parents get involved, there's no final action to projects. If we put the responsibility on parents we would get a lot of backlashes too. if we could integrate waste education with mindfulness as we do with song and grace on campus oh, I think there would be less waste used.

H: you both mentioned that there have been attempts to make waste-free education normalize on campus. What has been done in the past?

Tess Writer: We've seen a few parents that have attempted this. A few former board members try to do composting here on campus. We had to get rid of it because of vermin.

H: I'm sorry that happened. It's really difficult to balance the pros and cons when it comes to waste management for sure.

Teresa Grape: We do still use yard waste compost in our gardens here. But we do not have compost. I don't think students use recycling well yet either. The garbage and recycling cans are kind of mixed often too.

H: what is already being done for Waste here Monterey Gnome School?

Teresa Grape: When there are large events we encourage families to only bring food that is healthy and waste-free. That way we are having less of an impact when we have larger groups joined the campus.

H: I noticed this at the courage Festival. The parents were really good about it!

Teresa Grape: They are pretty good about it when we remind them. However, this ends up on the teacher's shoulders often too.

Tess Writer: When it comes to waste and other responsibilities, the teachers always are the ones that have to be burdened with it.

H: I hope that with proper waste reduction education, the responsibilities and empowerment could be in the student's hands. so what do you think should be done about waste at Monterey Gnome School?

Teresa Grape: Since the waste problem is really in the classroom and with food providing snacks to void Packaging during school and in aftercare could really make its impact. Are School hot lunches already are waste-free. However, I think food waste is still no problem.

H: Is there a place for the food waste to go from the lunches?

Teresa Grape: It goes into the garbage.

Tess Writer: I think if students are better educated about how to use the bins in their classroom, then getting another bin in each classroom for compost and food waste would be beneficial. However, they have to be knowledgeable about how to use the bins correctly. Otherwise, it causes more of a problem

H: you are absolutely correct. How do you say this education being brought to the students? I heard earlier you state that you didn't want the responsibility upon the teachers since they already have so much on their plate.

Teresa Grape: Involving the teachers isn't about idea however encouraging students to work with their parents to be more waste-free will also help. If the individual classrooms are responsible for their composting another bin then there's more likely for follow-up. A lot of the classrooms have classroom jobs, it could be added to the list as a new job for students?

Tess Writer: I also think about making waste reduction happen in the classroom through grace time and a song would help. We see a huge impact when we encourage students to use mindfulness in any venue. When the students are more aware they make choices that are more positive for everyone.

Teresa Grape: I remember a few years ago when a class made signs on campus saying what to throw away in the garbage and what to throw away in the recycling. Maybe putting signage up again would be helpful?

H: I absolutely agree that student-led action is more effective. Especially when it comes to encouraging their parents to help them packed lunches more efficiently and was wasteful. I also agree with keeping the responsibility off the shoulders of the teachers, since I am already so busy. The labeling bin is a great idea. My University does this and it's definitely effective!

what do you think the obstacles are in Waste Management on your campus?

Tess Writer: Time. The day goes by so quickly and the teachers have so much Curriculum get through it's really difficult to imagine there being enough time for another project.

Teresa Grape: I think Obstacles are also with the parents. they dropped the kids off and want to be done until they pick them up. Often lunches reflect that. Maybe educating the parents could help with waste?

H: You both mentioned earlier about compost...

Teresa Grape: Yes I think compost is really necessary here. Most of the waste made here is compostable.

H: I really appreciate both of your time and ideas. I have written down a lot of information but I think it really benefits School. as I continue with this project, I hope that we can find a solution that is sustainable for your campus. Something that can not be on the shoulders of the staff and teachers but in the responsibilities of the students. hopefully, this project will be something that can continue down for the length of the school's existence. Thanks again for your time. Did you have any other things you'd like to add?

Tess Writer: I would really like composting done here on campus. I think it will spread into homes and the community around the school if we can better educate our students. I hope you can help us with that.

Teresa Grape: I agree! Let us know how we can help you. We are excited for this project to start.

Interview with Jan Nacarrot second grade teacher:

H: What do you see as the problem with waste reduction at MBCS?; or What are you concerned about when it comes to waste reduction at MBCS?

Jan Nacarrot: Students bringing their own lunches to cause waste at MBCS. Parents send prepacked food in their lunches. This creates waste. Most of the waste is recyclable or food waste.

H: What is currently being done to improve waste reduction at MBCS- by whom - and what do you think about these efforts? Why?

Jan Nacarrot: Students are encouraged to pack healthy lunches free of pre-packed food and beverages. All students are encouraged to have reusable mugs and/or bottles for water.

H: What kinds of changes in practices would you like to see that would lessen the waste on campus?

Jan Nacarrot: Educating parents on healthy snacks and lunches. Things like Lunchables are easy to pack but are unhealthy and wasteful. Educating parents on how to pack their own Lunchable type lunches would be helpful and less wasteful. Teachers could send out healthy lunch ideas or create a list of websites to visit that help with lunch ideas.

H: What do you think should be done about waste reduction that could involve students as educators?

Jan Nacarrot: Empower students and have them take ownership of the problem, as well as understand the repercussions to our community and environment.

H: What do you think are the obstacles to changing waste reduction on campus?

Jan Nacarrot: Students can create labels for the recycling bins to show what can go into those bins. The 2nd/8th graders could go around to classes and promote the labels and do weekly checks. Daily would be ideal but time-consuming. Maybe a chart by the classroom door for tracking. This could become a chore for a student in the class to check the recycle bins to be sure the correct things are in the bins and to check their garbage bins to take out what can be recycled.

H: Is there anything else that you would like to say about waste reduction and/or the improvement of waste reduction education at MBCS??

Jan Nacarrot: Thank you for helping us improve our waste reduction. I know this isn't an easy project.

Interview with Lavi Marigold, eighth grade teacher:

H: What do you see as the problem with waste reduction at MBCS?; or What are you concerned about when it comes to waste reduction at MBCS?

Lavi Marigold: Education, lack of acknowledgment and care, and student buy-in. Almost daily I have to have my 8th graders pick up trash that is either on the classroom floor or blatantly outside. Without my pick up request, the middle schoolers walk idly by garbage.

H: What is currently being done to improve waste reduction at MBCS- by whom - and what do you think about these efforts? Why?

Lavi Marigold: The faculty and staff. There is little follow-through.

H: What kinds of changes in practices would you like to see that would lessen the waste on campus?

Lavi Marigold: More accountability

H: What do you think should be done about waste reduction that could involve students as educators?

Lavi Marigold: Empower students and have them take ownership of the problem, as well as understand the repercussions to our community and environment.

H: What do you think are the obstacles to changing waste reduction on campus?

Lavi Marigold: Time, accountability, care

H: Is there anything else that you would like to say about waste reduction and/or the improvement of waste reduction education at MBCS??

Lavi Marigold: Let's start a movement!!!

Responses from Gnome 2nd and 8th Grade Buddy Class:

*Numbers represent each group of 2-4 students buddy groups.

Questions	YES/NO	Explain why Yes or No...
Do Gnomes use the waste bins properly? *Only for one-time use items	Yes-13 No-9	Sorting issues-5 "Save the earth/respect the earth"-3
Does every classroom have a scrap paper drawer so that pupils and teachers can <u>reuse</u> paper?	Yes-6 No-15	"Does not use it well"-3 Not Labeled or clear- 3
Does every room have a paper <u>recycling</u> container that is used properly?	Yes-4 No-18	"Crumple and usage of both sides needs to happen"-6 Sorting issues-7

*Not crumpled up papers, both sides used, recyclable items only		
Does the school have a compost bin for recycling fruit and vegetable waste?	Yes-2 No-19	“Food in trash”-3 No compost available-6
Does the school encourage children to have packed lunches without throw-away packaging?	Yes-11 No-6 “I do not know”-4	Catered lunches do not have waste-3 The school encourages for waste-free lunches- 4 Parents packed-2
Does every Gnome understand WHY it is important to recycle and reduce waste?	Yes-20 No-1	Environment-4 Pollution-2 Lack of understanding/education-4

Action Plan

Who: School-15, Students- 4, Buddy Classes-3

When: Every other week-4, When needed- 2, Everyday-10

Check: Sorting-15, Label Bins-3, Accountability system:3