

Go Green for a Better Tomorrow

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Abstract

The late Whitney Houston had a song called “Greatest Love of All”, where some of the lyrics are “I believe the children are our future. Teach them well and let them lead the way. Give them a sense of pride.” In order for our children to have a future, they need to have a world to live in. As a result, it is our responsibility as educators to teach them how to be caretakers of our planet and be changemakers. This unit is an introduction to Ecology. Students will be introduced to the various types of trash, where it goes, and how trash is affecting their world. They will also learn of solutions that can be implemented to alleviate the issue. There will be a great deal of collaboration. Students will realize that they are not too young to make a difference. The unit is geared for First to Fourth graders. The materials utilized are easily accessible and can be differentiated for your class’ level of abilities. The unit is for four weeks. It is a cross curricular unit where every student will be successful. They are planned to be engaging and have fun along the way.

Keywords: ecology, reduce, reuse, recycle, pollution, trash, solutions, landfill, incinerators, changemakers.

Unit Content

The city of Philadelphia, in Pennsylvania, is known as the City of Brotherly Love and Sisterly Affections by its residents. However, lately it is also known as Filthadelphia. According to data collected from Forbes, which named Philadelphia the dirtiest city in America, several factors contributed to Philadelphia’s ranking, including low scores in several key categories like restaurant cleanliness, where it received the lowest possible score of 0, along with other minimal scores for electric vehicle market share (0.76), hand sanitizer availability (0.93) and quantity of recycling collectors (1.42). Overall, Philadelphia received a score of 1.84 out of a possible 10 across all the different data categories. (Begley Bloom,2020). Who wants their city to be known as that and who wants to live in a community that is filthy? How did it reach this stage and what can be done about it?

Philadelphia has had a municipal recycling program since 1989. It is a single-stream process. Streets Department workers collected an average of 1,200 tons of recycling weekly last year, which is less than in years past. As of July 2022, Philly’s recycling rates are at a historic low point, making up just 9% of waste collected, compared to 18% a few years ago (McLellan Ravitch, 2022). The article continues to say, part of the drop is

because advances in materials means a lot of things that can be recycled simply weigh less, according to city officials. Recycling has also become more costly. Instead of being able to sell the materials to China, which was the major buyer, Philly now has to pay for recycling to be taken off the city's hands. It was actually working. Since the COVID-19 pandemic began in March 2020, Philadelphians across the city have experienced recurring delays for trash collection. Philadelphia and the world were on lock down. People were not going to work. Also, people started getting sick, which led to a lack of workers. Consequently, the trash wasn't collected as frequently as it did before. According to City Controller, Rebecca Rhynhart, though many Philadelphians have expressed frustration with trash collection for years, the pandemic brought more attention to this issue than ever before. Data were collected that showed what Philadelphians have experienced firsthand, that the pandemic had a severe impact on trash collection citywide, but that was not felt equally across neighborhoods. While the pandemic's impact was significant, The Office of the City Controller found that the city was having challenges with on-time trash collection in the years leading up to the pandemic as well.

The analysis examines data on the on-time collection rate for curbside trash pickup and the total curbside trash tonnage collected by the Streets Department. This includes historical data on citywide trends in trash collection since fiscal year 2009 and detailed data on each of the City's 13 sanitation districts from January 2017 through June 2021. Sanitation districts are neighborhood-sized regions created by the Streets Department to assist with trash removal operations.

The data showed that the Streets Department consistently performed better in trash collection between FY09 and FY13, with a citywide average collection rate of 94%. However, a compactor shortage caused by the Great Recession impacted performance beginning in FY14. In the years following, the on-time collection rate never fully recovered, averaging around 85% in the years leading up to the pandemic. Of note, every sanitation district met the on-time goal in just two months between January 2017 and the start of the pandemic. The analysis showed that the pandemic exacerbated the decline in on-time collections. With pandemic-related staff shortages and a 21% increase in tonnage in FY21, the average citywide on-time rate for trash collection declined to a mere 53% in FY21. For comparison, the on-time rate for trash collection in FY19, the last full year before the pandemic, was 83%. (City of Philadelphia Office of the City Controller 2021) (Appendix B). Naturally, Philadelphia is not the only city that faced this issue.

A study of the world's oceans suggests the large bodies of water that cover more than 70 percent of the Earth's surface are home to nearly 270,000 tons of garbage. That is equivalent to the weight of 1350 blue whales (U.S News, Dec 12, 2014). Naturally this is affecting the animals that live in that habitat. What affects them will also affect us. Data from the World Bank (2018) show that the US produces on an average 2.2kg/of garbage per person/day. What about other countries? What is their average waste generation per person per day? EU countries produce 0.7 – 1.3 kg/person/d on average: 1 kg/person/d.

The global average is 0.74 kg/capita/d. The World Bank Data show high-income countries are the ones that generated the most waste compared to the lower income countries. It is surprising that the global countries are not doing a better job. If we don't get control of the accumulation of trash, our children will inherit a very polluted world. I believe why the numbers are so high is due to lack of education on the part of our citizens. We have not educated ourselves and our children on the various materials that can be recycled, what can be reduced or reused. We may not even know how to properly discard certain materials such as electronics and refrigerators. There are various waste categories. They are:

Municipal solid waste, industrial or manufacturing waste, agricultural waste, construction and demolition waste (CDW), electronic or e-waste, medical waste and hazardous or toxic waste. The principal source of solid waste is industrial (12.73kg/capita/day) globally according to the World Bank (2018), whereas the Municipal Solid Waste (MSW) is the lowest, 0.74 kg/capita/day (Appendix C). What is MSW? MSW comprises residential, commercial and institutional (e.g., schools, hospitals) waste as well as waste from municipal services (e.g., street cleaning, landscaping, wastewater treatment).

There are solutions to the problem of staggering amounts of waste. They are dumping, recycling, landfill, incineration. Of course, some are better than others. Let us look at dumping.

Dumping in Philadelphia has been a severe issue especially in Eastwick (Rinde, 2022). Residents have been watching as building materials, broken furniture, old appliances, black bags of household trash and other illegally dumped materials pile up in wooded lots along Mario Lanza Boulevard near the airport. Neighbors have organized clean up calls in the city but the improvements have only been temporary. Even though it is illegal to dump, with a \$2000 fine, this has not dissuaded others. Of course, it is natural that residents are frustrated and demoralized by the city's perennial inability to get a handle on the illegal dumping problem. Solutions have been suggested such as educating tire dealers about disposal rules, picking up thousands of tons of dumped trash every year, monitoring some 130 frequently-dumped on sites, and using about 250 surveillance cameras to watch other hotspots. Litter and illegally dumped trash don't just look bad. Trash piles attract rats and other vermin, tires collect rainwater and breed mosquitoes, and hazardous substances like lead can leach from debris such as spent car batteries." This is dangerous because it affects the health of the people and also the environment. Unfortunately, dumping is also occurring in low-income communities and in poor countries, e.g., in the continent of Africa (World Bank, 2018). Unfortunately, it is their main way of getting rid of trash. Even though one can find "treasures" where they turn around and sell them, the cost of life is too high.

Another solution is landfill. A landfill site is a large area of land specifically designed to be filled with rubbish. Some sites fill a hole in the ground with waste whereas others pile the waste directly onto the ground. Landfill sites are used to dispose of waste that cannot be recycled or reused. This can include domestic rubbish (like plastic, tin packaging and glass) as well as rubbish generated from construction, industrial and commercial businesses. Certain waste – such as hazardous waste, liquid waste and medical waste – cannot be sent to landfill because it causes harm to the environment and health issues. According to the SL Recycling 2022 article, there are some of the negative effects of landfill sites. Here are a few issues. Methane – alongside numerous other toxic gasses – is emitted from landfill sites. As the biodegradable organic waste decomposes, it naturally releases methane which is a potent greenhouse gas that absorbs heat and contributes to climate change. The article continues to state that landfill sites impact biodiversity in several ways. Here are a few examples –

The creation of landfill sites requires wild areas to be cleared, leading to habitat loss and degradation.

As landfill sites are filled, some local species can be replaced by other animals that feed on refuse, like rats and crows.

Leachate is the liquid produced in landfill sites. This can become toxic and thus contaminate nearby streams, ponds and lakes, damaging the habitat of many different organisms.

Soil fertility is impacted too. The combination of toxic substances and decaying organic material can be of detriment to the soil quality, distorting soil fertility and activity and affecting plant life.

Landfills are also an eyesore to the natural landscape and cause an unpleasant smell in the air. Moreover, the large amount of waste mixed with the gasses landfill sites produce can easily cause fires to start. In addition to causing air pollution, if the fires aren't put out immediately, they can get out of control and destroy neighboring habitats (SL Recycling 2022).

In the Clean Air Act, the EPA sets standards to protect Americans from landfill pollution. Twenty six percent of Philadelphia's trash goes into landfill and 46 percent is recycled (Jason) (Appendix A). Landfills are also built in low-income areas. There are four major landfills in the Philadelphia area and they are located in:

§ Morrisville, Bucks County.

§ Tullytown, Bucks County.

§ Pottstown, Montgomery County.

§ West Grove, Chester County.

What are these landfills filled with?

The U.S. Environmental Protection Agency EPA (2001), published a report on the environmental impact of food waste. EPA estimated that each year, U.S. food loss and waste embodies 170 million metric tons of carbon dioxide equivalent GHG emissions (excluding landfill emissions) – equal to the annual CO₂ emissions of 42 coal-fired power plants. This estimate does not include the significant methane emissions from food waste rotting in landfills. EPA data show that food waste is the single most common material landfilled and incinerated in the U.S., comprising 24 and 22 percent of landfilled and combusted MSW, respectively. The report also highlights the benefits of preventing food loss and waste in terms of agricultural land, blue water (i.e., freshwater from surface water and groundwater), fertilizer, and energy.

Reducing and preventing food waste can increase food security, foster productivity and economic efficiency, promote resource and energy conservation, and address climate change, which in turn, could also decrease climate change-related shocks to the supply chain. Why as a country are we not looking at the food waste and using it for something else, such as electricity? What happens to the byproduct of sugarcane? Brazil is the largest sugarcane producer on the planet, being home to forty percent of the world's crops. In Brazilian plants, the same feedstocks that are used to make sugar and ethanol, fueling almost one half of the country's entire fleet of automobiles and motorcycles. It also supplies enough electricity to power 12 million homes (The Brazilian Report,2021). The report continues to state that this energy is deemed as renewable—as it is made using sugarcane bagasse, a leftover fibrous plant matter—and clean, owing to its low-pollution production process using gas scrubbers. Every ton of sugarcane used to make sugar and ethanol generates an average of 250 kilograms of bagasse and 200 kilograms of straw. Rich in fiber, these byproducts are burned to generate electricity. Indeed, bagasse has been used to supply vapor and electricity for sugar and ethanol production since the industrial revolution, ensuring the self-sufficiency of ethanol plants during harvest periods (The Brazilian Report,2021).

What about rice? According to Triratanassirichai,el al. (2017) rice is one of the most common staple foods that people usually consume around the world. By-products from the rice milling process have high amounts of nutrients when compared to white rice itself. Rice straw, rice hull, broken rice, rice germ, rice bran, rice bran oil and wax are the by-products from the rice industry. These by-products usually have basic applications in their original form, but now can be used as raw materials for different value-added products or in food applications with functional properties. Rice by-products not only contain various types of functional components, but also contain dietary fiber. The fiber can be mostly found in rice hull and the types of fiber present include cellulose,

hemicellulose, lignin and hydrated silica. Because of the high fiber content in rice hull and rice bran, they are used as ingredients by the bakery industries to increase the fiber content and improve the nutritional value of bakery products. After gathering this information, it seems we need better alternatives than landfills.

Incineration

Incineration is another solution after education. Twenty-eight percent of Philadelphia's garbage is incinerated which is converted into energy (Jason, 2019). Incineration does not create significant pollution, if there are structures in place that clean up the off-gas. Burning destroys many of the harmful materials. Another advantage of incineration is that the waste can turn into energy. However, the question is, does the government and companies want to make an investment for the future? There is a need for start-up money and then to keep up with the infrastructure. It seems it is easier to send our garbage somewhere else in poor neighborhoods and other countries. Also, making certain materials is cheaper than solving the problem. In many cases companies' only interest is the bottom line-money. They do not care about our environment. There isn't a social consciousness.

There are others who feel that incineration is not the way to go. Ana Baptista, an environmental justice scholar, from PBS NewsHour 2019, who works directly with low-income and communities of color, says, "I see incineration as a poor waste management option." She continues to say, although these plants generate electricity from the heat created by burning trash, their primary purpose is waste disposal. Emissions from burning waste worsen environmental inequalities, create financial risks for host communities and reduce incentives to adopt more sustainable waste practices. There are signs of decline in the U.S. waste incineration industry due to many factors. They include a volatile revenue model, aging plants, high operation and maintenance costs, and growing public interest in reducing waste, promoting environmental justice and combating climate change. Nonetheless, 72 incinerators are still operating today in the U.S. Most of them – 58, or 80% – are sited in environmental justice communities, which are defined as areas where more than 25% of residents are low-income, people of color or both (PBS NewsHour, 2019). Incinerators worsen cumulative impacts from multiple pollution sources on these overburdened neighborhoods.

What incinerators burn

The composition of municipal solid waste has changed over the past 50 years. Synthetic materials such as plastics have increased, while biogenic, compostable materials such as paper and yard trimmings have decreased. Plastics are particularly problematic for waste handling because they are petroleum-based, non-biogenic materials. They are difficult to

decompose and release harmful pollutants such as dioxins and heavy metals when they are incinerated.

The bigger question maybe should be “What can we do to reduce waste?” Tatiana Lujana, *ClientEarth* plastics lawyer, stated “We need to reduce what we’re sending to landfill, but rather than turning to short-term ‘plasters’ like incineration, the government needs to tackle the problem at the source and turn off the tap of unnecessary plastic production.” She continues to say “Countries like Denmark have already understood that incineration won’t square with their climate goals and ordered a reduction in their incineration capacity. At the end of the day, converting plastic waste into energy does nothing to reduce demand for new plastic products and even less to mitigate climate change. To push for these approaches is to distract from real solutions like reuse systems at scale.”

In 2018, the European Union came out with a set of laws (*ClientEarth, 2021*) which many hailed as the world’s most ambitious to cut waste and encourage reuse. EU countries and the UK are under a legal obligation to:

Adopt economic instruments, including incineration and landfilling taxes, to provide incentives for the application of the waste hierarchy.

Take measures to ensure that waste that has been collected separately or preparing for reuse and recycling is not incinerated.

Adopt measures to increase the share of reusable packaging including through deposit return systems and reuse targets.

But as is the case with any legislation coming out of EU institutions, the key is how EU countries put them into national law – and EU countries are missing key implementation deadlines.

Tatiana said: “With the current situation likely to lead to an increase in all sorts of waste, governments cannot bury their heads in the sand. By not moving forward with a more circular model, we are losing out on massive environmental and economic benefits – and digging ourselves deeper into the rubbish heap.”

Other countries seem to be more successful in dealing with their garbage issues such as Sweden. Maybe we need to take a page out of their book. Let us see what they are doing.

According to Chan Kim and Renee Mauborgne, Professors of Strategy at INSEAD and authors of the international bestselling books *Blue Ocean Strategy* and *Blue Ocean Shift*, the world is heading towards a catastrophic two degrees Celsius increase in temperature because of climate change and greenhouse gasses. Fossil fuels are ever diminishing while global energy demand is expected to have increased by 50% in 2030. As the world’s

population continues to grow, the production of waste will drastically increase. The authors continue to state (Kim & Mauborgne , n.d) that, rather than sending trash to landfills, waste to energy plants generate energy which is then delivered in the form of electricity for homes and businesses.

Only 1% of Sweden’s trash is sent to landfills. By burning trash, another 52% is converted into energy and the remaining 47% gets recycled. The amount of energy generated from waste alone provides heating to one million homes and electricity to 250,000. Meanwhile, the UK recycles just 44% of its waste. So how do they do it? Well, first of all, Sweden was quick to identify a growing demand. They understood early on that resource scarcity and climate change are both irreversible trends with clear trajectories. By looking at these trends from the right perspective – namely, drawing insights into how these trends will add value to customers and impact the country over time — Sweden was able to seize a blue ocean opportunity. Sweden is not only saving money by replacing fossil fuel with waste to produce energy; it is generating 100 million USD annually by importing trash and recycling the waste produced by other countries. The United Kingdom, Norway, Ireland and Italy are willing to pay 43 USD for every ton of waste that Sweden imports to this end (Kim &Mauborgne, nd).

As stated earlier, there are a variety of things that are disposed of. While we know where most things should go such as paper, food, plastic, glass and cardboard, do we know how to properly dispose of electronics, even items like a television or a refrigerator? Let us explore this area.

Philadelphia has introduced a single-stream system, allowing residents to put all of their mixed recycling (cans, glass, paper, cardboard, and plastic) in one bin. This waste is collected from homes every week along with the trash, making recycling easier than ever for the residents of Philadelphia. However, there has been one area that has been a challenge, which is e-waste. What is e-waste? E-waste is a popular, informal name for electronic products nearing the end of their “useful life.” Computers, televisions, VCRs, stereos, copiers, and fax machines are common electronic products. Many of these products can be reused, refurbished, or recycled. With the passage of the Electronic Waste Recycling Act of 2003, certain portions of the electronic waste stream are defined and the systems to recover and recycle them will be administratively regulated beyond the universal waste rules that apply to material handling (Cal Recycle, 2022). In 2019 the world generated 53.6Mt e-waste, i.e. on average 7.3kg/capita (Global E-Waste Monitor 2020). Asia generates nearly 25 percent of the world's e-waste, followed by the Americas. (Global E-Waste Monitor,(2020) (See Appendix E).

Electronic products often contain harmful chemicals like arsenic, lead, and cadmium. If these materials end up in a landfill, they can do a lot of damage to the local environment. Luckily, Philadelphia is home to a number of e-waste recycling points. Located across the city, they are there to make it as easy as possible for residents of Philadelphia.

According to RTS - How to recycle e-waste in Philadelphia (RTS, 2020), a guide has been provided. Places that will accept e-waste are e-Force Recycling, e-Loop and Best Buy.

There seems to be so much we can do as a country and globally to make the world a better place. The technology is there and also the knowledge. I believe the solutions will not break the bank. If we make the investment now, it will go a long way for the future. Why then are the politicians not making a better effort in doing what is right for the people they are representing? What has to happen for everyone to wake up and see that, if we do not solve the trash issue now, it is only going to be worse. The government spends so much funds on other items, such as helping other countries and the army. Yes, those are important too but we need to help those at home as well. Maybe as educators, we need to be in the forefront of this issue. By giving our students the tools to be activists, maybe and just maybe then we can make a change. Afterall, we all deserve to have a healthy and bright future.

Teaching Strategies

This curriculum will be introduced to students who will draw pictures of what their neighborhood looks like. This will be a way to get them engaged and also ascertain how they feel about their community. We will do a KWHL Chart, where K = Know, W - What you want to know, H - How to find out, and L Learned. This will be a pre-assessment, and will be followed by telling students we are going to take a walk and explore the neighborhood and also our school. Students will be placed in small groups with chaperones. Each group will go to a different area to observe, take pictures and notes of what garbage was seen. The groups will be heterogenous and should not consist of more than 4 students, so that everyone can be heard. After returning, students will discuss what they have observed and their feelings. Students' responses will be written down on a chart paper, so the class can utilize it as a reference during the studies. Students will also use a word cloud, a computer app, to give their input. The teacher will also gather all the pictures and create a power point presentation for the next lesson. In our next lesson, the teacher will present the community power point, followed by a discussion. Questions will be posed to them, such as, what do they notice and wondering? Why do you think our city looks like that? Do you believe that we just don't care?

Students will then do a turn and talk about their findings. I will also show pictures about how much trash people accumulate around the city and the world. Students will discuss what is waste and how it affects the environment and us. We will engage in conversation and categorize the types of waste by working in small groups. Students will also investigate where trash goes once it is picked up. We will analyze what we are throwing away and how we can reduce, reuse and recycle. We will then graph trash quantity for a week at school from our class and others. Students will also graph trash quantities at

home as well. That will be one of many projects. Students will investigate how well our school and our homes are recycling. We will interview the school Building Engineer and bring guest speakers from the city. Before interviewing the speakers, students will formulate open ended questions. Another activity that students will partake in is the creation of posters and songs in small groups. This will be a way to convince their school community to take action. One of the final activities will be a Project Based Learning where students will create something new out of something old and propose solutions to the trash problem. They will share what they have learned with the school community during an assembly.

During the unit, students will read independently, share reading and also listen to read A-louds of different genres. Before reading a story, students will engage in a quick Write Up, which is writing a prediction of the story. Other strategies that will be implemented before reading will be Quick Draw, Four Corners, Listening with a focus. To help to learn vocabulary words, we will play vocabulary charades or explicit teaching using the word in a sentence. Also, other strategies to teach vocabulary will be utilized, including Illustrate the words, play "Quick Draw ", and use the words in the real world. During reading, the teacher will stop and ask various questions according to Bloom's Taxonomy. At the end of the story, there will be Exit slips or Think Write Pair and Share. After each section of study, there will be a post-assessment to check for understanding. For the project there will be a rubric.

During this unit, there will be a great deal of discussion and collaboration. It is then imperative that students understand how to work in groups and how to listen and be heard. The teacher will model and practice with students. Talking prompts to utilize will include "Rephrasing - This is what I hear you are saying." And "I respectfully disagree, but this is how I see it." Students will affirm someone else's hard work by saying "That's a great idea." or saying, "Marie, that was a good job." If students need clarification, they will say, "Could you explain that again please?" Students need to face each other, maintain eye contact (if that is accepted in that culture) and stay quiet while the other person is speaking. Talking chips talking sticks, talking bears)can be utilized to show that once your chips are finished, it is time to give another person to speak. They will have to understand that if someone disagrees with them, it is not that they do not like them, but rather that we are all entitled to our various points of view. This will mean that a safe community needs to be created for students to take chances and participate. These skills will be practiced during Morning Meetings, circle time, whatever name is being used at your school to create a class community.

Classroom Activities

This unit will take three days a week for 3 weeks.

Lesson 1

Title: Go Green for a Better Tomorrow

Grades: 1-4

Duration of Lesson: 45 minutes

Standards Utilized:

Objectives: Students will draw pictures of their neighborhood.

Materials: paper, crayons, Chart paper

This lesson is to get students curious about the unit.

Procedures: Teacher will say to students that we will be studying a unit called Go Green for a better Tomorrow. The teacher will ask, what do you think that would be about? Teacher will use the Think-Pair-Share strategy. After giving them 2 minutes to think, the teacher will say now find a partner and discuss your thoughts with your partner. Students will discuss with their partner for 5 minutes and then the teacher will count down to 5 which is a signal to finish up their last thoughts and to get ready to share them with the whole class. Teacher will choose 4 students to share out. While they are sharing out, the teacher will write their thoughts down on a chart paper title what is our unit going to be about?

Next, Teacher will tell students to close their eyes to visualize what their communities look like? After three minutes, students will then draw what their communities look like.

Lesson Closure: Students will after 30 minutes share their drawings with each other by doing a carousel in which students will go around and look at their classmates' works.

Lesson 2

Title: What if Everybody did that? By Ellen Javernick

Grades: 1-4

Duration of Lesson: 45 minutes

Standards Utilized: CC.1.2.2.B Ask and answer questions such as who, what, where, when, why, and how to demonstrate understanding of key details in a text.

Objectives: Students will be able to demonstrate an understanding of a text, in order to ask and answer questions.

Materials: The book, “What if everybody did That?” Worksheet (Appendix E)

Procedures: Teacher will remind the students of the picture that they drew about their communities and also of the new unit they will be studying. Teacher will say we are going to listen to a read Aloud called “What If Everybody did that?” Before reading, Teacher will ask, what do you think this book will be about? Teacher will give wait time while students think about their responses. Teacher will then say let us do a Turn and Talk. After a minute, the teacher will respond and say let us see if your predictions are accurate. During the reading, the teacher will stop at various points and ask questions to check for understanding. After reading, teacher will ask questions such as:

1. Was your prediction correct?
2. How does this book make you feel?
3. Why would people throw this away while driving in the car?
4. What would you say to someone who you saw throwing trash in an appropriate way?
5. Have you ever wanted to do one of the misbehaviors in the story? Why or why not?
6. Think about one recent misbehavior you have done. What would the world look like if everybody did that?

Lesson Closure: Students will be given a worksheet to check for understanding.

Lesson 3

Title: A Community Walk

Grade: 1-4

Duration of Lesson: One hour

Standards Utilized:

Objectives: Students will use their senses as they walk around the neighborhood and make observations.

Materials: Clipboard, Pencils Chaperones

Procedures: Teacher will tell students we are going to take a walk and explore the neighborhood and also our school. Students will be placed in small groups with chaperones, and go to different areas to observe, take pictures and notes of what was seen. The groups will be heterogenous and not be more than 4 students. The purpose of

this walk is for students to be familiar with their school community and be aware of various issues it is facing.

Lessons 4 and 5

Title: Reduce, Reuse and Recycle

Grade: 1-4

Duration of Lesson: 45 minutes each

Standards Utilized: CC.1.2.3.A Determine the main idea of a text; recount the key details and explain how they support the main idea.

CC.1.2.4.F Determine the meaning of words and phrases as they are used in grade level text, including figurative language.

Objectives: Students will be able to demonstrate an understanding of a text, in order to ask and answer questions.

Materials: by The Three R's. Reduce, Reuse, Recycle: Roca, Nuria / Curto, Rosam

Video:<http://brainpopjr.com/science/conservation/reducereuserecycle/>, Anchor Chart, pictures Computer, Jamboard

Vocabulary Words: composite, conserve litter, landfill recycle, reuse reduce, waste reduction, natural resources

Procedures: Teacher will make a chart with three columns label reduce, reuse and recycle. This will be used as an Anchor Chart for future reference. Before starting the lesson, there is a saying, Simple Acts. Big Impact. What do you think that means? Students will do a turn and talk. Afterwards, they will share their answers. Teacher will also ask "What are some examples of ways you can make a difference by taking a simple action? Today we are going to look at the three R's. Teacher will introduce the vocabulary words that will be discussed by showing the Brainpop video. The words will be practice saying them and using them in sentences. The book, *The Three R's. Reduce, Reuse, Recycle* will then be read. After reading a few pages on reducing, the teacher will ask "what does reduce mean and how can we reduce? Responses will be placed on the chart along with a picture. This routine will continue for reuse and recycling.

Lesson Closure: As a formative assessment, Students will create a Jamboard to show what can be reused, reduced and recycled. Students also will write a sentence for each of those words.

Lesson 6

Title: What can we do to take care of the Planet?(Reading)

Grade: 1-4

Duration of Lesson: 45 minutes

Standards Utilized:CC.1.2.3.A Determine the main idea of a text; recount the key details and explain how they support the main idea.

Objectives: Students will be able to demonstrate an understanding of a text, in order to ask and answer questions.

Students will be able to determine the meaning of words in order to comprehend the text.

Materials: the articles “Take Care of Our Planet”; “A Ton of Trash”; “Garbage in the Ocean”(These articles can be found on the Readworks Website).

Procedures: Before students read a nonfiction article, Teacher will explicitly teach the vocabulary words. They are reduced, reused, recycled, and polluted. Teacher will use them in a sentence and then let students also create a new sentence for those words. Students will create a dictionary in their journals. Teacher will state the objective, which is you will ask and answer questions about the article. There will be a discussion at the end. Students will read the text independently. In any class, you will have varying reading levels. Teacher will differentiate the articles. After reading the article, students will come together and the teacher will ask are there any questions about the article? Students will ask questions and others will answer them citing evidence from the text.

Lesson Closure: It will be an exit ticket. Students will answer the question, according to the article, how can we take care of the Planet? How are we causing so much? How is garbage affecting ocean life?

Lesson 7

Title: What can we do to take care Planet? (Writing)

Grade: 1-4

Duration of Lesson: 45 minutes

Standards Utilized: CC.1.4.3.H Introduce the topic and state an opinion on the topic. Introduce the topic and state an opinion on the topic.

Objectives: Students will be able to support a point of view with reasons and information, in order to write an opinion piece.

Materials: Student's journals.

Procedures: Teacher will ask, How Can we take care of the planet/ What do you think?

Today we will be writing an opinion piece. Depending on the time of year, students would have discussed opinion vs. fact. Teacher will review what is an opinion and what should be in an opinion writing such as stating your opinion, give three reasons for your opinion and a closing statement.

As a class, students will have a discussion of their point of view. After the discussion, students will independently start their writing. Students will use a graphic organizer to assist in their writing.

Lesson Closure: After students are finished, in small groups, they will share out. A rubric will be given to students.

Lesson 8

Title: What is in your trash?

Grade: 1-4

Duration of Lesson: 45 minutes

Standards Utilized: CC.2.4.3.A.4 Represent and interpret data using tally charts, tables, pictographs, line plots, and bar graphs Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.

Objectives: Students will be able to collect data and sort them in what types of trash (trash from the classrooms) in order to create a bar graph to show the types of trash collected.

Materials: Class trash, gloves, newspapers, paper to keep track of data.

Procedures: Today we will be going through our trash. What are things you will think we will find? After we have sorted them by types of trash, we will also make a graph show your findings. Students will be working in groups. The teacher will have an anchor chart of how students should work in groups and remind them of these norms.

Lesson Closure: Students will present their findings to the class. They will answer questions like How much trash? What types of trash? Which class is the most trash? How can they reduce their trash?

Lesson 9

Title: Let's find Solutions: What is a Landfill?

Grade: 1-4

Duration of Lesson: 45 minutes

Standards Utilized:CC.1.2.3.B Ask and answer questions about the text and make inferences from text; refer to text to support responses.

Objectives: Students will be able to make inference from the text in order to ask and answer questions with evidence.

Materials: Where does the Garbage Go? By Paul Showers and Randy Chewning

Procedures: Teacher will read aloud the text. Teacher will pause at various times to ask questions and check for understanding.

Lesson Closure: At the end, students will write down five facts they learned.

Lesson 10

Title: How to convince others to take action?

Grade: 1-4

Duration of Lesson: 45 minutes

Standards Utilized: VA:Cr1.2.4a Collaboratively set goals and create artwork that is meaningful and has purpose to the makers.

VA:Cr1.2.3a Apply knowledge of available resources, tools, and technologies to investigate personal ideas through the art-making process.

Objectives: Students will be able to create artwork that has purpose in order to convince an audience to make a social change.

Materials: Paint, paper crayons, computers

Procedures: Teacher will show examples of artwork that display various landscapes which are trash free. Teacher will ask, how does this make you feel? Is this the kind of world that you would like to live in? We are going to create pictures and post them around the school and hope this will inspire others to want to take care of our world. First you will do a draft of what ideas you will want to present. Then when it is approved, we will do the final product.

This is an opportunity to collaborate with the Art Teacher.

Lesson closure: Will be the final product a poster.

Lesson 11

Title: How to convince others to take action?

Grade: 1-4

Duration of Lesson: 45 minutes

Standards Utilized: MU:Cr3.2.3a Present the final version of personal created music to others, and describe connection to expressive intent.

MU:Cr3.2.4a Present the final version of personal created music to others, and explain connection to expressive intent.

Objectives: Students will be able to listen to a piece of music and interpret it in order to provide a message

Materials: Lyrics to “What a Wonderful World” by Louis Armstrong

Procedures: Teacher will play the song, and ask students to do a quick draw of what they are visualizing in the song. They will then share what they have drawn. Teacher will ask, “What made you draw that?” “What feelings are you experiencing?” Teacher may even share with students the book that the song inspired. Teacher will state that in groups, you will create a song that persuades others to do a better job in Going Green.

Lesson Closure: Students will produce songs where they will share it with the school community.

Lesson 12

Title: Field Trip

Grade: 1-4

Objectives: Students will visit a recycling or an incinerator center, where what they have learned will be more concrete in order to comprehend the trash issue.

Standards Utilized:CC.1.4.4.A Write informative/ explanatory texts to examine a topic and convey ideas and information clearly.

Lesson Closure: When students return from the trip, they will write about their experiences.

Final Product: Students will produce something new from old recycled items. They will also write short research solutions to a Garbage Problem. A rubric will be utilized for the project and Writing. (Appendix F&G).

Resources

Baptista, Ana. (2019, June 23). *PBS NewsHour*.

Begley-Bloom, Laura. (2020, December 31). *Forbes Best Travel Insurance Companies*.

Buzby, Jean. (2022, January 24). *Food Waste and its Links to Greenhouse Gases and Climate Change*.

Cal Recycle.(2022). *What Is E-Waste?* State of California.

ClientEarth Communications. (2021, March 9). *What are the environmental impacts of Waste incineration?*

Desai, Sheil. (2022, January 3). 34th Street. *How Philadelphia Trash is spurring an Environmental Justice Campaign*.

Global e-waste Monitor.(2020).

Jason. (2019, February 2nd). Roll off Dumpster Direct. *Where does the trash go in Philadelphia?*

Kim, Chan & Mauborgne, Renee. (n.d.) Blue Ocean. *Turning Waste to Energy: Sweden's Recycling Revolution*

Rhynhart, Rebecca. (2021, November 4th). *Data Release: Sanitation Performance Metrics*.

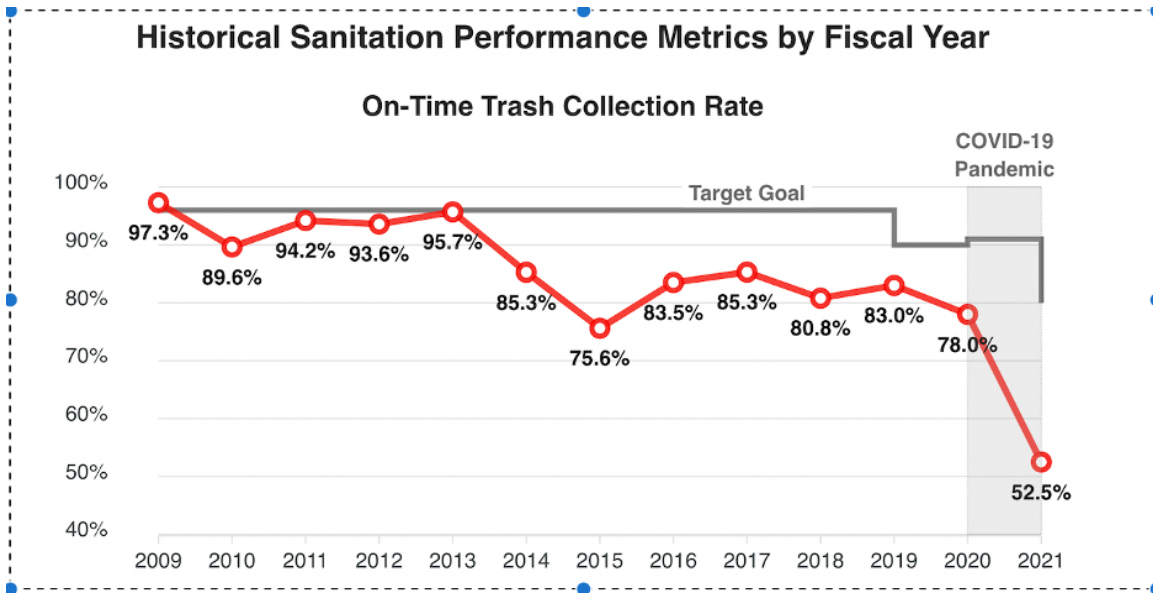
Rinde, Meir. (2022, March 28th). BillyPenn. *Philly's big illegal dumping problem. Residents are furious as the city picks up more trash and catches fewer perpetrators*.

- RTS Blog. (2020, December 2). How to recycle e-waste in Philadelphia: A Guide.
- SL Recycling. (2022). *What are the Negative Effects of Landfill?*
- Soergel, Andrew. (2020, December 12). 270,000 Tons of Trash Float in Earth's Oceans. *U.S. News*.
- Triratanassirichai, Singh, Anal. (2017, November 3rd). *Value-Added By-Products from Rice Processing Industries. Chapter 12*.
- The Brazilian Report. (2021, February 2021). *Ethanol Producers Use Sugarcane to Generate Electricity*.
- World Bank, 2018 Children's Resources
- Javernick, Ellen. (1990). *What if Everybody Did That?*
- National Institute of Environment Health Sciences: *Recycle*
- Roca, Nuria, Curto, Rosam. (2007). *The Three R's. Reduce, Reuse, Recycle*
- Showers, Paul. Chewnin, Randy. (1974). *Where does the Garbage Go?*
- Thiele, Bob. Weiss, George David. (2014). *What a wonderful World*.
- Wood, Susan. (2016). *Ada's Violin: The Story of the Recycled Orchestra of Paraguay*.
- <https://brainpopjr.com/science/conservation/reducereuserecycle/>
- <https://video.link/w/kZvGd>- What a Beautiful World by Louis Armstrong

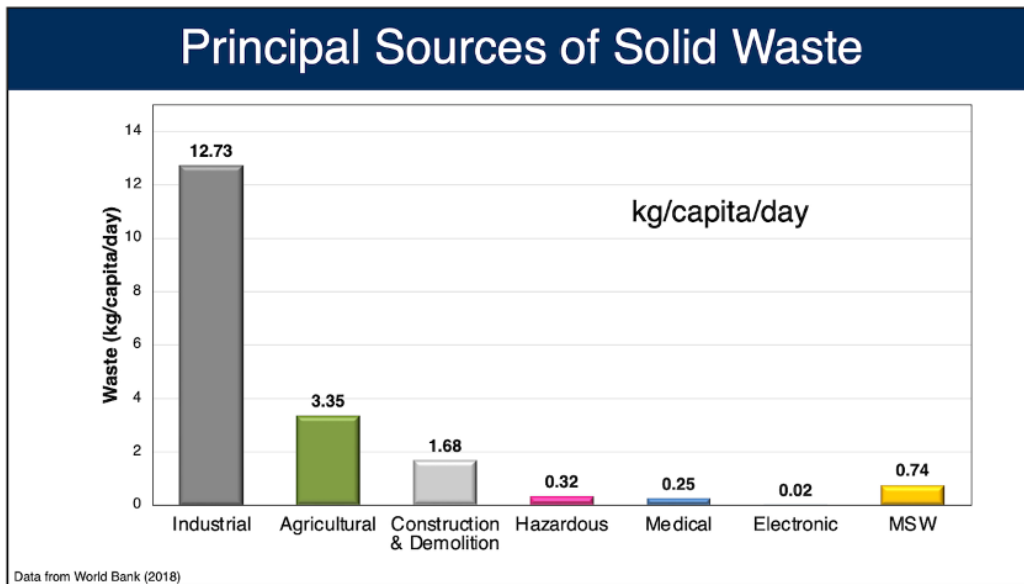
The children's resources are all fiction books that can be used as Read Alouds to students. They will be helpful to build background knowledge for the children as they build upon their learning. There are also articles from Readworks that can be employed. The video from Brainpop, is an introduction to the unit. The song "What a Beautiful World" by Lou Armstrong is for students to visualize what the song is about.

The other resources are for the teachers to assist in their planning and for their own edification on the topic.

Appendices

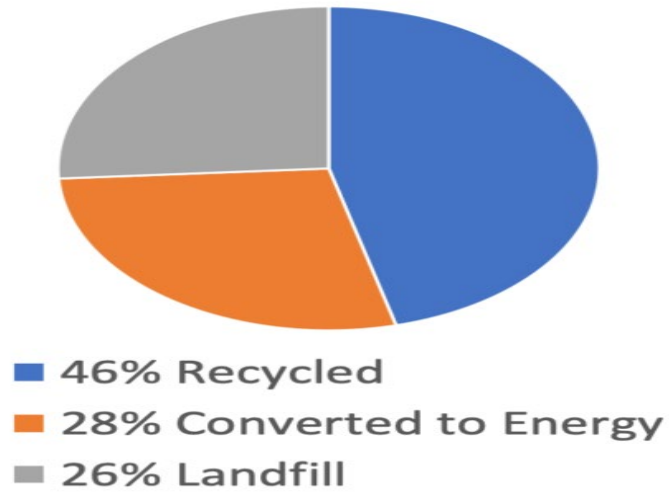


Appendix A



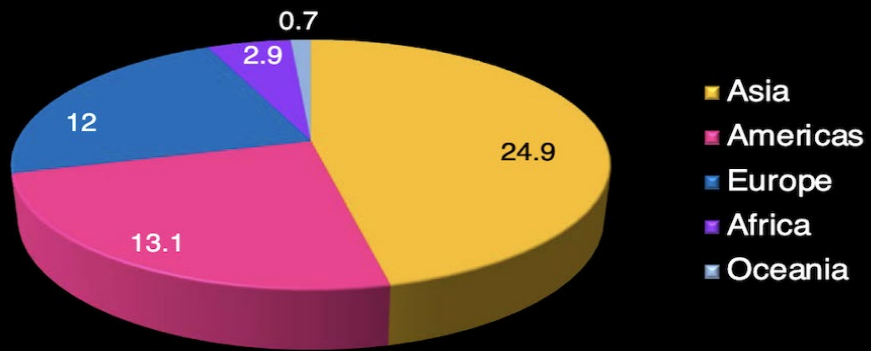
Appendix B

Where Trash Ends Up in Philadelphia



Appendix C

e-Waste Generation



Data from Global E-waste Monitor (2020)

in Mt (2019 data)

Appendix D

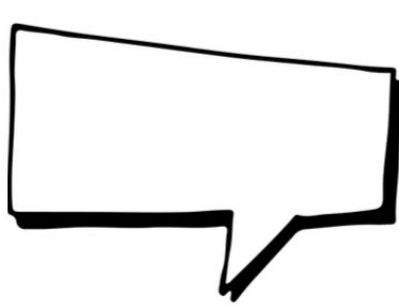
Name _____ Date _____

What If Everybody Did That?

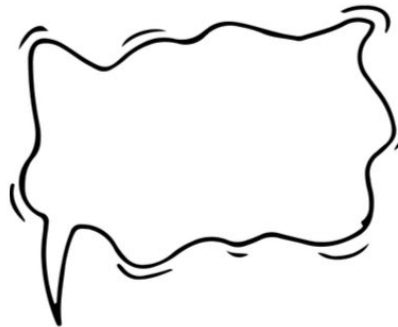
Directions: Read the story and answer the questions.

1. Have you ever wanted to do one of the misbehaviors in the story? Why or why not?

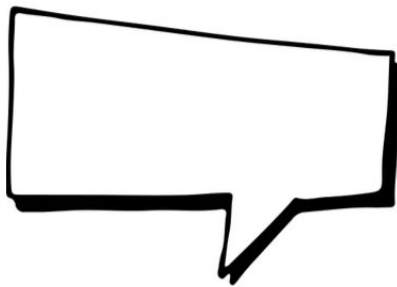
2. Draw a picture of a two misbehavior you have done on the left, then on the right draw what the world would look like if everybody did that.



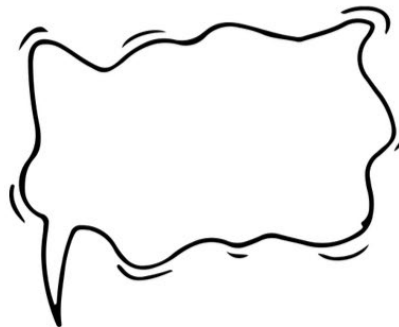
What did you do?



What if everybody did that?



What did you do?



What if everybody did that?

Recycling Project - Rubric

Student: _____

	Needs Improvement 1	Fair 2	Good 3	Excellent 4
Project Students crafted something out of recycled materials				
Handwritten Students hand wrote their paper with correct spelling				
List of Materials Students provided a list of materials used for project.				
Clear steps Students wrote clear step by step instructions explaining how they built their object				
Presentation Students presented their project clearly with little to no assistance.				

Total: ____/20

*If project is turned in late, 4 points will be deducted from total score.



_____ 's
writing rubric



	needs improvement	fair	good	excellent
convention Student uses accurate punctuation and capitalization. Student writes most sight words correctly and uses best guess spelling.	1	2	3	4
sentence fluency Student has a variety of sentence lengths. Few choppy or run-on sentences. Sentences are complete and make sense.	1	2	3	4
organization Student has a beginning, middle, and end. Student uses transitional words. Student has an opening and closing.	1	2	3	4
style and voice Student tries interesting words. Shows own personality in appropriate ways.	1	2	3	4
content/ideas Student stays on topic, and is thorough with interesting details. Uses "showing" or "descriptive" detail effectively.	1	2	3	4
writing process Student applied the writing process to create a finished product. Student attempted some editing, and/or use resources such as a dictionary.	1 needed a lot of guidance	2 needed some guidance	3 very little guidance	4 independent writer

Comments/ goals:

Total:

This curriculum unit aligns with the Pennsylvania Common Core Standards.

CC.1.2.3.A Determine the main idea of a text; recount the key details and explain how they support the main idea.

CC.1.2.4.A Determine the main idea of a text and explain how it is supported by key details; summarize the text.

CC.1.2.2.B Ask and answer questions such as who, what, where, when, why, and how to demonstrate understanding of key details in a text.

CC.1.2.3.B Ask and answer questions about the text and make inferences from text; refer to text to support responses.

CC.1.2.3.C Explain how a series of events, concepts, or steps in a procedure is connected within a text, using language that pertains to time, sequence, and cause/effect.

CC.1.2.4.C Explain events, procedures, ideas, or concepts in a text, including what happened and why, based on specific information in the text.

CC.1.2.3.F Determine the meaning of words and phrases as they are used in grade level text, distinguishing literal from nonliteral meaning as well as shades of meaning among related words.

CC.1.2.4.F Determine the meaning of words and phrases as they are used in grade level text, including figurative language.

CC.1.4.3.A Write informative/ explanatory texts to examine a topic and convey ideas and information clearly.

CC.1.4.4.A Write informative/ explanatory texts to examine a topic and convey ideas and information clearly.

MU:Cr3.2.3a Present the final version of personal created music to others, and describe connection to expressive intent.

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VA:Cr1.2.4a Collaboratively set goals and create artwork that is meaningful and has purpose to the makers.

VA:Cr1.2.3a Apply knowledge of available resources, tools, and technologies to investigate personal ideas through the art-making process.

NGSS

- 3-5-ETS2-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- 3-5-ETS2-3 Plan and carry out fair tests in which variables are controlled and failure point.