

Dear Educator,

If you are looking to investigate solid waste issues in your school and take action to reduce, reuse, and recycle resources from the waste stream then this guide is for you! The purpose of this guide is to assist educators seeking to launch or expand a waste reduction program in their school.

This guide provides the background information you will need as well as methods for introducing the topic of solid waste to your students. Students exposed to this knowledge pick up key strategies to reducing waste in their schools, homes, and communities.

Included in this resource guide are steps to take when starting projects and keys to success. These elements include a problem-solving framework for addressing the issue, tips on integrating waste reduction into curriculum, kick-start acitvities to launch your project, and case study examples of successful waste reduction projects from around the area.

Additionally, this guide is a part of a larger toolkit to enable educators to implement waste reduction projects in their school and classrooms. This toolkit includes posters, fliers, bookmarks, and bin labels that may be downloaded and used in the school or classroom. Educators are free to modify, reproduce, and recreate these materials to fit their needs as long as it is for educational purposes.

By empowering youth with the appropriate knowledge and resources students can work to achieve waste reduction goals. As young learners, students form the knowledge-base and values that are carried into their adult lives. These values and judgments impact student's relationship to the environment. For this reason it is imperative that students are exposed to environmental education.

Every school and school district is distinct so what works best at one location may not always be the way that works for all schools. Keep in mind that every waste reduction program is unique, takes time, and is beneficial to the classroom, the school, your community, and the environment. Good luck!

-The EarthWays Center Staff of the Missouri Botanical Garden

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Missouri Botanical Garden

Waste Reduction Projects in Schools

Waste reduction projects in schools generate interest in the topic of solid waste as an environmental issue. These projects focus on reducing, reusing, and recycling material waste at a school with the overall goal reduce waste at the school. A successful waste reduction project includes a focus on preventing waste, understanding where waste ends up, and exploring how waste issues impact the land, air, water, and other living things in the local environment.

Students involved in waste reduction projects explore topics of how humans interact with the world around them including the use of natural resources, impacts on the land, water, air, and other living things in a local environment. Students think about their actions and learn to make their own choices. Students begin to develop a sense of wonder about the world around them and will understand the importance of caring for the Earth.

Waste reduction projects vary in size and depth. Projects can target overall waste generated at the school, a specific material, increasing reuse of office supplies, and much more. Waste reduction can also take place behind the scenes as faculty and staff engage in sustainable practices such as duplex printing, digital communications, sustainable purchasing of office supplies and materials, and engaging in conversation with the school's waste hauler.

When starting a waste reduction project, first think about the needs of the school. What does the building need? Are there programs that should be doing more? Are there programs in place that have not been performing to their best capabilities? Is there are particular material or area in the school that should be targeted? Think about resources available and the key partners that will be involved through this project. Get the administration, the board, parents, and students excited and engaged-with the project and it will go far.

Use this resource guide to get started, kick-off student engagement, and start reducing waste in the classroom, school, home, and community!

Benefits

Convincing a school board or administration to begin implementing a costly waste reduction program may not always be the easiest thing to do, but it is not the only way to get started in the school. Start small and develop a program that is sustainable from year to year by engaging students, faculty, and staff. Expand on the program each year to maintain excitement and results. Look at the overarching benefits a waste reduction program could brings to the school community. Schools engaged in successful waste reduction programs see benefits both financially, academically, and environmentally.

Educationally

Students develop civic responsibility, communication and team-building skills, improve critical thinking & problem solving skills, and cultivate inquiry and analysis skills that are keys to solving any real-world problem. Students learn to value the natural world and understand how humans and the environment

interact.

Environmentaly

Taking steps to reduce

school waste can have a huge impact on the environment. The school can save energy, reduce greenhouse gas emissions, and decrease the amount of material in landfills by implementaing waste reduction projects. Reducing waste can have

positive impacts on local soil and air quality. Students become

champions of the environment.

Financially

- Starting a new program may have some costs, but waste reduction programs
- can decrease disposal costs. By increasing recycling
- rates, schools may be able
- to cut costs by reducing how often trash is picked
- up. In addition to cutting waste disposal costs, several programs
- exist which actually allow schools to bring in
 - additional revenue by
 - selling recyclables.

How do students, schools, and communities benefit from waste reduction programs?

Beyond Recycling - Reduce, Reuse, Recycle

Students are taught at young ages to practice the "three R's" in order to care for the environment. It's a big challenge to task students with saving the planet, but it is important to challenge students to understand that their actions impacts the health of the environment. Learning to reduce, reuse, and recycle, is a good start because it

Source Reduction & Reuse

Recycling / Composting

Energy Recovery

Treatment

& Disposal

easy a manageable task for learners of any age to achieve, and the topic is universal. We all create waste. Additionally, from engaging in topics on waste students can dive into more complex thoughts related to creating a more sustainable future.

The concepts behind the simplified "3R's" approach reflect a much broader, more complex hierarchy for managing waste. The Environmental Protection Agency, has developed an integrated Waste Management Hierarchy model that focuses on four key strategies to reducing waste and environmental impacts. This heirarchy focuses on a systematic approach to solving waste problems by thinking about the products we use, how we use them,

and what happens to the product once we've used them.

The first strategy, and most favorable of the four, emphasizes reducing the volume of trash generated before it even enters the waste stream through source reduction and reuse strategies. This may mean creating products with non-toxic substances, minimizing packaging, or purchasing longer lasting products rather than disposable products. This is the most important strategy a classroom waste reduction project can teach students.

The next strategy, and perhaps the most common, is increasing the collection and processing of materials for recycling. This step is necessary to reduce the volume of waste already generated. Finally, it is imperative to establish the understanding that any item that cannot be recycled or reused must be disposed of in a landfill. Along with this understanding the basic knowledge of how a landfill operates and the environmental impact these operations have on the environment builds the backbone for any waste reduction program.

Integrated Waste Management Programs

When developing an action plan for waste reduction projects think about multiple solutions and alternatives. Incorporating multiple layers will allow the program to maximize waste reduced. Analyze the environmental, social, and ecomonic costs associated with each solution and involve students in decision making processes when possible.

Here is an example of a school who has taken on a project to reduce the amount of paper sent to the landfill:

Reduce

- Teachers, staff, and students begin to reduce use through duplex printing
- Teachers and students only print what is absolutely necessary
- Teachers begin to assign work that does not need to be written
- Teachers use a smartboard or chalkboard to deliver written instructions
- Students submit assignments digitally rather than in print

Reuse

- Students collect paper scraps and turn them into note-pads
- Students and staff create a paper supply exchange for notebooks and other paper products a person no longer uses
- The student art clubs turn old homework into paper mache materials, recycled beads, and more

Recycle

- Students and staff collect and recycle old homework
- Students host a paper recycling competition to determine see grade level can collect the most paper
- The school hosts a recycled paper drive for the community and weighs the final amount collected
- The school starts purchasing paper made from recycled paper

6 Easy Steps To Becoming Waste-Free

Many schools have initiated creative, fun, and effective waste reduction projects in the classroom around the St. Louis City and County area. For as many projects that have been successful it is important to remember that there is no one way to becoming a waste-free school. No easy check-list exists that will work in all classrooms or schools. Instead, it takes dedication from administrators, teachers, and students who are passionate and willing to put in the time and effort to make things happen. For those that may just be getting started, this can seem like a daunting task. By following six steps outlined on the following page projects will move forward with great success and impact.

Recycling

Recycling

Audit

Recycling

Assessment Single-Stream

Newspaper

Waste Composting

Center Vermicomposting

Classroom

Newspaper

Waste-Free

Papers Aluminum

While these steps may help get a project started, it is also very important to think about the long-term sustainability of a waste reduction program. As new programs begin do not get discouraged when faced with obstacles. This is a part of the action process and it is an important skill for students to learn. Encourage students to problem solve around these obstacles to keep projects moving forward. Keep a structured plan in place and continue to engage students and staff throughout the year. A team of dedicated staff and students is necessary to ensure that a program continues from year to year. Sustainability from year to year adds value to the program and greatly extends the impact of a project. Expand on successful elements and troubleshoot those that were unsuccessful to ensure sustainability of the program over time.



The 8-Step Action Plan

The 8-Step Action Plan is a framework that has been developed by the EarthWays Center of the Missouri Botanical Garden to develop student's problem-solving skills. This framework extends beyond rote memorization of steps and encourages students to develop critical thinking skills necessary for solving real-world issues.

By creating an action plan and implementing a project to solve the problem identified students realize that solutions require hard work, teamwork, and most importantly can be achieved. Following the implementation of their action project, students reflect on the changes made and evaluate the immediate and long-term effects their efforts have caused. The nature of the 8-Step Action Plan framework draws students in on both an academic and personal level as students begin to invest themselves in the process. Students see and analyze tangible evidence as a result of their work with this framework.

Integrating the 8-Step Action Plan into curriculum recognizes students as integral players not only in the school but within the greater communit. Students develop a healthy positive relationship within their community and the natural world.

AWARENESS opens a student's eyes and heart to an ISSUE. In-depth RESEARCH partners students and adults with a diversity of occupations and viewpoints. Students begin to realize that realistic SOLUTIONS are the result of teamwork and that each PLAYER brings his or her own perspective to the table. Taking ACTION is, therefore, a culmination of perseverance, frustration, re-evaluation and communication. Finally, students ASSESS and EVALUATE the immediate and long-term effects of their efforts.



Awareness

Open student's minds and create awareness of the environmental issues related to waste.

Issues

Identify issues that are both problems and opportunities. How can students address these issues?





Research

Investigate the facts about the issues students choose to address. How can students uncover the facts? What resources are needed?

Players

Identify and communicate with people who hold the key to working with these issues. Discuss concerns, values, beliefs, and needs. Form partnerships!





Solutions

Explore possible ways to address the issues and solve the problems. Formulate an action plan.

Action

Put students' awareness into action. Include key players and use the research to create a project. Implement this action plan at the school!





Assessment

Record successes and obstacles. Keep in touch with key players. Make changes as the plan proceeds to adjust to obstacles along the way.

Evaluate

Document the overall outcome of student efforts. Share the findings with others. Use what knowledge was gained to sustain projects over time!



Gathering Data Through Waste Assessments

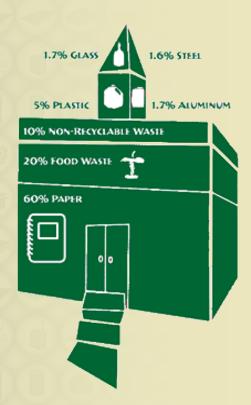
Waste reduction programs thrive on measurability. Whether starting a new program or expanding an established waste-reduction program it is important to gather data. This information will create a baseline against which progress can be measured. This data also identifies needs for implementing or expanding existing programs. Students will use this information to gain a true sense of waste issues as it pertains to the school.

Gathering this data can, and should, be done in a manner that involves students. Students exposed to the real-life visuals of waste gain a sense of ownership in becoming a part of the solution to the problem. Students want to solve this problem in the classroom, at home, and in the greater community.

There are many ways to gather the necessary information for baseline data. Depending on student age, grade-level, size of school, and amount of time available to dedicate to this part of the project, educators will want to form a plan that works well for their group.

The most comphrensive method involves conducting both a Waste Assessment Survey and a Waste Audit of all or part of the school. While these two activities can be done separate of one another, together the information creates a complete picture of waste at the school. During the Waste Assessment participating students will need to use math, written and oral communication skills, and even visual and performing art to be successful.

Did You Know?



Students conducting waste audits in their school discovered that paper and food waste contributed to the majority of material being sent to the landfill.



Waste Assessment Surveys

A waste survey uncovers the ways in which schools create trash as well as what types of materials are in the school's waste stream. The survey is an investigative process in which students find out where waste is generated in the school, how much is created, how waste at the school is handled, and what is done to materials after it is thrown into the classroom trashcan.

Waste assessment surveys factor in purchasing policies and the waste hauler involved. Students should work with the school facilities staff and waste hauler to obtain necessary information. Students are encouraged to think about the kind of materials coming into the school, the type of equipment used, and how these policies impact the amount of trash that is created. Students can draw conclusions as to how or why waste is generated at the school. This information gives students a basic understanding of waste at the school.

How many people use the school building each day?

How many dumpsters does the school have? Where are they located?

Study a map of the school. How many classrooms are there? How many offices?

What type of food packaging is used in the cafeteria?

What company handles the waste hauling for the school? Is this the same company who handles recycling for the school? How often does the waste hauler collect the trash?

How much money does the school spend on disposal of waste? Include recycling and landfill costs.

What waste reduction steps is the school already taking? Is recycling available? Composting? Are there any other programs being implemented?

Waste Audits

A waste audit gets students to think beyond the garbage can and connect with waste as they weigh, sort, and calculate how much waste is being generated at the school. The audit allows schools to gain a better understanding of just what type of waste and how much is being generated as students gather quantitative data.

Audits establish a starting point for students to begin their waste projects. The information gained reveals key points along the waste stream where work needs to be done, and can demonstrate how effective recycling is in reducing the amount of waste sent to the landfill.

Procedures for waste audits will vary based on number of students involved, grade levle, size of school, and extent of the audit. Audits can focus on specific classrooms, comparison of various locations (classrooms, offices, cafeteria, etc.), or audit the entire school. Whatever the goal, make a plan, and communicate the plan with all parties involved. Recruit volunteers to help organize and carry out the audit. Assign students tasks such as sorting, clean-up, recorders, weight checkers, and safety monitors.

It is important to work with the school's facilities team when planning a waste audit. This team will help gather the sample for the audit and may be able to provide other areas of suppot such as gloves, tarps, hoses, etc., for the day of the audit. Inform parents and obtain permission slips for any student participating.

SCHOOL WASTE AUDIT TOTALS

MATERIAL	OFFICE	CAFETERIA	CLASS- ROOMS	TOTAL LBS
PAPER				
PLASTIC				
METALS				
GLASS				
LANDFILL				
FOOD				

SCHOOL TOTAL LBS OF WASTE

Online Tools For Educators

Waste reduction projects provide the platform for students to learn about more than just recycling. A good waste reduction project focuses on developing civic responsibility, action-motivated students, and a comprehensive understanding of environmental issues. Students learn how human activity impacts the environment around them.

As an educator, begin to think of ways to incorporate waste, recycling, and the environment into classroom lesson plans. Comprehensive waste reduction projects incorporate the theme of waste into the classroom. Waste reduction projects can be incorporated into writing, research, math, arts, science, health, and social sciences. The more avenues used to reach students during the implementation of a new program the more successful the project will be.

There are many places to start when planning a waste reduction project. Lots of things to consider and plans to be made. In order to make things a little easier a tool-kit of activities, posters, fliers, and more has been developed by the EarthWays Center of the Missouri Botanical Garden. Educators are free to download, alter, and replicate the materials found in the tool-kit to fit their project needs.

Tool-Kit Includes:

Recycling Do's and Don't's Poster
Composting Do's and Don't's Poster
Printable labels for landfill, recycling and compost bins
Printable recycling do's and don't's bookmark
Template for a label design competition
Template for a bookmark design competition
Example of a waste assessment survey

This tool-kit can be accessed by visiting the Misouri Botanical Garden's website at www.missouribotanicalgarden.org

Kick-Start Activites for the Classroom

Use these fun and easy activities in the classroom to start students thinking about problems with waste. These activities were developed to get the conversation started, encourage engagement, and garner excitement for a waste reduction project. These activities should be used as part of a larger, more comprehensive lesson plan.

Launch a Bookmark Design Competition With a Recycling Focus

Students will engage in a discussion of waste and recycling through a story, followed by a class discussion, and a creative competition.

TIME: 30-45 minutes
SUPPLIES: Copies of Bookmark Template, crayons, markers, etc,

Prior to class choose a story, book, or novel that is grade-level appropriate.

Read the story as a class or individually.

After reading the story hold a classroom discussion on the topic of waste and recycling. Start by asking the students "What does recycling mean to you?"

Further the discussion by asking students "Why is it important to recycle?"

When ready, tell the students that they will be participating in a bookmark design challenge to help inform the school about recycling.

Hand out the template and allow students to begin creating their designs. Give them as much time as available, or have them take the bookmark home to work.

After everyone has turned in their competition have students vote on three favorite designs to be turned into bookmarks for the school.

Alternatively, students could cut their design out, laminate, and use as a bookmark.

Hold a Re-Label and Re-Locate Day

Engage students in conversations about waste by examining the placement of trash cans and recycling bins throughout the school. Have students take action and re-label bins to connect landfill waste to trash cans.

TIME: 30-45 minutes or more

SUPPLIES: Bin labels (pre-made or home-made), crayons, markers, etc, access to school waste and recycling bins

Get the conversation going by holding up the trash bin and the recycling bin and asking the class if they know which bin is for paper, plastic, aluminum, etc.

Ask students the question "where does the garbage go?" and explain that waste gets sent to the landfill. Explain that people often forget that their garbage has to go somewhere. State that from now on their class will call the trash can the landfill bin. This helps remind the class that waste doesn't disappear when thrown away.

Quickly survey the students and ask them how they think the school is doing on recycling. Could the class be doing more to recycle? Are things being recycled that shouldn't be?

Discuss with students ways to increase the contents of the recycling bin and decrease the contents of the landfill bin. Take one or more of their ideas and put them into action!

Here's an idea....

- Instead of having one trash can per classroom, try having one trash can per hall way and recycling bins in every room.
- Don't have enough recycling bins? It's easy! Turn any trash bin or unused box into a brand new recycling bin.
- Have kids decorate labels to place on each bin or have them place the pre-made labels included in the Online Tool Kit on bins throughout the school.
- Turn the the larger "trash can" into a recycling bin and make a smaller bin for landfill waste. Keep changing the landfill bin to a smaller and smaller container as students learn more to demonstrate how they are decreasing the amount of waste generated.

How Much Trash Do You Make in One Day?

Students will begin to become more aware of how much trash they generate in daily life by observing and recording how much trash they produce in one day. Students will become conscious of what type of materials they throw away.

TIME: 45 minutes for introduction and 20 minutes for wrap-up discussion.

Acitvity is spread over the course of one or more days.

SUPPLIES: One trash bag/student, one ziplock bag/student (for food waste), scales, copies of a waste record worksheet for each student

Get students to think about waste by holding a classroom discussion. Ask students:
What is waste? What types of things get thrown away?
What material do you think gets thrown away the most?
What happens to the trash that we throw away? Where does it go?
How many pounds of trash do you think you produce each day?

A note about waste:

On average a person living in the United States generates approximately 4.6 lbs of trash each day. About 220 million tonnes of waste is sent to the landfill each year. Of this 220 million tonnes sent to landfills, the number one material found in a landfill is paper followed by organic wastes including food and yard waste.

Explain that the next day the students will be keeping track of the waste items they would normally throw away. Distribute trash bags and ziplock bags to students. All items that would be trash will be put into the trash bag. Any food or "yucky" waste should be put in the ziplock bag and sealed.

Distribute waste record worksheets and have students write down an estimate of how much waste they think they will have at the end of the day.

Following the trash collection day have students weigh their trash bags, record the results of materials, and dispose of the waste in the proper containers.

Hold a class discussion on what the student's learned through this process. Use this discussion to begin talking about changes or ideas the students have to reduce waste at the school.

Worms & Waste: Using Vermicomposting to Teach Waste Reduction in Early Childhood at Raintree Learning Community

The Raintree Learning Community is a private kindergarten and preschool located in Ballwin, Missouri. Faculty at Raintree Learning Community worked hard to design a program that would engage young learners in understanding the problem of waste, understand that people of all ages can make a difference in their environment, and to appreciate the environment around them.

The program focused on using vermicomposting as a method to engage students in thinking critically about the waste problems in their lives. A worm bin was introduced to the Community and placed in a visible area for all students to be aware of. A weekly worm club was started to engage interested students in which children participated in a variety of activities and experiments. Students studied the worm bin, learned about worms, through various hands-on activities, and explored how the worm bin worked to reduce food waste. Families, teachers, and community members were engaged through various community events such as a "Worm Park-n-Play" parent night.

Raintree Learning Community worked to integrate environmentally responsible policies throughout the entire campus. The Worm Club established a "Living Creatures Peace Agreement" and worked to create a campus full of students ready to embrace nature. The Club practiced traditions of respecting the worms through kind messages, sung songs about worms to understand the decomposition process, and conducted science experiments to determine the best conditions for worms.

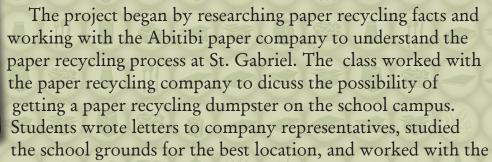
After spending a year with the worms, students were more able to accurately share what trash is and were able to describe their personal contribution to creating waste. Students spent more time outdoors, learned to respect the worms, and understood that the worms ate food waste in order to reduce the amount of trash produced at Raintree.

Eighth Graders at St. Gabriel the Archangel Tackle Paper Waste

St. Gabriel the Archangel is a co-ed private catholic school serving 511 students in grades K-8. After identifying the issues related to paper recycling on their campus, the St. Gabriel the Archangel's eighth grade class decided to make a difference. The class realized that people at the school were throwing away material that could, and should, have been recycled, while items that could not be recycled were being placed in recycling bins. The eighth grade students worked with faculty, maintenance, and

the principal to take on the topic of paper waste at the school while also working to educate the entire school on proper

recycling procedures.



head custodian on getting the bin in place. The students then worked on a presentation for the school to create awareness for paper recycling throughout the entire school. With suggestions from the head custodian, the students expanded their recycling program to include aluminum cans and plastic bottles #1 and #2.

As a part of their campaign, the students moved recycling bins to more visible and accessible locations, created new recycling bin signs for each classroom and grade level, and prepared scripts for weekly recycling announcements. Students conducted a trash can inventory after the project was in place for a few weeks to determine the effectiveness of their campaign. Students also created a campaign to show the school total amounts of pounds recycled by updating a thermometer poster in the cafeteria monthly. This kept the entire school engaged and excited about the project.

Students worked hard to get the entire school to recycle correctly, and visited each classroom to collect and sort their bins. Students also visited a landfill during their program to see what actually happens to things once they are thrown away. The students ended up recycling enough paper to save approximately twenty-one trees!

Using Systems Thinking to Further Waste Reduction Programs at Maplewood Richmond Heights Middle School

The Maplewood Richmond Heights (MRH) Middle school, part of the Maplewood Richmond Heights school district, serves 160 students in seventh and eighth grade. The topic of waste has been intigrated into the teachings of the school as the school focuses on conservation and systems thinking in sustainability education. MRH Middle school's extensive waste reduction program began about ten years ago with strong support from the surronding community. From single stream recycling to launching new composting programs MRH is on the path to solving their waste crisis.

MRH Middle's waste reduction program focuses on reducing the amount of unrecyclable material in the school. The school works to get the message of recycling across to all students, bridging the gap of organic waste through composting, and preparing the students for future challenges in a changing world. MRH Middle has focused on students as change-makers. Students are given the information needed to make their own choices for a more sustainable future.

Teachers at MRH Middle integrate the waste system as a part of their teaching from a systems thinking approach. Teachers use the school building as a learning tool as many initiatives focus on conservation and waste reduction. Students are tasked as leaders in sustainability initatives at the school. From the beginning of the program, much of the movement towards waste reduction has been student led. A student sustainability club was formed as a means of getting interested students engaged in furthering new initatives at the school.

Through these many efforts, the MRH Middle school has successfully reduced the amount of materials being sent the landfill, as well as the amount of unrecyclable material found at the school. The majority of the waste at MRH was found to be paper and electronic materials, most of which is recycled now. As Bill Henske, leader of the student sustainability club, states there is "very little solid waste going to landfills". The MRH Middle recycling program features bins in every classroom and is a single-stream system to allow for more materials to be recycled.

Currently students have taken on the task of expanding the composting program to include cafeteria waste. When the expanded compost program first launched, students and faculty realized that there was a greater need to inform students and staff about proper composting procedures, conduct periodic checks of the system to ensure that the compost does not become contaminated, and to engage as the key supervisors of sorting materials in the cafeteria.

