Classroom Waste Audit

Recommended grade level: 4-12
Time required: Minimum of three class periods for waste audit alone, additional time depending on depth and scope of project.

Purpose

This activity will introduce students to the issues of solid waste at your school. After collecting and sorting a representative sample of your school's trash, students brainstorm the most effective way to reduce the solid waste generated in classrooms (and offices). During this lesson, students will exercise critical thinking skills in solving real life problems through use of the scientific method.

Goals

At the end of this lesson students will understand:

- Individual choices can have a large impact overall
- Recycling can be an effective way to reduce the amount of solid waste
- Awareness affects people's actions

Objectives

At the end of this lesson students will be able to:

- Identify the major components of classroom trash
- List items that can be recycled from classroom waste
- Determine and limit the number of variables in an scientific study
- Quantify and analyze results of the initial and follow-up audit

Materials

Large tabletop or floor space
Large tarp
Disposable plastic tarps
Large trash bags
Worksheets (these can be duplicated for students or used on an overhead projector)
Latex or rubber gloves
Smocks or shirts (to protect clothing)
Bathroom scale
Access to soap and water or Disinfectant hand-wipes
Container in which to measure trash (medium size trash can)
Trash collected from representative classrooms

Scientific Method

Question or Problem: The topic you want to investigate.
Write in question form.

Question or Problem:
How can our school's trash be reduced?

What kind of **Background** will you need for this problem? The Background will show students "why it is important." Here are some issues you might want to investigate.

- Is trash a problem? Where does it go when it is hauled away?
- Does it impact the environment? How?
- Does it cost the school money?
- How much trash does your school or district have hauled away each year?
- What are the easiest methods for reducing your classroom waste?

Reduce what you use. For example, use both sides of a piece of paper.
Reuse- many things are reused in the classrooms, such as pencils and lunch bags that are used everyday.
Recycle- what recycling opportunities exist at your school?

Observations: Observations actually take place throughout the scientific method.

Observation:
Even though recycling is available at our school, people don't seem to take advantage of it. There is a lot of paper in our classroom trash.

Hypothesis: A reasonable guess about what might happen. Best if phrased as an "If, …then" question.

Hypothesis:
If a recycling awareness program in our school improves the recycling habits of staff and students, then the amount of classroom trash will be reduced.

Experiment: **Good experiments test only one variable and have a control.**

The Independent Variable is what is being tested.

IV: The effect of encouraging students to recycle paper from classroom trash

The Dependent Variable is what is measured.

DV: We are measuring the amount of classroom trash.

The Control is how the situation would exist if nothing were done.

CV: We will create a baseline of how much classroom trash is being collected before the experiment.

Setting up your experiment

- Decide what would be a representative sample of trash from your classrooms. What time would be best to collect it? Trash is best represented just before custodians collect it. The larger your sample is, the more accurate your results are. Also consider including office trash to have a variety of school waste.
- Caution should be exercised when handling trash. Do not sort trash from bathrooms or kitchen. Be on the lookout for anything that could cause injury. If any of your trash presents a problem roll it up in a disposable tarp and discard it. Replace the disposable tarp with a new one.

- Determine how you will record the results of your sort both by weight and by volume. Have students determine the volume of a medium sized trash can. Use this container to measure your trash by volume.

Procedure: What steps will you take?

Procedure:
Explain the steps you will take.

- Collect the trash. Keep track of which classrooms were sampled and how they were combined.
- First, spread tarp on table or on the floor. Then place a disposable tarp on top of the first tarp. One student will dump the trash on to the tarp, while other students separate the sample into categories and others measure, weigh and record data. (You may have to group classroom trash together to obtain a measurable amount. For example, combine all of the 4th grade classrooms, all classrooms sampled on the second floor, etc.) If your sample is large, you may want to divide the amount between several groups of students. Students who handle trash should wear gloves and smocks.

As you sort trash the categories you will use include:

recyclable paper (depends on what is recycled in your area)
aluminum
steel
glass
food waste
plastic (usually types 1 and 2 are recyclable, maybe more in some areas)
other waste (food waste, used paper from the kitchen or bathroom, facial tissues, anything that does not fit into other categories)

- Using the scale and the measured trash can container, students weigh and measure sorted trash. Depending on the size of your sample multiple sets of scales and containers will save time. One container and scale for each group of students is ideal. Have students record the results both by weight and by volume. They may have to estimate the volume of some materials.

- Combine your group totals on a worksheet or overhead.

Discussion Questions Remember your goal for this activity. Is it to boost paper recycling or to explore recycling of other materials at your school? Tailor your discussion questions accordingly.

- What trash items did you and your classmates generate the most?
- What kinds of resources were used to make these items? (wood/trees, petroleum, metal ore etc.)
- How much of the waste is packaging?
- What are some alternatives to this kind of packaging?
- How can you reduce the amount of trash you produce each day?
- Which of the items can be Reduced? Reused? Recycled?
- How easy is it to recycle at your school? What might help? Example: placing containers in each classroom, organizing a collection, listing what can and cannot be recycled on a posted by each container.
- Who do you need to help your effort? Example: Principal, custodial staff, student council, Parent Teacher Organization.

Results: What did you find out?

Results:
What did you find out?

What is the best way to show and explain your data?

What types of charts or graphs are the most effective in communicating what you found out and what your goals are for this experiment? What math and communication skills can you incorporate?

- What percentage of your sample was the material you are targeting for recycling? Have students develop a pie chart that shows the potential improvement in your waste stream. Help students develop reasonable goals-- start small and build upon your success.

Implementing Your Independent Variable

- Organize a school wide recycling education campaign. Let students and staff know what can and can not be recycled at your school and why it is important. Set up recycling systems so it is easy for people to participate. PA announcements, posters, contests between classrooms

and recognition of efforts made, can really make a difference and help boost the rate of recycling.

- Determine when you will reassess. Allow enough time between your two assessments to work out any challenges and for people to develop better habits. Casually monitoring the trash and the recycling bins should give you an idea of how your project is going.

Reassessment

- Collect trash samples and conduct trash sort again using the same criteria as before.
- Record your results.

Conclusion: Was your hypothesis supported? Why or Why not? Why was your project important? What could you do differently?

Conclusion:

What was the answer to the original question?
Was your hypothesis supported?
What other effects have there been in your school as a result of your experiment?
What changes would you make if you were to do this project again?

Extensions

- Display your results to the school as a large mock Science Fair Project display board.
- Arrange a field trip to a landfill or material reclamation facility to see how the materials that we discard or recycle are managed.
- Have students research and interview local businesses that exhibit good recycling practices.
- Extend your recycling campaign into community families and businesses. In what ways can their recycling efforts improve?
- Did your students find other recyclables at your school that can be diverted from the trash? Have them write a letter with recommendations and send it to district officials.