Composting Is Recycling!
Three lesson from an integrated unit on composting
**Introduction:**

Composting is Recycling!

Grade: 5

Target group: urban, mainstream, integrated classroom.

Source of written material:


Video:

Plastic recycling - http://www.youtube.com/watch?v=f72L9IPXITk&feature=related (5:04 min)
Glass recycling - http://www.youtube.com/watch?v=UAnzQ1-EIs4 (3:13)
Food composting - http://www.youtube.com/watch?v=Oj6DLDlI5OA&feature=related (3:14)

Source of lessons:


Goal:

My students will know:

- The greenhouse effect is a physical phenomenon,
- How to use the scientific method to predict, justify and verify,
- What materials can be recycled and what materials can be composted,
- How to follow direction to complete an experiment,
- How to collect data and form opinions.
- How to present their opinions and findings to each other, the teacher, and the class.
Lesson 1
Lesson Plan
Unit: Composting is Recycling
Lesson 1: The Greenhouse Effect in a Jar
Grade 5 Science: 1 or 2 - 45 min. class periods
Mainstream classroom with integrated English Language Learners

**Big Ideas:**
I want my students to know excess greenhouse gasses trap heat in Earth’s atmosphere.
I want my students to know methane from landfills contribute to greenhouse gasses and global warming.
I want my students to know composting can lower levels of methane from landfills.

**The Greenhouse Effect in a Jar**

**Part 1: Introduction, Introductory Activity, Background Information**

Write “Composting is Recycling” on the board. Have this as the focus of the unit on the board throughout all the lessons of the unit.

**Vocabulary:** These words should be posted on the science word wall and referred to during the unit. The following are the most important words of this lesson: atmosphere, sun, Earth, heat, greenhouse gas, global warming, compost, food

The following are the most important words used during the experiment in this lesson: thermometer, jar, heat, increase, decrease, up, down

**Materials:**
For each student for background information:
Copy of 1A, *How the Sun’s Energy Enters the Earth’s Atmosphere*
Colored Pencils

**Introduction, Activity, and Background:**

Give each student a copy of 1A, *How the Sun’s Energy Enters the Earth’s Atmosphere*, and colored pencils.

**Make an overhead of 1A.**
Use colored Vis-à-vis pens to color, and draw attention, to the illustration, vocabulary, and concepts. Have students color the top half of their copy of #16 as the teacher explains the concepts using Think-A-Loud. The following is a script which could be used:

Teacher: (Covers top half of *How the Sun’s Energy Enters the Earth’s Atmosphere* circles the title.) How the Sun's energy enters the Earth's atmosphere. I know this is the Earth (circle the word Earth) so I'll color the land green and the ocean blue. You can
follow along and color your illustration. I know this is the sun so I'll color it yellow or orange, you do the same.

I see that short wavelength radiation, or HEAT, (circle words) comes FROM the sun TO the Earth (outline the short waves from the sun to Earth). I know Earth takes that heat and sends some back as long wavelength radiation, or HEAT (outline the waves leaving the atmosphere).

I see the boundary, or END, of Earth's atmosphere (outline the atmosphere). I also see some of the HEAT from Earth cannot escape the atmosphere and bounces back to the land. This is good, it keeps our environment at the right temperature.

Now look at the bottom half of you handout.

Can anyone tell me the missing words? (Wait for responses.)

Again, I see the Earth and her land and oceans. I see the sun and I see the short and long wavelengths of radiation or HEAT (color as you speak). But, I also see EXCESS GREENHOUSE GASSES in the atmosphere (color the band with a darker color).

What is happening? Can anyone help me?

Yes, the long wavelength radiation, HEAT, can NOT leave the atmosphere. What could that do to Earth? Yes, it can cause the temperature to go up!

This is called the greenhouse effect and it can make our planet warmer which is not good. What are some of the things that could happen if the planet gets too warm? (Make a list on the board.)

Now there are ways to stop too much heat in our atmosphere, also called global warming, and composting is one of them.

Write on the board "Composting is changing plant matter through decomposition into a soil-like material called compost. Composting keeps tons of food waste out of landfills and helps slow global warming."

Part 2: Experiment

Supplies:
Instructions for students:
   Level 5 and mainstream students - #27
   Level 4 - #28
   Level3 - #29
   Level 2 and 1 - #30
Materials for each group of students:
2 Small thermometers
2 Jars or other see-through containers
1 Clock or watch, or classroom clock
Sunlamp or access to a sunny area to perform the experiment.
1 Copy of the data sheet:
   Mainstream students, Levels 3, 4, & 5 - Lab Report organizer#32 and data organizer #34.
   Level 1 & 2 students - Lab Report organizer#33 and data organizer #35.

NOTE: Levels 1 & 2 will use #36, #37, & #38 to show their understanding of the experiment by attaching the illustrations to their lab report.

Write: Science experiment - The Greenhouse Effect In A Jar, on the board. Tell the students they will be performing an experiment showing how the greenhouse effect works. Write Scientific Method and tell the students they will be using predictions to support their findings and make justifications with their data to the class and in their lab reports.

Hold up one of the jars and explain the jar will be like the atmosphere around the Earth. The light from a window, or a lamp will be the sun.

Ask students to predict what would happen if a thermometer were placed under a jar. Ask the students to predict what would happen to a thermometer placed in an open jar. Write the prediction on the board.

Tell the students each group will report back to the whole class at the end of the experiment.

Put the students in heterogeneous groups of levels of learners, four to a group. Give each student the appropriate instructions for their level.

Provide students with materials, data forms, and leveled instructions. Allow time for the students to complete the experiment, circulating around the room for questioning and support.

When the students have recorded their data and conversed in their groups about their outcomes, invite them to give their findings to the rest of the class. Pick a few students and ask them what they learned from this experience.

Remind them that food waste in landfills can raise temperatures through the greenhouse effect just like the jar holds the heat in the covered jar.

Tell the class they will learn about composting in the next lesson.
Have the students write up their lab reports using modified graphic organizers and support materials.

**Scientific Literature in Reading Groups:**

Have students break into their leveled reading groups. Give the following readings to the mainstream and leveled readers.

*The Greenhouse Effect*
- Level 5 and mainstream students - #17
- Level 4 - #18
- Level 3 - #19
- Level 2 - #20
- Level 1 - #21

*Why is it bad for food waste to decompose in a landfill?*
- Level 5 and mainstream students - #22
- Level 4 - #23
- Level 3 - #24
- Level 2 - #25
- Level 1 - #26

Tell the students to buddy read the two articles.

After they read *Why is it bad for food waste to decompose in a landfill?* Have the students draw and illustration for the text on the bottom of the text.

Meet with Levels 2 & 1
Give them copies of modified *The Greenhouse Effect?* and *Why is it bad for food waste to decompose in a landfill?* Read the texts, discuss the illustrations, and make the connection between the greenhouse effect and the need to compost. Give the students an opportunity to draw their reaction to the readings.

Whole Group: Post the illustrations from groups on the board and ask for reactions and comments from the class.

**Assessment:** Give the students their Exit Slips, #39 for Levels 3, 4, 5, & mainstream students, and #40 for Level 1 & 2. #40 asks the students to draw, or use words, to show something they learned (!), or something they wondered, or had a question about (?).

Ask for volunteers to share what they drew or wrote on their exit slips. Collect the slips.

**Closure - Whole group:**

Clean up. Have students collect and put away supplies.

Remind the students of the focus of the unit
Revisit the goals and ask if they have been met.

Cheers all around and end of lesson.

NOTE: This lesson will form the necessary background knowledge for the students to be able to understand the importance of composting, which is the main objective of the six-week unit.

Vocabulary: Thermometer, jar, sun, radiation, Earth, atmosphere, heat, solar, greenhouse gas, global warming, data table, scientific method, increase, decrease, up, down

Overarching Goals:
I want my students to know the vocabulary of global warming and the greenhouse effect.
I want my students to know three components of the scientific method.
I want my students to know that like the heat trapped in the jar, gasses in the atmosphere trap heat in to cause the average temperature the Earth to increase.

<table>
<thead>
<tr>
<th>Content Objectives:</th>
<th>Language Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Students will form an understanding about the greenhouse effect as a physical phenomenon.</td>
<td>1a. Whole group – Students will understand the vocabulary of global warming and the greenhouse effect by completing a pictorial class activity and by completing Content Objective #2</td>
</tr>
</tbody>
</table>
| 2. Students will use the scientific method to predict, justify, and verify how temperatures will react in different environments. | 2a. Whole group – Students will predict, orally, the results of the experiment.  
2b. Small group – Students will follow written and visual directions, perform an experiment, and discuss their findings. 
2c. Small group – Students will discuss their findings in writing. 
2d. Individual – Students will reflect on the experiment in their science journals. |
## Language and Content Objectives
### Composting is Recycling
### Lesson 1: The Greenhouse Effect in a Jar

<table>
<thead>
<tr>
<th>Domain</th>
<th>Level 5 Transitional Fluency</th>
<th>Level 4 Intermediate Fluency</th>
<th>Level 3 Speech Emergent</th>
<th>Level 2 Early Production</th>
<th>Level 1 Preproduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Speaking:</strong></td>
<td>Students, in small groups, will be able to use the scientific language to express their predictions, verifications, and justifications in an extended conversation with the teacher. They will take a leading role in their assigned groups, model pronunciations, and support less fluent students with the assigned task. Students will be able to report the findings of the group to the whole class using scientific language.</td>
<td>Students, in small groups, will be able to discuss their predictions and verifications in their small group. They will be able to justify their predictions when questioned by the teacher. Students will be able to orally assist the more fluent students to present findings to the whole group.</td>
<td>Students, in small groups, will be able to identify the terms introduced to the class from realia. Students will also be able to identify the more common items used in the experiment and respond to prediction and verification questions about the experiment from the teacher.</td>
<td>Students, in small groups, will be able to describe the steps of the experiment and their predictions and results using pictures and a word bank. They will have the opportunity to demonstrate their understanding in response to questions from the teacher. If possible, the students can partner with another student who speaks their L1.</td>
<td>Students, in small groups, will be able to name the realia by using a word and phrase bank and their L1 if desired. They will describe the steps of the experiment using illustrations and a word and phrase bank when questioned by the teacher. If possible they can partner with a student who speaks their L1.</td>
</tr>
<tr>
<td><strong>Reading:</strong></td>
<td>Students will be able to read the introductory information, and follow the directions to complete the experiment.</td>
<td>Students will be able to read the introductory information and follow direction with illustrations.</td>
<td>Students will be able to highlight important vocabulary in the introductory information and order.</td>
<td>Students will be able to highlight important vocabulary in the directions and match illustrations to the experiment.</td>
<td>Students will be able to match the illustrations of the sequence of the experiment.</td>
</tr>
</tbody>
</table>
Directions:  
experiment.  
the help of illustrations to complete the experiment.  
and label illustrations while completing the experiment.  
titles of the parts of the experiment.

| Writing: Three parts of a lab report. | Students will be able to complete a lab report explaining their predictions and justifying their results, the three components of the scientific method. They will be able to identify and label a diagram. | Students will be able to write a three paragraph lab report using a graphic organize and model. They will be able to identify and label a diagram. | Students will be able to write a modified lab report using a phrase bank, sentence starters and a word bank. Students will be encouraged to write 2 or 3 sentences. They will be able to identify and label a diagram. | Students will be able to write a modified lab report using one word answers, or short phrases to questions using a word and phrase bank. They will be able to identify and label parts of the diagram. | Students will be able to write a modified lab report using one word answers in a frame naming the components of the experiment and label parts of a diagram using a word bank. |

<p>| Writing: Reflection on process in science journal. | Student will write an extended reflection in their science journal. | Students will write a paragraph reflection in their science journal. | Students will write a few sentences or phrases in their science journal using the phrase and word bank. | Students will illustrate and use phrase and word banks to write a reflection in their science journal. Students can use their L1. | Students will illustrate their reflection in their science journal and write in their L1. |</p>
<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expression</th>
<th>Word/Phrase</th>
<th>Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predict</td>
<td>Results of Greenhouse</td>
<td>I ______ the temperature will ________ when the thermometer is covered.</td>
<td>Think, believe, predict</td>
<td>Verbs</td>
</tr>
<tr>
<td></td>
<td>experiment</td>
<td></td>
<td>Increase, decrease, go up,</td>
<td>Present tense</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I _____ the temperature will ________ when the thermometer is uncovered.</td>
<td>go down</td>
<td></td>
</tr>
<tr>
<td>List</td>
<td>Steps of the Greenhouse</td>
<td>______ you cover one thermometer.</td>
<td>First, second, third, then,</td>
<td>Adverb clauses</td>
</tr>
<tr>
<td></td>
<td>experiment</td>
<td>______ you cover the other thermometer.</td>
<td>next, after, last</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>______ you check the temperature every ten minutes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verify</td>
<td>Results of Greenhouse</td>
<td>_____ was ______, the temperature of the covered thermometer _________.</td>
<td>I, we, my group</td>
<td>Pronouns, nouns</td>
</tr>
<tr>
<td></td>
<td>experiment</td>
<td>_____ was ______, the temperature of the uncovered thermometer _________.</td>
<td>Wrong, incorrect, right,</td>
<td>Verbs, past tense</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>correct</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Increased, decreased, went</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>up, went down</td>
<td></td>
</tr>
<tr>
<td>Connect</td>
<td>The reading to the experiment</td>
<td>During the day sunlight _____ the Earth.</td>
<td>Warms, heats</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------</td>
<td>----------------------------------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>During the night _____ leaves the Earth.</td>
<td>Heat, energy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The uncovered thermometer lets the heat _____</td>
<td>Leave, escape, get out</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The covered thermometer does not let the heat .</td>
<td>Leave, escape, get out</td>
<td></td>
</tr>
</tbody>
</table>
Composting is Recycling Unit for 5th grade Science
Lesson 1- The Greenhouse Effect in a Jar

Narrative

I think it is important for students to understand the stresses we are placing on our environment today. There are also things students can do to help the environment. I hope my students feel empowered in a way which will make them take a keen interest in how their actions can influence the world.

For any student it is important for vocabulary to be accessible in the classroom. I like to use a big word wall with vocabulary in many, fluid categories. For this lesson I would put the vocabulary in a science section and add simple line drawings to support the ELLS.

The modifications I made to the lesson, I feel, could be easily incorporated in my classroom. The first activity, where all the students have the same handout illustrating the greenhouse effect, is helpful to ELLs. By doing a Think-A-Loud, almost talking to oneself, but pausing and questioning the class while using the illustration to explain the concept, will help the Ells understand. Following the teacher's lead by coloring and tracing certain aspects of the illustration will lead the ELL to understand the point being presented. Filling in the blank spaces on the second half of the illustration will add familiarity to the students vocabulary.

When the class is working on the experiment in heterogeneous small groups, the ELLs have the chance to interact with their classmates while having a set of instructions which they can understand. This first experiment is simple, all the students should successfully complete it and be able to collect their data. Students working in small groups take great pleasure in helping one another. I would expect the ELLs to share their modified instructions with the mainstream students as well - I have always noticed quite a bit of give and take between English and non-English speaking students in my class. The English speakers take pride in helping the ELLs. While the students who know more English will write a lab report after finishing the experiment. The ELLs with little or no English writing skills will still be able to complete a lab report by sequencing illustrations to show how they completed the task.

The reading portion of this science lesson brought some problems to light. Science is a subject rich in vocabulary and content. I had to keep reminding myself to think of the big ideas I wanted the all the students to understand. The use of visuals lends itself well to this lesson and future lessons have a number of short videos.
Using exit slips as an informal assessment tool helps me take brief, frequent snapshots of the students' achievement. The modified exit slips let the ELLs prove that they too have made gains without the vast store of literacy skills in English. I know with the modifications I have made for this lesson, all the students will be actively engaged in their learning.
APPENDICES LESSON 1
How the sun’s energy enters the Earth’s atmosphere.

How the sun’s energy is trapped in the Earth’s atmosphere.

Excess Greenhouse Gasses
heat. This keeps the night from getting too cold. If there are few clouds, less heat is absorbed, and the night is cooler.

**The Greenhouse Effect**

Why doesn’t all of Earth’s heat just go out into space? The atmosphere keeps Earth warmer than it would otherwise be. This is called the **greenhouse effect**. Earth’s atmosphere acts somewhat like the glass in a greenhouse. In a greenhouse the glass lets sunlight in but does not let heat escape. This helps create a warm environment in which plants can flourish.

Earth’s greenhouse effect is caused by just a few gases. These greenhouse gases make up only a tiny part of the air. The main greenhouse gases are water vapor and carbon dioxide. Other gases also have less of an effect. These gases are methane, nitrous oxide, and chlorofluorocarbons (CFCs).

Human activities are putting more and more greenhouse gases into the atmosphere. Many scientists are worried that these gases may change Earth’s climate. Even a small increase in these gases adds to the greenhouse effect, making our planet warmer.

Scientists are still examining and interpreting data in order to understand the greenhouse effect better.

> How does the greenhouse effect keep Earth from losing energy?
The Greenhouse Effect

Why doesn’t all of Earth’s heat just go out into space? The atmosphere keeps Earth warmer than it would otherwise be. This is called the greenhouse effect. Earth’s atmosphere acts somewhat like the glass in a greenhouse. In a greenhouse the glass lets sunlight in but does not let heat escape. This helps create a warm environment in which plants can flourish.

Earth’s greenhouse effect is caused by just a few gases. These greenhouse gases make up only a tiny part of the air. The main greenhouse gases are water vapor and carbon dioxide. Other gases also have less of an effect. These gases are methane, nitrous oxide, and chlorofluorocarbons (CFCs).

Human activities are putting more and more greenhouse gases into the atmosphere. Many scientists are worried that these gases may change Earth’s climate. Even a small increase in these gases adds to the greenhouse effect, making our planet warmer.

Scientists are still examining and interpreting data in order to understand the greenhouse effect better.
The Greenhouse Effect

The atmosphere keeps Earth warmer than it would otherwise be. This is called the greenhouse effect. Earth's atmosphere acts somewhat like the glass in a greenhouse. In a greenhouse the glass lets sunlight in but does not let heat escape. This helps create a warm environment in which plants can flourish.

Earth's greenhouse effect is caused by just a few gases. These greenhouse gases make up only a tiny part of the air. The main greenhouse gases are water vapor and carbon dioxide. Other gases also have less of an effect. These gases are methane, nitrous oxide, and chlorofluorocarbons (CFCs).

What could happen?

Human activities are putting more and more greenhouse gases into the atmosphere. Many scientists are worried that these gases may change Earth's climate.
The atmosphere keeps heat from the sun on the Earth. Plants can grow.

Too many gases in the atmosphere can make the Earth heat up. This can be bad for the world.

The atmosphere keeps Earth warmer than it would otherwise be. This is called the greenhouse effect. Earth's atmosphere acts somewhat like the glass in a greenhouse. In a greenhouse the glass lets sunlight in but does not let heat escape. This helps create a warm environment in which plants can flourish.

Human activities are putting more and more greenhouse gases into the atmosphere. Many scientists are worried that these gases may change Earth's climate.
The Greenhouse Effect

Glass of greenhouse

Sun

Incoming solar energy

Cutting down forests

Cows

Industry

Heat

Incoming solar energy

Greenhouse gases

Vehicle exhaust

Rice paddies

atmosphere keeps air in.

The heat from the sun makes plants grow.

Too much heat is bad for the Earth.
Why is it bad for food waste to decompose in a landfill?

Rotting food in the landfill releases methane, a greenhouse gas which contributes to global warming. Methane traps 23 times as much heat in the atmosphere as the same amount of Carbon Dioxide (CO2) and the release of methane from landfills accounts for 34 percent of all methane emissions in the U.S.

Just over a quarter of the food in the U.S.—about 25.9 million tons—gets thrown away and taken to the landfill every year and the U.S. spends more than $1 billion every year just to dispose of all its food waste.

The best solution to solve this problem is for individuals and businesses to compost their food waste.

Draw an illustration for this article below.
Level 4

Why is it bad for food waste to decompose in a landfill?

Rotting food in the landfill releases methane, a greenhouse gas which contributes to global warming. Methane traps 23 times as much heat in the atmosphere as the same amount of Carbon Dioxide (CO2).

Just over a quarter of the food in the U.S.—about 25.9 million tons—gets thrown away.

The best solution is for people to compost their food waste.

Draw an illustration for this article below.
Level 3
Why is it bad for food waste to decompose in a landfill?

Food in the landfill releases methane, a greenhouse gas which contributes to global warming.

Just over a 1/4 of the food in the U.S.—about 25.9 million tons—gets thrown away.

The best solution is to compost food.

Draw an illustration about this article below.
Level 2
Why is it bad for food waste to decompose in a landfill?

Food in the landfill releases methane. Methane is a gas. Methane contributes to global warming.

People in the U.S. throw away 1/4 of their food. That is 25.9 tons each day.

The best solution is to compost food.

Compost is good for plants.
Level 1
Why is it bad for food waste to decompose in a landfill?

Methane is a gas. Methane causes global warming.

The best solution is to compost food.

Compost is good for plants.
Level 5

The Greenhouse Effect In A Jar

This simple experiment serves as an introduction to the greenhouse effect. Students can see for themselves the effects of a greenhouse, and relate this understanding to what occurs in our atmosphere.

Materials:

For every group of (about) four students:

1 Copy of the experiment per group, visual directions will be on the board or overhead.
2 Small thermometers
2 Jars or other see-through containers
1 Clock or watch, or classroom clock
1 Copy of the data sheet
Sunlamp or access to a sunny area to perform the experiment

Instructions

1) Place the two thermometers in the sunlight for a few minutes to let them get warm.

2) Record the readings of both thermometers on the data organizer.

3) Record the time next to the starting temperatures and place the jar over thermometer #1.

4) Place the thermometer in jar number #2.

5) Every minute, record the readings of both thermometers without disturbing them.

6) Write up your results on your lab report.

Explanation

The air over the thermometer not covered by the jar constantly changing, and as it gets warm it is replaced by cooler air. The warm air can rise up, like the warmed air of Earth does at night.

The air in the covered jar cannot leave the jar, like the Earth with a thick layer of greenhouse gasses. The air stays in the sunlight and gets warmer and warmer.

Sunlight passes through the atmosphere and warms the Earth's surface. The heat radiating from the surface is trapped by greenhouse gasses.
Level 4

The Greenhouse Effect In A Jar

This experiment is an introduction to the greenhouse effect. Students can see the effects of a greenhouse, and relate this to what happens in our atmosphere.

Materials:

1 Copy of the experiment
2 Small thermometers
2 Jars or other see-through containers
1 Clock or watch, or classroom clock
1 Copy of the data sheet
Sunlamp or access to a sunny area to perform the experiment

Instructions:

1) Place the two thermometers in the sunlight for a few minutes to let them get warm.

2) Record the readings of both thermometers at the top of the data organizer.

3) Record the time next to the starting temperatures and place the jar over thermometer #1.

4) Place the thermometer in jar number #2.

5) Every minute, record the readings of both thermometers without disturbing them.

6) Write up your results on your lab report.

Explanation

The air over the thermometer not covered by the jar constantly changing. The warm air can rise up, like the warmed air of Earth does at night.

The air in the covered jar cannot leave the jar, like the Earth with a thick layer of greenhouse gasses. The air stays in the sunlight and gets warmer and warmer.

Sunlight passes through the atmosphere and warms the Earth's surface. The heat from the surface is trapped by greenhouse gasses.
Level 3

The Greenhouse Effect In A Jar

This experiment shows the greenhouse effect.

Materials:

1 Copy of the experiment per group
2 Small thermometers
2 Jars or other see-through containers
1 Clock or watch, or classroom clock
1 Copy of the data sheet
Sunlamp or access to a sunny area to perform the experiment

Instructions:

1) Place the two thermometers in the sunlight for a few minutes to let them get warm.

2) Record the readings of both thermometers at the top of the columns.

3) Record the time next to the starting temperatures and place the jar over thermometer #1.

4) Place the thermometer in jar number #2.

5) Every minute, record the readings of both thermometers without disturbing them.

6) Write up your results on your lab report.

Explanation:

The air over the thermometer not covered by the jar is changing. The warm air can rise up out of the jar, like the warm air of Earth does at night.

The air in the covered jar cannot leave the jar.

Sunlight passes through the atmosphere and warms the Earth's surface. The heat from the surface is trapped by greenhouse gasses.
Levels 1 and 2

The Greenhouse Effect In A Jar

Materials:

2 thermometers
2 Jars
1 Clock
1 data sheet
Sunlamp or a sunny area.

INSTRUCTIONS:

1) Record the readings of both thermometers.

2) Record the time next to the starting temperatures and place the jar over thermometer #1.
3) Place the thermometer in jar number #2.

![Diagram of a jar with a thermometer]

<table>
<thead>
<tr>
<th>Trial</th>
<th>Covered</th>
<th>Uncovered</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>28°</td>
<td>28°</td>
</tr>
<tr>
<td>1</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>2</td>
<td>10:31</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>10:32</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4) Every minute, record the readings of both thermometers without disturbing them.

![Table of temperature readings]

5) Show your results on your lab report.

![Lab report diagram]
Lab Report Level 5, 4, and 3

NAME _______________________________ DATE _____________

LAB REPORT

Title: ____________________
Materials: 

Procedure: 

Data Table (attach data table here): 

Results (written): 

Illustrations (show something that happened):
Level 1 and 2

NAME _______________________________________               DATE _____________

LAB REPORT

Title: __________________________
<table>
<thead>
<tr>
<th>Trial and Time</th>
<th>Covered</th>
<th>Uncovered</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial and Time</td>
<td>Covered</td>
<td>Uncovered</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>---------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LEVEL 5, 4, & 3
EXIT SLIP

NAME ______________________________ DATE ___________________

CLASS ______________________________

This activity made me (circle one or more),
LEARN        THINK        FEEL        WONDER
Because:

-----------------------------
EXIT SLIP
-----------------------------

NAME ______________________________ DATE ___________________

CLASS ______________________________

This activity made me (circle one or more),
LEARN        THINK        FEEL        WONDER
Because:
Lesson 2
Lesson Plan
Unit: Composting is Recycling
Lesson 2: Introduction to Composting
Grade 5 Science: 1- 45 min. class period, 20 min. additional time for followup.
Mainstream classroom with integrated English Language Learners

NOTE: A portion of this lesson may need to be completed the next day. Students are familiar with the concepts and language of metric weight and the components of a chart.

Big Ideas:
I want my students to know that most materials can be recycled.
I want my students to know that food and yard waste can be composted.
I want my students to know that compost is the part of soil that makes plants grow.

Introduction to Composting
What Good is Trash?

This is an introductory lesson to composting designed to encourage students to rethink the way we value our trash.

Materials:
“Mystery Box” containing the following as a suggestion:
Cereal box, soda can, another metal food container, plastic food container, old piece of foil, tea bag, a cracker (in a baggie), dry leaves or grass clippings (in a baggie), ribbon or gift bow, piece of junk mail, magazine, peanut or cocoa “can” (made of foil, cardboard and plastic), plastic shopping bag, picture of a glass bottle, picture of a car, empty container of bug spray, carpet powder, plant fertilizer, or oil-based paint. There is no glass used in the introduction or experiment for safety reasons. There is a video clip of glass recycling.

Note: some items are in baggies for convenience and should not be removed from the bag.

Six cards to display on the board marked: Plastic, Metal, Paper, Household Hazardous Waste, Food and Yard Waste, and Other. #52 can be copied on an overhead for clarification.

Videos: 18:18 total time
Plastic recycling - http://www.youtube.com/watch?v=f72L9IPXITk&feature=related (5:04 min)
Glass recycling - http://www.youtube.com/watch?v=UAnzQ1-EIs4 (3:13)
Food composting - http://www.youtube.com/watch?v=Oj6DLDIi5OA&feature=related (3:14)

Five labeled containers, copy paper boxes work well, for the students to use to separate their waste for the day, lunch and snacks included.
Graphic organizers:
- Mainstream, Level 5 & 4 - #59 - 6 copies each
- Level 3 - #54 - 59
- Level 2 - #60 - 65
- Level 1 - #66 - 71

Magazines
Overhead of *Trash Can Diagram* - #74

**Introduction:**

Tell the class they will learn about what gets recycled and where it goes. Ask for clarification of the headings on the board. Show the overhead 6B for students who need visual clarification.

**Activity:**

Start taking objects out of the box and pass them around the room. Ask the students to say which heading the objects go under, record the answers.

When questioning ELLs, give them adequate time to formulate their answers and offer support before moving on.

**TURN-and-TALK:** Have students turn to their partner and see if they can name any other items which could go in the headings. Record the answers on the board.

Remind the students that plastic, metal, and paper, are collected by towns and cities in their municipal recycling programs. Household hazardous waste is collected at special locations and recycled or safely disposed of.

Show the plastic, paper, and glass recycling videos - these show how the waste is recycled.

- Plastic recycling - http://www.youtube.com/watch?v=f72L9IPXITk&feature=related (5:04 min)
- Glass recycling - http://www.youtube.com/watch?v=UAnzQi-EIs4 (3:13)

Ask for comments about the video from the students.

Put the following vocabulary words or cards on the board, these words will be added to the word wall:

- **biodegradable**
- **humus**
- **compost**
- **organic matter/material**
- **decomposition**
- **nutrients**
- **decomposers**
- **decay**
- **rot**

If something is **biodegradable** it can be **composted**, or allowed to rot or decompose and so it is recycled. **Compost** is organic material that can be used as a soil amendment, which makes soil
better for plants. **Compost** becomes **humus** that is dark brown or black and has a soil-like, earthy smell when it can no longer be broken down.

Discuss **decomposition**: **rotting**, **decaying**, breaking down of **organic material**, by insects, worms, fungi and bacteria, **decomposers**. The end product is **humus**, which is something that can no longer be broken down anymore. Then plants can take the nutrients and grow bigger and stronger.

Show the composting video:
Ask for comments about the video from the students.

If we composted all the **biodegradable** trash, about 23 - 26% could be turned into compost and humus to grow more food. (Refer to Trash Can #74 transparency: about 23 - 26%.)

Show a baggie full of food scraps and a baggie of finished compost. Allow students to smell and touch the compost. Completely composted food results in a crumbly, earthy-smelling product.

Explain that we imitate nature when we **compost**, but we speed up the process by creating the conditions needed for efficient **decomposition**.

Show the students the boxes/containers labeled food, plastic, paper, metal. List the following types of trash on the board: Plastic, paper, food wastes, metal, yard/garden wastes. Ask the students to vote on what container will weigh more at the end of the day (or the end of the next day), and predict the weight of the containers filled. Chart the predictions.

Tell the students for the next 24 hours (or the end of the day), they will not throw anything in school in the trash. They will decide which container to place their waste in. Have the students either eat in the classroom or bring their lunch waste back to the classroom.

Decide where to put all the items from the “Mystery Box” to start the process.

Break the students into groups of 3, 4, or 5. Tell them they are to fill in their graphic organizers to display in the hall showing what items go in which recycling category. They will get their ideas from the magazines which they will then recycle.

Circulate around the groups questioning the students about their understanding of recycling and composting.

After about 20 minutes have the students share their posters.

**Closure and Assessment:**
Give students their exit slips, Levels 5, 4, & 3 - #72, Levels 2 & 1 - #73. Ask students to share their exit slips. The exit slips are good informal assessments.
**Follow-up:**
At the end of the day, or the next day, weigh the boxes and record the totals. Record the percentages of each category.

**Closure:**
Ask the students how they can help recycle. Ask if there is a way to reduce the food waste in the class. Have students write something in their science journals that each of them learned about recycling and composting or how their attitude about garbage has changed. Students can share their statements or illustrations. Tell the students the next lesson will be making their own composter.
### Content and Language Objectives

**Composting is Recycling**  
**Lesson 2: Introduction to Composting**

<table>
<thead>
<tr>
<th>Content Objectives:</th>
<th>Language Objectives:</th>
</tr>
</thead>
</table>
| 1. Students will form an understanding of what materials can be recycled and what materials can be composted. | 1a. Whole Group - Students will be able to verbally sort some common recyclable items.  
1b. Small Group - Students will show understanding of directions and concepts by making a poster showing which recyclable materials go in which category.  
1c. Individual – Students will write in their journal. |
| 2. Students will determine the percentage of waste in different categories produced in a classroom in 24 hours. | 2a. Small group - Students will design a chart and present their findings to the class.  
2b. Individual – Students will write in their journal. |

<table>
<thead>
<tr>
<th>Domain Language Objective 1</th>
<th>Level 5 Transitional Fluency</th>
<th>Level 4 Intermediate Fluency</th>
<th>Level 3 Speech Emergent</th>
<th>Level 2 Early Production</th>
<th>Level 1 Preproduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaking: Sorting some common items</td>
<td>Students will be able to name many different objects to go in the categories.</td>
<td>Students will be able to name some different objects to go in the categories.</td>
<td>Students will be able to name and repeat some of the items in the categories.</td>
<td>Students will be able to repeat the names of the items in the categories.</td>
<td>Students will be able to point to some of the most common items in the categories.</td>
</tr>
<tr>
<td>Speaking: Finding information with a partner and designing a poster</td>
<td>Students will be able to communicate with their partners to design a poster, and</td>
<td>Students will be able to communicate with their partners in sentences and phrases</td>
<td>Students will be able to communicate with their partners and teacher through short</td>
<td>Students will be able to communicate with their partners by pointing and single</td>
<td>Students will be able to point to their choices when asked by their group</td>
</tr>
</tbody>
</table>
Students will be able to explain their choices to the teacher. To design a poster, and explain their choices to the teacher using sentences and phrases. Phrases, single words, and pointing and name some of their choices for their poster. Students will be able to use single words to show the teacher their choices. Members and the teacher.

**Writing: Journal entries**

<table>
<thead>
<tr>
<th>Domain Language Objective 2</th>
<th>Level 5 Transitional Fluency</th>
<th>Level 4 Intermediate Fluency</th>
<th>Level 3 Speech Emergent</th>
<th>Level 2 Early Production</th>
<th>Level 1 Preproduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing:</td>
<td>Students will be able to write a paragraph of at least three well-constructed sentences about the composting process.</td>
<td>Students will be able to write an entry about the composting process using short sentences and phrases.</td>
<td>Students will be able to write a journal entry using short phrases, single words, and illustrations about the composting process.</td>
<td>Students will be able to write a journal entry using single words and illustrations about the composting process.</td>
<td>Students will be able to draw an illustration of the composting process.</td>
</tr>
</tbody>
</table>

**Speaking:**

- **Compare data, designing and present findings to the class.**
  - Students will be able to tabulate data, decide on the design of the data presentation and present their findings clearly to the class. Students will be able to tabulate data, decide on a design and present their findings to the class with a more advanced partner. Students will be able to tabulate their data, decide on a design and explain to the teacher, in words and phrases, their findings. Students will be able to answer “yes” and “no” questions.
  - Students will be able to tabulate their data, decide on a design, and explain to the teacher, through words, gestures, and the visual cards, their findings.

**Writing:**

- **Journal entries**
  - Students will be able to write a paragraph of at least three well-constructed sentences about their findings. Students will be able to write an entry about their findings using short sentences and phrases. Students will be able to write a journal entry using short phrases, single words, and illustrations about their findings. Students will be able to write a journal entry using single words and illustrations about their findings. Students will be able to draw an illustration of their findings.
## Function Chart
### Composting is Recycling
#### Lesson 2: Introduction to Composting

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expression</th>
<th>Word/Phrase</th>
<th>Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sort</td>
<td>Items in the Mystery Box</td>
<td>I think the _<strong>a.</strong> goes in the _<strong>b.</strong> column.</td>
<td>a. Box, foil, leaves, etc. (items in the box)</td>
<td>Nouns</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b. Plastic, metal, compost, etc. (categories on board)</td>
<td>Prepositions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>c. On, under, below, in, with</td>
<td></td>
</tr>
<tr>
<td>Identify/Verify</td>
<td>Why a certain object is chosen.</td>
<td>I put the _<strong>a.</strong> in this column because it is made of _<strong>b.</strong>.</td>
<td>a. Picture the student finds in a magazine. The student may need help identifying the object</td>
<td>Nouns</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b. Plastic, metal, compost, etc. (categories on board)</td>
<td></td>
</tr>
<tr>
<td>Comparing</td>
<td>Different weights of containers.</td>
<td>This container weighs _<strong>a.</strong> than _<strong>b.</strong>.</td>
<td>a. More, less, the same</td>
<td>Determining extent or degree</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b. The others, the rest, that one.</td>
<td></td>
</tr>
</tbody>
</table>
I used a lot of visuals in this lesson to help the ELLs understand the big ideas I want to convey. Using the Mystery Box gets the students engaged in the lesson and realia is important for all students, especially ELLs. I use turn-and-talk in the beginning of the lesson for ELLs to either ask for clarification in their L1, if another student in the class speaks their L1, or to practice their L2 with a more competent speaker. The teacher can also use this short bit of time to help students who need more directed clarification. Turn-and-talk is a non-threatening activity and students of all levels generally like the chance to share with a neighbor. If you have a student with minimal or no English, they can share by pointing to items in the room. This is also a great chance of classmates to encourage the ELLs.

The video clips I chose are short, to the point and clearly show the processes of recycling. The composting video, although more wordy, is easy to understand. I turned the sound off on all the videos to see if I understood just by watching.

I want to have all the students use the containers for a whole day to see how much waste they produce. Having the ability to make a choice with each piece of paper, food, or plastic, will help the ELL students understand the concepts and vocabulary of recycling and composting. Even though the students may not be speaking, they are practicing with their new language in their minds but making associations between what they have in their hands and what is written and spoken in the class.

The graphic organizers for the activity help direct the students to the task at hand. The mainstream and Levels 4 and 5 need to fill out the heading for each category and find illustrations to fill each of the nine boxes on each sheet. The Level 3 students have the topic on their graphic organizers and should recognize the words. If they do not, there are numerous clues around the room, and they can also ask for clarification in their L1. The Level 2 students have a graphic representation for clarification, and the L1s have numerous graphic representations. Depending on the motivation and understanding you see in the ELLs in Levels 1, 2, & 3, the teacher can put a line through some of the boxes to show the students they need to find fewer items. I think this activity is designed for all students to have the same successful outcome since it is a more visual than literary activity.
Finally, this lesson gives the teacher plenty of time to interact with the ELLs and question them informally. It also gives the whole class a chance to interact with one another in their L1 and L2. This social interaction, or the chance to practice their language is integral for students learning English.
APPENDICES LESSON 2
Visuals to Accompany Mystery Box
Cut and apply to cards for display on the board.
**LEVEL 5 & 4**

(Category)______________________________________________

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

53
**LEVEL 3**

**PLASTIC**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PLASTIC

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LEVEL 2
FOOD AND YARD WASTE
HOUSEHOLD HAZARDOUS WASTE

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LEVEL 5, 4, & 3
EXIT SLIP

NAME ___________________________________ DATE ___________________

CLASS ______________________________
This activity made me (circle one or more),
LEARN THINK FEEL WONDER
Because:

---

NAME ___________________________________ DATE ___________________

CLASS ______________________________
This activity made me (circle one or more),
LEARN THINK FEEL WONDER
Because:
The Trash Can Diagram

Permission for reprinting was given by Marin County Office of Waste Management, San Rafael, California.
Lesson 3
Hope Carloni
Lesson Plan
Unit: Composting is Recycling
Lesson 3: Building a Bioreactor in a Bottle
Grade 5 Science: 1 - 45 min. class period
Mainstream classroom with integrated English Language Learners

**Big Ideas:**
I want my students to follow directions to build a scientific instrument.
I want my students to collect data over a period of time.
I want my students to understand the process of decomposition through observation.

**Note:**
This lesson can use the food waste and paper the students collected during Lesson 2. However, food and yard waste can be collected and brought to school as a homework assignment. Meat, meat products, bread and dairy products are not suitable for a bioreactor. Students have been introduced to the greenhouse effect and to the processes of recycling and composting as recycling biodegradables. This lesson will enable them to build their own bioreactors to observe and record the composting process.

**Building a Bioreactor in a Bottle**

**Materials:**
For each student
2 - 2 or 3 liter bottles
1 plastic bowl
1 plastic plate
packing tape
old stocking
scissors
marker
metric ruler
Bowl for mixing compost
Food and yard scraps for the compost.

**Additional teacher supplies:**
Box cutter or Exacto knife, candle, matches, pliers, nail to heat for vent holes

**Introduction:**
Show a finished bioreactor to the class. Explain to the students that they have learned about composting and now they will build their own composting unit and chart the decomposition process. A bioreactor is something that make a biologic event happen.

Show the PowerPoint showing step-by-step instructions on how to build a bioreactor to the class. (The PowerPoint, How to Build a Bioreactor is on the CD).
Ask students if they have any predictions as to what will happen in the bioreactor. Write down the predictions on chart paper to keep until the experiment is finished. (It will take two to three weeks for the compost to decompose, depending on the amount of heat the bioreactors are subjected to.

**Experiment:**
Give each student the instructions for the experiment:
- Mainstream and Levels 5 and 4 - #82 & 83 and data organizer #94
- Levels 3, 2, and 1 - #84 - 93 and data organizer #94.

Have the students work in groups of two or three to encourage conversation. Have the groups gather their supplies and begin the experiment.

The teacher should have a place to use the sharp knife and candle.

The teacher should circulate around the room to offer support and question the students about their progress.

When the bioreactors are done, they should be placed in a sunny window or in a location outdoors where they get direct sunlight but are readily available for data collection.

**Data Collection:**
Have the students write the first entry in their data collection tables 3C and keep the tables in their science journal.

**Assessment and Closure:**
Give students an exit slip #95 for mainstream and Levels 5, 4, and 3; #96 for Levels 2 and 1. Ask students to share their experiences and thoughts about the class.

Clean up.
## Content and Language Objectives
**Composting is Recycling**
**Lesson 3: Building a Bioreactor in a Bottle for Composting**

<table>
<thead>
<tr>
<th>Content Objectives:</th>
<th>Language Objectives:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Students will construct a bioreactor in a bottle.</td>
<td>1. Students will follow directions to construct a bioreactor in a bottle.</td>
</tr>
<tr>
<td>2. Students will form an understanding of how organic waste decomposes during the composting process to make humus.</td>
<td>2. Students will gather data to determine how organic matter changes during decomposition.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domain Language Objective</th>
<th>Level 5 Transitional Fluency</th>
<th>Level 4 Intermediate Fluency</th>
<th>Level 3 Speech Emergent</th>
<th>Level 2 Early Production</th>
<th>Level 1 Preproduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening Reading, Listening to a PowerPoint presentation and following directions.</td>
<td>Students will be able to watch a PowerPoint of the experiment and follow written directions.</td>
<td>Students will be able to watch a PowerPoint of the experiment and follow written directions.</td>
<td>Students will be able to watch a PowerPoint of the experiment and follow written directions.</td>
<td>Students will have access to a computer to review the PowerPoint.</td>
<td>Students will be able to watch a PowerPoint of the experiment and follow visual directions. Students will have access to a computer to review the PowerPoint.</td>
</tr>
<tr>
<td>Writing Compiling and graphing data</td>
<td>Students will be able to compile data, and draw and label a graph.</td>
<td>Students will be able to compile data, and draw and label a graph.</td>
<td>Students will be able to compile data with help of a graphic organizer and fill in a graph using a word bank.</td>
<td>Students will be able to compile data using a graphic organizer and fill in a graph using a word bank and visuals.</td>
<td>Students will be able to compile data using a graphic organizer and fill in a graph using a word bank, and visuals, and word starters.</td>
</tr>
</tbody>
</table>
## Function Chart

**Composting is Recycling**  
**Lesson 3: Building a Bioreactor in a Bottle for Composting**

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expression</th>
<th>Word/Phrase</th>
<th>Grammar</th>
</tr>
</thead>
</table>
| Identify | Items needed to build the bioreactor | I need a _______.  
I need a _________ and a _________ | Bottle, scissors, pen, tape, bowl - any of the items needed for the experiment | Nouns |
| Demonstrate | Steps to build a bioreactor | _____ I mark the bottle.  
_____ I cut the bottle.  
I need to _____ the food.  
I need to ____ the food and paper. | First, last, next, then  
Chop, cut, rip  
Mix, move, mix-up | Sequencing words, Verbs |
| Justify | Graph of the results of the experiment | The __a.__ went __b.__ | a. Compost, mix, food  
b. down, lower | Nouns, Adverbs |
I chose this experiment because it gives all students a real hands-on experience. There are a number of directions the students have to follow to build their reactors. I showed the class a completed reactor and made a PowerPoint to show the steps before they attempted their own reactor. I would have a computer, or two, available with the PowerPoint showing, so all students, especially the ELLs can refer to it. Having all the different visual aids in the class and readily available make the ELLs comfortable in their learning. Working in groups with other students gives them a chance for interaction and practice in their L2. Working with students who speak their L1 will give them time for clarification and practice.

All of the students will be able to use the data organizer to chart the progress of their bioreactor, and by the end of the project will have meaningful evidence of their work. This lesson gives students many opportunities to interact with their peers, to speak and questions, and to figure out a task. It gives the teacher an opportunity to question the students about their understanding and ask the ELLs to expand on their answers and practice their L2 while performing an authentic and enjoyable task.

I find the exit slips are the best way to check on knowledge during classes where there is a lot of movement and interaction. The slips can be copied and put in the students portfolios to track the progress of the student in understanding of concepts as well as development of L2. I pay particular attention to the "question" (on exit slips for Levels 1 and 2) and "wonder" (on levels 5, 4, and 3) in case the students need additional clarification and to also check for higher order thinking questions. With the higher order questions, I can direct the students to find their answers in and outside of the classroom.
APPENDICES LESSON 3
You will build a bioreactor which will turn some of the food and yard waste you have collected to make compost which will, in turn, become humus. This process of decomposition will take the nutrients out of the food and yard waste and help them return to the Earth for new plants to use and to grow.

Supplies:
- 2 - 2 or 3 liter bottles
- 1 plastic bowl
- 1 plastic plate
- packing tape
- old stocking
- scissors
- marker
- metric ruler
- Bowl for mixing compost
- Food and yard scraps for the compost. If you do not have any leaves or straw, ripped paper or cardboard works. Remember paper and cardboard used to be trees!

INSTRUCTIONS:

1. Put the two bottles next to each other. Make a mark around one ABOVE the shoulder of the bottle. Make a mark around the other BELOW the shoulder of the bottle.

2. Have your teacher start a cut on each bottle large enough to fit your scissors.

3. Cut the two bottles, recycle the smaller top and smaller bottom.
4. Now you will make a platform with the plastic bowl. Cut the bowl so it is about 3cm tall. Turn the bowl upside down and put it in the bottom of the bottle. This will let the air circulate through the compost.

5. On the plastic plate, draw the diameter of the bottle and cut it out. You may have to trim it a little to make it fit on top of the bowl. Take the disk you just cut and cut a "V" shaped notch, about 1cm deep, about ten times around the disk. It will look like a saw-blade.

The notches will help the air circulate, but not let the compost fall down and cover the holes in the bottom of the bioreactor.

6. Take everything out of the bottle and have the teacher use the heated nail to melt some holes in the bottom of the bottle for air flow.

7. Set the bottle aside and mix up your compost.

8. Cut equal amounts of compost and bulking agent (dried leaves, paper, or cardboard) into about 2cm by 2cm pieces. Mix it up in a bowl.

9. Fill the bioreactor to the top with compost. Put on the top half of the bottle and seal with the tape.

10. Cut a piece of stocking and tie it over the top of the bottle. This will keep bugs out.

11. Tape the metric ruler to the side of the bioreactor and record the height of the compost on your data sheet.

12. Record height of the compost every day. Note the changes you see in the mix in the bottle.
LEVELS 3, 2, & 1
How to Build a Bioreactor

Slide 1

Slide 2

Slide 3

Slide 4

Slide 5

Slide 6
Cut plate the diameter of the bottle

Cut plate the diameter of the bottle

Cut plate the diameter of the bottle

Cut plate the diameter of the bottle
Cut little Vs for airflow
Have the teacher help to melt holes in the bottom for air flow **below** compost level.
# All Levels
**Data Organizer for Bioreactor**

<table>
<thead>
<tr>
<th>Date</th>
<th>Height of compost measured in cm.</th>
<th>Date</th>
<th>Height of compost measured in cm.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LEVEL 5, 4, & 3
EXIT SLIP

NAME ______________________________ DATE ___________________

CLASS ______________________________
This activity made me (circle one or more),
LEARN THİNXK FEEL WONDER
Because:

---

EXIT SLIP

NAME ______________________________ DATE ___________________

CLASS ______________________________
This activity made me (circle one or more),
LEARN THINK FEEL WONDER
Because:
Checklists
<table>
<thead>
<tr>
<th>Grammar</th>
<th>Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nouns</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Sequencing words</td>
<td>3</td>
</tr>
<tr>
<td>Verbs</td>
<td>1, 2</td>
</tr>
<tr>
<td>Adverbs/adverb clauses</td>
<td>1, 3</td>
</tr>
<tr>
<td>Prepositions</td>
<td>2</td>
</tr>
<tr>
<td>Determining extent or degree</td>
<td>2</td>
</tr>
<tr>
<td>Present tense</td>
<td>1</td>
</tr>
<tr>
<td>Past tense</td>
<td>1</td>
</tr>
<tr>
<td>Pronouns</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Functions</th>
<th>Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify/Verify</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Demonstrate</td>
<td>2</td>
</tr>
<tr>
<td>Justify</td>
<td>1, 2</td>
</tr>
<tr>
<td>Sort</td>
<td>2</td>
</tr>
<tr>
<td>Compare</td>
<td>2</td>
</tr>
<tr>
<td>Predict</td>
<td>1</td>
</tr>
<tr>
<td>List</td>
<td>1</td>
</tr>
<tr>
<td>Connect</td>
<td>1</td>
</tr>
</tbody>
</table>
FLA 518: Sheltered ELL Strategies Checklist

Write the page numbers and any other identifying features to identify those parts of your lessons that employ the following strategies.

<table>
<thead>
<tr>
<th>SHELTERED STRATEGIES</th>
<th>Lesson 1</th>
<th>Lesson 2</th>
<th>Lesson 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Contextualize Lesson</td>
<td></td>
<td>3</td>
<td>42</td>
</tr>
<tr>
<td>I.A. Build and Activate Background Knowledge</td>
<td></td>
<td></td>
<td>84</td>
</tr>
<tr>
<td>I.B. Develop Vocabulary</td>
<td>3</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>I.C. Use extensive Visuals, Realia, Manipulatives, &amp; Gestures</td>
<td>42</td>
<td>43</td>
<td>77</td>
</tr>
<tr>
<td>I.D. Model (Instructions, Processes)</td>
<td>3</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>I.E. Create Opps. To Negotiate Meaning/ Check Understanding</td>
<td>43</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>II. Make Text Comprehensible</td>
<td></td>
<td>32, 35</td>
<td>85-71</td>
</tr>
<tr>
<td>II.A. Intentional Use of Graphic Organizers</td>
<td></td>
<td></td>
<td>94, 96</td>
</tr>
<tr>
<td>II.B. Modify Written Text</td>
<td>17-40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III. Make Talk Comprehensible</td>
<td></td>
<td>3</td>
<td>43</td>
</tr>
<tr>
<td>III.A. Pace Teacher’s Speech</td>
<td>75</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>III.B. Use of Listening Guides</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.C. Use of Word Walls</td>
<td>3</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>III.D. Frame Main Ideas</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.E. Check for Understanding</td>
<td>6</td>
<td>44</td>
<td>77</td>
</tr>
<tr>
<td>IV. Engage: Opportunities for Output</td>
<td></td>
<td>3</td>
<td>44</td>
</tr>
<tr>
<td>IV.A. Use Teacher Questioning and Response Strategies</td>
<td></td>
<td>44</td>
<td>77</td>
</tr>
<tr>
<td>IV.B. Practice Instructional Conversations</td>
<td>3</td>
<td>44</td>
<td>77</td>
</tr>
<tr>
<td>V. Engage at Appropriate Language Proficiency Levels</td>
<td></td>
<td>6.7</td>
<td>44</td>
</tr>
<tr>
<td>V.A. Use questions appropriate for language proficiency levels in conversations, activities, and assessments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI. Give Students Voice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI.A. Challenge students to produce extended talk</td>
<td></td>
<td>4, 6</td>
<td></td>
</tr>
<tr>
<td>VI.B. Model Language for Oral and Written Production</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI.C Use Group/Pr. Work to Elicit Student Talk; Students as Researchers</td>
<td>4, 6</td>
<td>44</td>
<td>77</td>
</tr>
</tbody>
</table>
On the Cover:
The Siberian, or Amur, tiger lives primarily in the forests of eastern Russia. Some are also found in China and northern North Korea. Only about 400 of these beautiful animals still exist in the wild. About 500 captive Siberian tigers are in wildlife conservation programs. The survival of Siberian tigers in the wild depends on preserving their habitat and protecting them from poachers.