Lesson Plan for Middle School Students
COMMUNITY CLASSROOM is an innovative education resource providing short documentary film content and accompanying curricular materials, lesson plans and homework assignments, to high school and community college instructors and youth-serving community-based organizations. Film modules are drawn from documentaries scheduled for broadcast on the Emmy Award-winning PBS series Independent Lens. Content is grouped into subject specific segments that correspond to lesson plans and educational activities. All COMMUNITY CLASSROOM materials are designed with key education standards in mind, and available, along with the film modules, free of charge on a DVD and online.

COMMUNITY CLASSROOM is a product of the Independent Television Service, with support from the Corporation for Public Broadcasting, and with guidance from the American Association of Community Colleges, KQED Education Network, National Association for Media Literacy Education, National Council for the Social Studies, National State Teachers of the Year, and PBS Teachers.

Community Classroom
Independent Television Service (ITVS)
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Lesson Plan for Middle School Students

Objectives:

• Students will watch the film, *Garbage Dreams* and understand basic facts about the benefits of recycling.
• Student will play the *Garbage Dreams* Game and understand that different types of materials are worth different values.
• Students will engage in recycling activities to find out about waste management and recycling in their own communities.

Subject Areas:
Social Studies, Language Arts, Cultural Studies, Economics, Mathematics, Science

Materials:

• DVD of the movie *Garbage Dreams*, or the six-minute preview found at the PBS companion website (http://www.pbs.org/independentlens/garbage-dreams/classroom.html)
• Interactive game – the *Garbage Dreams* Game
• Paper and markers
• Garbage
• A map or globe

Time:
Two class periods (or more if students engage in extension activities).

Learning Style:
Individual and small group instruction

Grades:
Middle school; grades 5-8
Procedures – Viewing the Film or Trailer:

1. Students will view the DVD, Garbage Dreams, or the six-minute preview. Before viewing, build background by asking students to think about garbage and recycling in their own communities. Use the map or globe to show students where the Zaballeen community lives and where the action in the movie takes place. Ask them to list what they think they know about garbage and what they want to learn about recycling from watching the film. List their ideas on the board. You can hand out Worksheet #1 KWL Chart if you desire, and students can fill out the KWL chart as they watch the film.

2. The movie runs for just under one hour. You can watch the film in two class periods if desired. As you watch the film, you can stop and start to point out facts or answer student questions. Alternatively, you can watch the six-minute preview.

3. After the film, discuss the Zaballeen community with your students. What did they learn about this community? What do they think about the way these people make their living? Do your students think this is a hard or easy life style? How are the Zaballeen teens the same as or different than they are?

4. Remind them that the Zaballeen people recycle 80 percent of all the garbage they collect. Many U.S. cities, with recycling programs in place, recycle only about 30 percent of what they collect. Ask them why they think the Zaballeen are so good at recycling. Ask students to explain what recycling is. Why do they think the materials have to be divided into different types?

Discuss with the students their own recycling practices. Have them list the major benefits of recycling and some of the challenges, and record their ideas on a sheet of paper. Allow them to share their ideas and list some on the board to discuss. Collect their work and use this for assessment purposes.

Procedures – Playing the Game:

1. Model the game for your students to explain game rules. You can hand out Worksheet #3 Game Rules before the game begins.

The entire game runs for 8 rounds (representing 8 months), and each round takes approximately 3 minutes, for a total game play experience of under 30 minutes. Students can play the game as individuals, or in pairs or even groups of three. You may wish to divide them into small groups in order to cycle more students through game play and also to encourage strategy discussion. The game can also be played in a computer lab setting.
2. Introduce the goal of the game. The stated goal is to try to recycle as high a percentage of the garbage as you can in 8 rounds. Special bonus points are awarded if the player reaches an 80 percent recycling rate. This represents the efficiency of the Zaballeen people who are much more efficient than other recycling communities or waste management companies, who have, at best, a rate of about 20-30 percent efficiency in recycling. Ask students the following:

- Why is being good at recycling beneficial?
- Why do they think recycling is good for the environment?
- Why is it good for a community economically?
- What happens to the garbage that is not recycled?

3. Model different strategies for game play. Students can use their money in different ways. They can invest in more expensive recycling factories so that they can recycle more valuable materials (the factories are represented by the bins that recycle the different types of garbage). Or they can invest in expansion strategies, like trucks and workers. They can also invest in Awareness Campaigns, which refers to going out into the community and teaching people ways that they can change their own habits to improve recycling efficiency.

Ask students why they might want to invest in one type of recycling factory or strategy over another. Why do they think the different materials are worth different amounts? How does investing in workers improve the game play? How does investing in Awareness Campaigns improve the game play? What if they tried to achieve a different goal – such as maximizing their cash on hand? How would that change their game play? Ask them to think about their gaming strategies as they play the game.

4. After students play the game, ask them to reflect on game play with the following questions:

- What were the different types of garbage that could be recycled?
- Why do they think the materials were worth different amounts of money?
- What strategies did students employ? How did those strategies affect their game play?
- Did any students expand into a new neighborhood? How did that affect the game?
- Ask students to compare the game to real life. What are some things about the game that reflect real life?

Assessment:

Students demonstrate successful completion of the lesson by playing the game and demonstrating, during class discussion, an understanding of the different materials that can be recycled and of some of the benefits of recycling. If you have chosen to hand out Worksheet #1: KWL Chart, use the completed chart for assessing students’ understanding of the content.

Photo Credit: Christine (11 years old)
Extension Activities:

Science:

- Ask students to research the recycling facilities in their communities.
  
  - What items can and cannot be recycled?
  - What items cost more to recycle than to throw away?
  - What community recycling programs are already in place? Does the community participate in these programs?

They may wish to interview key local lawmakers or managers of recycling facilities to learn more. Ask students to write a one- to two-page research paper describing the recycling practices in their communities. Or invite them to create a Public Service Announcement (PSA), telling the community about best practices for recycling in their communities.

- Research papermaking and set up a papermaking activity for students to help them discover, hands-on, what paper recycling is like. Papermaking requires only a few, easily available materials and can be done in one class period. The Additional Resources section of this guide provides sites for finding out more about this activity.

Math:

- Present the idea of over-packaging to students, with the idea that there would be less garbage to recycle or “throw away” if items had less packaging. Ask students to bring in two packaged items from home. Have students compare the size and weight of the packaging compared to the contents of the package. They can use a scale to compare the gross weight of the package (the package plus the contents) to the weight of the contents themselves. Or they may be able to find information about weight right on the package. They can also compare the differences in packaging and contents sizes, by measuring each one with a ruler. Or they may make the comparison by eye.

What is the ratio of the package with the contents, and just the contents, without packaging? How much packaging is too much packaging? Ask students to create a graph where they compare the size ratios by weight, or area, or length. They can also paste onto poster board, the actual packages, accompanied by the graph. Use the graph to help others understand the problems with over-packaging.

Photo Credit: Dimiana (11 years old)
Language Arts:

• Ask students to use cameras to tell a story about their community by taking pictures of their neighborhood. Ask them to post the pictures on poster board or to upload them onto online presentation software. Guided by the photographs, students can tell the story of the community including the history, the number of people living there, and the major points of interest. Is there a certain kind of work that many people in the community engage in, like the Zaballeen? Ask them to describe what makes their community special — how is it different than other places?

Social Studies:

• Have students research more about the Zaballeen people. Ask them to use pictures from the film (which can be downloaded at http://www.pbs.org/independentlens/garbage-dreams/classroom.html) or facts from the Garbage Dreams film to support their work. Ask them to put together a presentation describing the Zaballeen people.

• Ask students to choose a community of people living anywhere in the world. Research how they live, where they work, and how their community is set up. Remind them to talk about the foods they eat, how they spend their days, and how they are alike or different from students living in the United States.

• Have students use different types of maps to find out more about the Zaballeen. Can they find Egypt on a map? Can they find Cairo? Can they find the neighborhood where the Zaballeen live? (It’s called Mokattam and is in the district of Manshiet Nasser.) Ask students to research the area and report about the land where the Zaballeen live. How large an area is it? There are about 60,000 Zaballeen — how crowded do they think the neighborhood might be? How close is it to Cairo? How do they think the Zaballeen go back and forth to Cairo each day? What are some factors about the climate that might affect the way the Zaballeen live?

• Students can interview someone from any other culture than their own. Tell them to think about questions to ask that will give them a real picture of the similarities and differences in the cultures.
**Worksheet #1 KWL Chart**

**Lesson One: Viewing the Film**

**KWL Chart**

<table>
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<th>What We <strong>Want To Know</strong></th>
<th>What We <strong>Learned</strong></th>
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What are three things about the **Zaballeen** people that are similar to your community, your neighbors, or your friends?

____________________________________________________________________________________________
____________________________________________________________________________________________
____________________________________________________________________________________________

What are three things about the **Zaballeen** that are different from you and your community?

__________________________________________________________________________________________
__________________________________________________________________________________________
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Worksheet #2 Game Rules

Lesson Two: Playing the Game

Game Rules

1. Click on RECYCLE to start the game.

2. You will start the game with one hungry goat and a paper recycling factory; these give you the ability to recycle only clean paper and organic (food waste) materials. Click and drag those materials out of the pile of garbage and onto the matching recycling factories. Each time you use a particular recycling factory (or the goat), it will take a few seconds for it to process and be ready for the next item.

You may need to move an object out of the way to get your item out. Throw out materials that can’t be recycled into the garbage can (Landfill). If you clear the pile before time runs out, you will get a small time bonus.

3. As the game begins, you will be given seed money to start your recycling business. You can choose to Upgrade or Expand using the money you have on hand, or you can just begin to play the game. It is, however, highly recommended that you start by spending your seed money.

At the end of each turn, you will again be able to spend money improving your recycling capabilities. The more you recycle, the more you money you’ll earn, and the more you’ll be able to spend.

In Upgrade, you can invest in new factories (bins) to recycle new materials (tin, glass, plastic, and aluminum), or you can improve an existing factory by making it more efficient (an improvement will reduce processing time or allow you to recycle new types of materials).

You can also invest in Workers (which increase the time on the clock during the Recycle phase); Education (which increases the amount of time that Workers add to the clock); or Awareness Campaigns (which teach citizens ways that they can help to improve the overall recycling rate)

In Expand, you can buy trucks that let you collect garbage from more neighborhoods. To Expand, first buy a truck and then choose a new neighborhood. This will increase the amount of garbage you collect, which increases the size of your garbage pile during the Recycle phase. The more neighborhoods you collect from, they higher your City-Wide recycling rate can grow by the end of the game.

Remember, if you find yourself running out of time during Recycle, it might be time to invest in Workers!
4. Each investment and expansion comes with a maintenance fee (the Upkeep cost) that must be paid each turn. If you invest in too much too soon, you may not be able to recycle enough to cover your costs and you’ll lose the game.

5. Early in the game, sending garbage to the Landfill is free. Later in the game, you will start to be charged for garbage that goes to the Landfill. Any item of garbage you put in the Landfill yourself will cost a $1 Disposal Fee. Any items that are left unsorted when you run out of time (including recyclables) will be automatically sent to the Landfill for you… and will cost a $2 Hauling fee.

6. Continue to click “Recycle” and go through the turns (months) until you have reached the end of the game. At that point, you will see your overall City-Wide recycling percentage and be given a total score that ranks how well you have played. This score is mostly based on your City-Wide recycling, but also accounts for your monthly income and cash on hand.

Once you get your score, you may then post it on the Leaderboards to compete with other students or friends.
Worksheet #3

Lesson Two: Playing the Game

Game Playing Strategies

As you play the Garbage Dreams Game, think about the different strategies you can use to win the game. What kinds of game playing techniques can you employ to be a more efficient recycler? Each game area below has two hints or game play ideas. Which one do you think is better? Try each one as you play the game. Use these ideas to create your own strategies and add them to this sheet.

Game Area: Getting Started

• Invest in community outreach; you will get much more recyclable paper, and the cost is low. You can also afford more goats (the organics upgrade), so that you can clear out organic material efficiently.
• Invest your starting money into plastics recycling, so that you quickly get a higher value recyclable to earn more money (and so you won’t have to throw plastic in the garbage).

Game Area: Sorting

• Pre-sort garbage when possible. For example, if your paper recycling is busy, you can place the next paper right above it, so that it’s easy to drop it in later.
• Focus on the most valuable waste. It is better to find all the aluminum than it is to spend time feeding the goat.

Game Area: Expansion

• If you’re a fast sorter, better technologies make more sense than more workers. If you’re slow with the mouse, then workers are the best way to get more time.
• When you buy a truck, study the neighborhoods and add the richest ones first. They’re more likely to have the most valuable waste. Caution: Richer neighborhoods also have a higher upkeep cost, so make sure you have the ability to recycle many different materials.

Add your own hint in the space below.

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Worksheet #4 Garbage Graph

Lesson Three: We Recycle!

Garbage Graph

Your collection area ______________________________________________

About how much does your bag weigh? __________

Use the chart below to graph the garbage you collected. Fill the column with color up to the number of items you collected, to make a bar graph.

<table>
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<th>Organic (Food)</th>
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List some of the individual types of garbage that you found in your Collection Area in the space below.

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__________________________________________________________________________________________________
Worksheet #5 Garbage Math

Lesson Three: We Recycle!

Garbage Math

What is the community you will be analyzing? Write it here. ____________________

How many people are in that community? Write it here. ____________________

Assume that each person in your community produces 5 pounds of garbage per day.

Multiply the number of people in your community with the amount of garbage they produce each day.

____________ (number of people) X 5 = ______ pounds of garbage each day

Multiply that number with 30 to get the pounds of garbage produced in one month.

_______ pounds x 30 days = ___________ pounds

Now divide the number of pounds by 2,000 to find out how many tons are produced.

______ pounds / 2,000 = ______tons of garbage per month

It costs the city, on average, 40 dollars per ton to “throw away” their garbage. How much does the city spend throwing away the garbage from your community?

______ tons of garbage per month X $40 per ton = _$_________. THIS IS THE COST OF HANDLING THE COMMUNITY'S GARBAGE, WITHOUT RECYCLING.

Now divide the number of tons of garbage per month by 50% (or in half) to find out how much of the garbage could be recycled.

______ tons of garbage / 50% = ______ tons of garbage to be recycled.

Take the number of garbage that could be recycled and multiply it by $10 to find out how much money the city would make by recycling half its garbage each month.

______ tons of garbage / 50% = _____ tons x $10 per ton = _$____________ per month.

Take the number the city would have to pay for their garbage without recycling and divide it in half. That is what they would pay for their garbage if they did recycle.

_______ dollars per month for garbage disposal / 50%.

Now subtract the money that the city will earn by recycling from the amount the city will have to pay to get rid of its garbage. This is total cost of garbage disposal to the city, if the city recycles. Compare this number to the original cost of garbage disposal. Is recycling cost effective to a community?
Additional Resources

Use these links to reviewed websites to learn more about the Zaballeen people, the Garbage Dreams film, the science of waste management, and recycling. You will also find sites with additional lesson plans on recycling and on learning about other cultures.

About the Film

The official Garbage Dreams website
http://www.garbagedreams.com
The Independent Lens/PBS companion site
http://www.pbs.org/independentlens/garbage-dreams.html
This Discussion Guide for the film (PDF):

Additional Lesson Plans

Scholastic Teachers: Lesson plan activity on papermaking
http://www2.scholastic.com/browse/lessonplan.jsp?id=1329

The National Health Museum: Access Excellence: Waste Management: Activities for reusing and recycling garbage

The Educator’s Reference Desk: Pollution and Recycling
http://www.eduref.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Health/Environmental_Health/ENH0002.html

Pennsylvania Department of Environmental Protection
Eight quality lesson plans on recycling, packaging and waste
http://www.dep.state.pa.us/dep/deputate/ened/Rec_lessons/contents.htm

Recycling

Environmental Protection Agency (EPA): Recycling Games & Activities
http://www.epa.gov/recyclecity/activity.htm#Information

University of Oregon: The Recycling Process After Collection
http://www.uoregon.edu/~recycle/after_collection.html
Offers clear details on garbage processing techniques.
Environmental Issues

No-Burn.org: The Global Alliance for Incinerator Alternatives
http://www.no-burn.org
Provides facts and calls-to-action in opposition to incineration as a waste management strategy.

UNESCO: Teaching and Learning for a Sustainable Future
http://www.unesco.org/education/tlsf/

Vermont Education for Sustainability
http://www.vtefs.org/index.html
Provides information about sustainability curricula and other resources.

Green Learning
http://www.greenlearning.ca/
Comprehensive Canadian site includes a variety of downloadable curricula on sustainability.

The Zaballeen

Coptic Cairo
http://www.coptic-cairo.com
Provides a background on Coptic Christian culture.

The Zaballeen Recycling School Fan Page on Facebook
http://www.facebook.com/group.php?v=wall&ref=search&gid=121855759600

Independent Lens Garbage Dreams Discussion Guide
http://www.pbs.org/independentlens/garbage-dreams/getinvolved.html
GUIDE CREDITS

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About ITVS:
The Independent Television Service (ITVS) funds and presents award-winning documentaries and dramas on public television, innovative new media projects on the Web and the Emmy Award-winning weekly series Independent Lens on Tuesday nights at 10 PM on PBS. ITVS is a miracle of public policy created by media activists, citizens and politicians seeking to foster plurality and diversity in public television. ITVS was established by a historic mandate of Congress to champion independently produced programs that take creative risks, spark public dialogue and serve underserved audiences. Since its inception in 1991, ITVS programs have revitalized the relationship between the public and public television, bringing TV audiences face-to-face with the lives and concerns of their fellow Americans. More information about ITVS can be obtained by visiting itvs.org. ITVS is funded by the Corporation for Public Broadcasting, a private corporation funded by the American people.

About Independent Lens:
Independent Lens is an Emmy® Award-winning weekly series airing Tuesday nights at 10 PM on PBS. Hosted this season by Maggie Gyllenhaal, the acclaimed anthology series features documentaries and a limited number of fiction films united by the creative freedom, artistic achievement and unflinching visions of their independent producers. Independent Lens features unforgettable stories about a unique individual, community or moment in history. Presented by ITVS, the series is supported by interactive companion websites, and national publicity and community engagement campaigns. Further information about the series is available at pbs.org/independentlens. Independent Lens is jointly curated by ITVS and PBS, and is funded by the Corporation for Public Broadcasting (CPB), a private corporation funded by the American people, with additional funding provided by PBS and the National Endowment for the Arts. The series producer is Lois Vossen.

About PBS:
PBS is a media enterprise that serves 354 public noncommercial television stations and reaches almost 90 million people each week through on-air and online content. Bringing diverse viewpoints to television and the Internet, PBS provides high-quality documentary and dramatic entertainment, and consistently dominates the most prestigious award competitions. PBS is a leading provider of educational materials for K-12 teachers, and offers a broad array of other educational services. PBS’ premier kids’ TV programming and Web site, PBS KIDS Online (pbskids.org), continue to be parents’ and teachers’ most trusted learning environments for children. More information about PBS is available at pbs.org, one of the leading dot-org Web sites on the Internet.