

Homemade Toys

Engineering Design Brief

Adapted from Children's Engineering Educators, LLC



K. Moses
The “E” in STEM
Fall 2012

Why Homemade Toys?

Rationale:

Since my fourth graders have had little to no experience with using the engineering design process, I wanted to give them an opportunity to participate in an introductory problem-based activity that they would have the necessary background knowledge to complete.

After all, what kid doesn't like toys?

The Problem

Every day people throw away items that can easily be reused. If the items that were commonly thrown away were used for a different purpose, there would be less waste. Less waste improves both the environment and our communities.

We must find a way that we can reduce waste by reusing the trashed items.

- How can we help? Children all over the world have some things in common. They all need food, shelter, and clothing. And they all play.

Your Engineering Task

Use the engineering design process to design and build a homemade toy that at least two children from anywhere in the world can play with together. You must use as many found materials as possible. No store bought toys will be accepted. All creations must be original.

Criteria

The toy you design should:

- be a toy that children around the world would like to play with.
- be designed for at least 2 children to be able to play with together.
- be constructed of mostly found materials.
- be safe to play with.
- be easy to carry.

Materials-What Can You Use?

Materials Provided By Ms. Moses:

- straws
- craft sticks
- pipe cleaners
- thread
- glue
- tape
- string
- paper clips

Items You May Bring From Home:

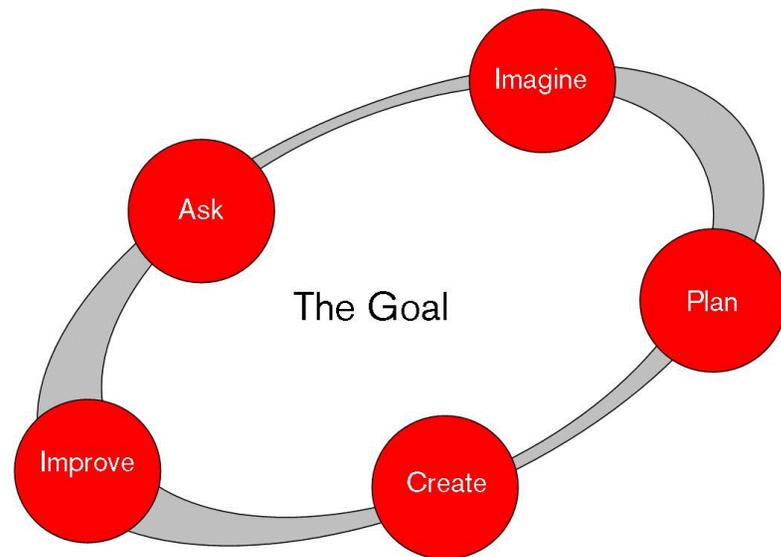
Clean, reusable materials including:

- empty food boxes
- cardboard
- paper tubes (paper towel, toilet paper, etc)
- egg cartons
- milk cartons
- drink bottles
- fabric scraps
- yarn
- string
- buttons
- ribbon
- washers
- wire
- rubber bands

Elementary Engineers In Action

First, we discussed the engineering design process.

Then, we set expectations for what each step in the process required.



Elementary Engineers In Action

The students then chose partners and got to work.

They completed this engineering task using a modified engineering notebook called a guided portfolio. The following slides show the students in action as well as their prototypes.

Guided Portfolios

The modified version of the engineering notebook

What is the Problem?

Guided Portfolio

Homemade Toys
Reuse & Recycle

Group Members: Jada Dezani

1. What is the problem?
State the problem in your own words.

I believe the problem is that we need to make homemade toys
out of recycled things.



Guided Portfolio

Homemade Toys
Reuse & Recycle

Group Members: Eun Alessandra
Jamaya Santiago

1. What is the problem?
State the problem in your own words.

People are not recycling so we use recycled
things to make toys to recycle.



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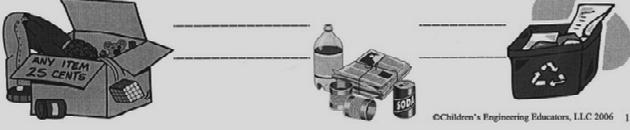
Guided Portfolio

Homemade Toys
Reuse & Recycle

Group Members: Marilyn Mixel
Dariana Mae

1. What is the problem?
State the problem in your own words.

The problem is that there is too much waste
in the world so people need toys that can
be made from recycled items.



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As you can see,
students had different
thoughts about what
the problem was.



Brainstorming



Guided Portfolio The Maze won

2. Brainstorm solutions.
Sketch or describe some possible solutions.

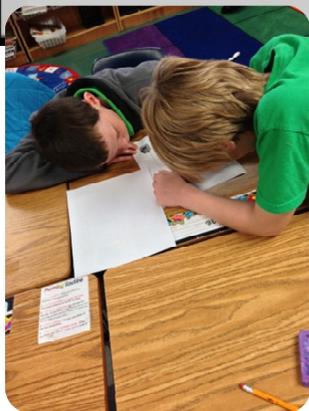
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Guided Portfolio

2. Brainstorm solutions.
Sketch or describe some possible solutions.

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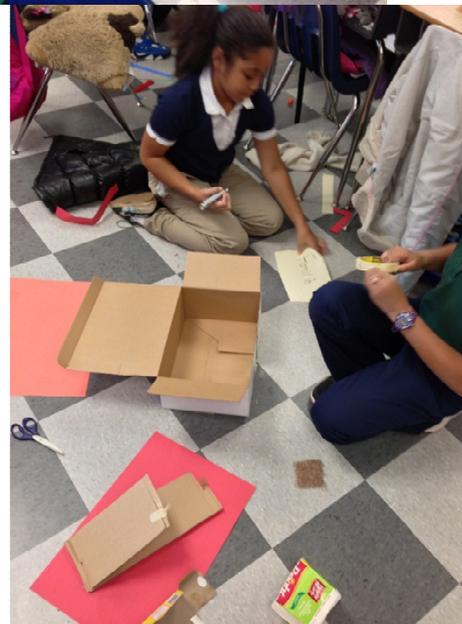
Guided Portfolio

2. Brainstorm solutions.
Sketch or describe some possible solutions.

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Students worked in teams to brainstorm solutions to the problem, then they came up with designs for their toys.

Build



Test & Evaluate



Students went to other classes and tested their designs to see if their games were enjoyable. Modifications were made based on the data they received.

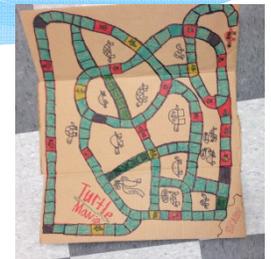
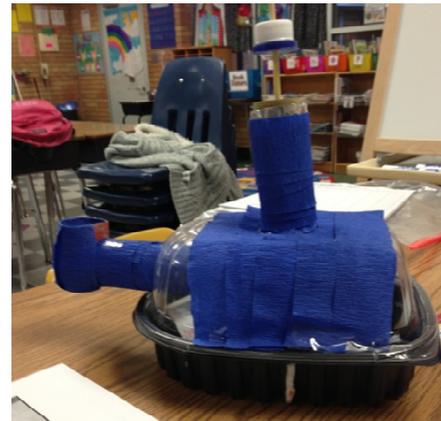
Redesign

Several students were able to improve their original designs. Afterwards, they wrote about their experience including what improvements they made after testing their toys/games.

Before



After



This group's first game was made of tagboard. They improved their game board by using cardboard which is more durable.

The students in this team added a propane tank to their house.

Sharing the Solution

Because each team is in a different stage of the process, not all of them have finished improving/redesigning their prototypes. One group was confident that their toy was complete. Their description is below.

Guided Portfolio

3. Create the solution you think is best.

4. Test your solution.

Is your toy made of mostly found, recycled, or reused stuff? YES NO

Is your toy safe to play with? YES NO

Can 2 to 4 children play with it together? YES NO

Is it easy to carry? YES NO

Would Children all over the world like to play with it? YES NO

5. Evaluate your solution.

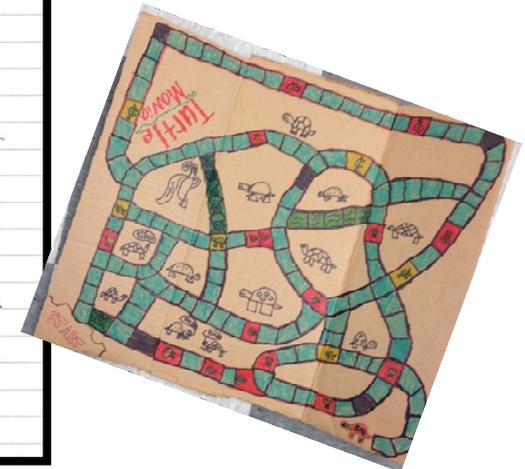
Was it the best solution? Would one of your other ideas have been better? Why or why not?
No, because we did a survey and more people voted for our last idea.

What would you have done differently? Can you add to it to make it better? What would you add to it?
We would change the material of the board and the pieces even the spinner and the instructions. So that it will not get messed up or destroyed.



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We made a board game called Turtle mania. Our toy is for boys and girls around the world. 6 people can play with this game at a time so that it is fair. We faced making our spinner, our board, and our game pieces for turtle mania. We could have made the board with a stronger material, better and stronger game pieces and a stronger spinner. So that the game will not fall apart. Turtle mania is a good game for children all over the world because it is fun and entertaining for kids it is also very safe for kids to play with. It is challenging and made to test your skill but fun. It is also a game of challenge and skill. So that's why our game is a good game for kids all over the world.



Concluding Thoughts

All of the groups have completed prototypes and are in the process of testing and redesigning their toys. Due to time constraints, and the fact that I have a class full of perfectionists, the remaining groups will be finished by the end of the week.

The final step of the process is for the students to complete a written summary of their experience while completing this task. Each summary must answer the following questions:

- * What kind of toy did you make?
- * Is your toy for boys, girls, or both?
- * How many people can play with your toy at a time?
- * What challenges did you face while creating our toy?
- * What could you have done differently?
- * Why is your toy a good toy for children around the world to play with?