Simple Machines Needed To Clean Up Lead Paint

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Grades: 4-6
Time: 3 days - 45 minute sessions

Outcome Statement:

In this lesson the students will create an imaginary machine that could be used to clean up lead or toxins from the environment. The student will be introduced to the seven simple machines: wheel and axle, screw, pulley, wedge, inclined plane, lever, and gear. This lesson is important at this age level because it increases creativity and knowledge about the design process and the impact of design in the 21st century.

The students will also learn that their art and the art of other artists can make the world a better and cleaner place.

Objectives:

The Learner Will:

- Create an imaginary drawing of a "lead clean up machine" that incorporates at least three simple machines.
- Students will complete the "Fundred Dollar" template to contribute to Mel Chin's Operation PayDirt.
- Learn the importance of taking care of the earth and the responsibility we have of considering what we put in the ground thus cultivating the concept of interdependence.
- Learn how they and other artists raise awareness and incite change by creating artwork involving environmental issues and at the same time, giving students hope and the knowledge to know that they can make a difference.
- Apply the design process.
- Understand the danger of lead and how it can get into our homes and soil.

Visual Art Standards:

ART.VA.III.4.2 Recognize that artwork may serve functional purposes, be purely decorative, or serve multiple purposes.
ART.VA.III.4.5 Analyze how art can be a reflection of society and a response to real world experiences.
ART.VA.IV.4.3 Evaluate the interrelationship between design, trends, events, and the economics of a culture.
ART.VA.V.4.1 Analyze various uses of art globally, in media, business, technology, and industry.

Integrated Standards:

Elementary Science: Motion of Objects (PMO) IV.3

4. Identify and use simple machines and describe how they change effort.
Key concepts: Inclined planes, levers, pulleys, wedges, wheel and axle; force, distance.
5. Manipulate simple mechanical devices and explain how their parts work together.
Key concepts: Names and uses for parts of machines, such as levers, wheel and axles, pulleys, inclined planes, gears, screws, wedges.
6. 6. Demonstrate ways to conserve natural resources and reduce pollution through reduction, reuse, and recycling of manufactured materials.
Key concepts: Materials that can be recycled—paper, metal, glass, plastic. Conservation and anti-pollution activities—reduce, reuse, and recycle

Universal Design for Learning:

Multiple Intelligences:

Interpersonal – Students will be divided into small groups to brainstorm and walk through the design process

Visual & Kinesthetic: Students will be given visual or actual examples on their tables of the 7 simple machines

Naturalist – Discussion and reflection on the theme of protecting the environment

Existential: The opportunity to help make a political/social statement through Operation PayDirt

Musical: Machine Sounds playing while students enter the room and during work time

Mind Styles:

Abstract Random: Students will enter the room with the teacher "sweeping or mopping" the floor with a broom or mop while machine sounds are playing, or teacher could be using a simple machine

Concrete Sequential: Diagrams throughout the room that identify the 7 different simple machines

Anticipatory Set:

Students will enter the classroom with the sounds of machines working (see resources). The teacher will be using a broom pretending to sweep or mop the floor. Listed on the board are the seven examples of simple machines. The teacher will ask the students what simple machine is a broom or mop an example of. A simple broom or mop is an example of a lever.

Material & Supplies:

-Pencils
-Colored Pencils or Markers
-Fundred Dollar template

-Broom
-Visual Examples of the 7 simple machines around the room

Resources:
https://www.youtube.com/watch?v=HEsH1iA20GM - Great Bill Nye Simple machine video
https://www.youtube.com/watch?v=iJO6EUaDfJ4 - Song and Video on simple machines
https://www.youtube.com/watch?v=l1Fhs8pXGxM - Simple machine song
https://www.youtube.com/watch?v=7ODXREubFxs - High quality, 1 hour long recording of machines working
http://vimeo.com/43795366 Operation PayDirt Informational Video

Concepts and Vocabulary:

Environment – Relating to the natural world and the impact of human activity on its condition

7 Simple Machines – Wheel and axle, screw, pulley, wedge, inclined plane, lever, and gear

Pollution - Unhealthy things (lead paint) that can get into our ground, water and air

Lead – A heavy toxic metallic element that was used in paint and banned in 1978

Lead Poisoning – When lead gets in the body and interferes with body processes. Lead is toxic to many organs and tissues including the heart, bones, kidneys and brain.

Collective Voice – A group of people working on the same goal

Social or Political Art- Artwork created to increase awareness on an issue in our society that needs to be changed

What are some of the steps of the design process? Understanding the problem, brainstorming ideas, experimenting with rough sketches, evaluating and a final presentation

Day One Procedures:

Machine sounds are playing as the students enter the room (see resources). Greet students at the door while pretending to sweep or mop the floor. Ask the students which simple machine that they would consider a broom to be (the list of the seven will be written on the board). The lesson continues with a viewing of the Bill Nye simple machine video - https://www.youtube.com/watch?v=HEsH1iA20GM. The lesson will expand with the discussion of lead paint and the Mel Chin Operation PayDirt project. A short video from Operation Paydirt can be shown - http://www.fundred.org/experience/ Show the short video, http://vimeo.com/43795366 . Discuss the ways that we can keep ourselves safe from lead paint in our homes and in our environment. Begin a

brainstorming discussion. What if they could invent a machine that would clean up lead paint? Discuss what type of machines could be produced to help in the clean up process. Students are asked to be designers and participate in the design process, which include the following steps: understanding the problem, brainstorming ideas, experimenting with rough sketches, evaluating and a final presentation. Students are divided into small groups and asked to consider the seven simple machines and determine which of these machines could be used in an invention for cleaning up lead in our ground. After a brainstorming session the students will be asked to begin creating three to five thumbnail sketches of a "lead clean up machine". Their sketches should include five or more simple machines.

After the students complete their thumbnail sketches they will get back into their small groups and discuss which of their designs are the most interesting, which designs are the most creative and which of their designs would be the most effective. Remind the students of the importance of brainstorming and looking for possibilities of why a machine could work before they find reasons why it couldn't work. The students are asked to go back to their worktables and begin drawing their "Lead Clean Up Machine" on their Fundred Dollar Bill.

Day Two Procedures:

Students will review week one discussing more detail about the dangers of lead paint and what we can each do to keep ourselves safe. There will also be a discussion on the power of art in changing the world. Review Operation PayDirt and Mel Chin. Show the short Mel Chin video
http://www.cnn.com/2009/TECH/04/20/gsif.fundred.dollar.bills/#cnnSTCVideo .
Review the process of using design to make products that improve our world. Review the seven simple machines and allow the students the rest of the class to complete both sides of their Fundred Dollar.

The Fundred Dollar Bills will be collected for the Operation PayDirt Organization and delivered to Washington as a social action statement.

Day Three Procedures:

The teacher review day one and two. The students are divided into groups of four and five. They are asked to discuss what parts of each individual machine are the best of each design. The students are then given a large piece of mural paper and they collaborate with each other to create a team "Lead Clean Up Machine". The final team drawings are hung in the hallway with a written description.

An extension of the project could be having the students construct a 3-D prototype of their clean up machine out of collected recycled materials. They students could work independently or in groups. If time remains, the students can present their projects to the class.

Closure for each day will include the following questions:

What are the seven simple machines? Wheel and axle, screw, pulley, wedge, inclined

plane, lever, and gear

What machines have already been designed to help us clean? Vacuum, washing machine, dishwasher, car wash, street sweeper, swifter

What does the word Environment mean? - Relating to the natural world and the impact of human activity on its condition.

What is Pollution? - Poison (lead paint) that gets into the air, water, and ground

What is lead poisoning? - How can we protect our environment from lead poisoning? Lead is a dangerous element that can be in our homes through old paint.

What is Social Action or Political Art? Artwork that brings attention to a social problem

What is a collective voice? When a group of people joins together working to accomplish the same goal.

Accommodations:

Students with physical disabilities will receive markers that have been adapted with a tennis modified tennis ball. The tennis ball will have a slit cut into it and the marker inserted. This eases hand stress.
Students can be broken into diversified groups allowing students to help and learn from each other, fostering empathy and mentoring relationships.

Assessment:

Exemplary – Student freely and enthusiastically created an imaginary "lead clean up machine" that incorporates at least three simple machines. He/she has a strong understanding of the design process and the seven simple machines. The student understands that each of us has the responsibility in taking care of the planet. Students completed the "Fundred Dollar" template to contribute to Mel Chin's Operation PayDirt. Student has a strong understanding of the dangers of lead paint. Student is aware of artists being social and political activists.

Good - Student created an imaginary "lead clean up machine" but the machine does not incorporate at least three simple machines. He/she has a moderate understanding of the design process and the seven simple machines. The student is somewhat aware that each of us has the responsibility in taking care of the planet. Students completed one side of the "Fundred Dollar" template to contribute to Mel Chin's Operation PayDirt. Student has an limited understanding of the dangers of lead paint. Student is moderately aware of artists being social and political activists.

Needs Improvement - Student did not comprehend the concepts and was not able to complete the assignment or the Fundred Dollar bill.