Robots Helping Humans

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<th>National Standards</th>
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| GEOGRAPHY STANDARDS
Element Five: Environment and Society
16. The changes that occur in the meaning, use, distribution, and importance of resources | ELA Writing
Text Types and Purposes
1.W.3 Write narratives in which they recount two or more appropriately sequenced events, include some details regarding what happened, use temporal words to signal event order, and provide some sense of closure. |
| NEXT GENERATION OF SCIENCE STANDARDS
Engineering Design
K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. | Mathematics Measurement and Data
1.MD.1. Order three objects by length; compare the lengths of two objects indirectly by using a third object. |
| SOCIAL STUDIES STANDARDS
Strand 4 Geography
Concept 5: Environment and Society
PO 2. Identify ways of protecting natural resources by reusing, recycling and reducing. | Strand 5 Economics
Concept 1 Foundations of Economics
PO 2. Recognize that people need to make choices because of limited resources. |

**SIOP Elements**

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TESOL Standard(s)

Goal 2, Standard 2
To use English to achieve academically in all content areas: Students will use English to obtain, process, construct, and provide subject matter information in spoken and written form

- listening to, speaking, reading, and writing about subject matter information
- gathering information orally and in writing
- retelling information
- selecting, connecting, and explaining information
- representing information visually and interpreting information presented visually
- understanding and producing technical vocabulary and text features according to content area

Arizona English Language Proficiency Standards

Stage II
Writing
Writing Applications
Standard 1: The student will express his or her thinking and ideas in a variety of writing genres. The student will express his or her thinking and ideas by using a variety of writing genres, as demonstrated by:

B-3: completing a written summary of the key events or ideas of informational text using key words and phrases with instructional support.

Vocabulary
Standard 2: The student will acquire English language vocabulary and use it in relevant contexts.

B-4: selecting grade specific academic vocabulary and symbols within a given context.

Overview

The twenty first century has machines (robots) that can do difficult and repetitive jobs. Is this a good thing? Will machines replace people? People in the twenty first century are also worried about our wise use of resources. Will future generations have enough of everything for their lives.

Purpose

In this lesson students will learn that robots can help humans have a better quality of life by building a device that can help others. They will also learn about recycling. This lesson includes strategies for diverse learners (ELLs).

Key Vocabulary

Future: at a later time

Machine: a device that makes work easier

Replace: put something else in its place

Robot: a machine able to perform a task without human help

Recycle: to use over again

Materials

- Bubble map graphic organizer
- My Robot by Eve Bunting
Robots Help Humans

- Styrofoam cups
- Masking tape
- Twine
- How Tall is Your Robot graphing sheet
- Computer, internet, LCD projector
- Scoring Rubric for Robot Story
- Writing About Robots worksheet
- Newspaper Article about Wearable Robotic Arm (optional)
- Vocabulary cards

Objectives

The student will be able to:

1. describe how robots can help humans.
2. measure objects and compare them.
3. use the Engineering Design Process to solve a problem.
4. write a narrative.
5. identify ways to use recycled materials.
6. recognize that resources are limited.

Procedures

Prerequisite Skills: Students should have experience with measuring items prior to this lesson.

SESSION ONE

Engage:

a. Ask students to pretend they are in a classroom with a robot. Have them discuss what this might be like. (Preparation: Adapting Content, Linking to background) (Grouping Option: Whole Class)
b. Show students the video of 2nd grader using a robot to go to school. He commands the robot from home, and through the use of the robot, he is able to interact with his classmates. http://www.youtube.com/watch?v=2XaXVQV1e8Y
c. Explain to the students that their task is to create a machine that could help a student in the future. This student does not have one of his/her hands and a replacement hand could really help him/her out.
d. Explain they will work in groups of 3 to decide how to create a machine that can help a student that has a missing hand.
e. Ask groups to share out their ideas. (Integrating Process: Listening) (Grouping Option: Small Groups)
f. Give each group a sheet of paper. Have them sketch their machine that could replace a missing hand. (Application: Hands on)

Explain:

a. Ask students to share some of the ideas they sketched. (Integrating Process: Speaking)
b. Tell students that we will design a machine that will help him/her grasp objects.
c. Explain the term “end effector.” (In robotics, an end effector is a device or tool that’s connected to the end of a robot arm where the hand would be.) (Integrated Process: Listening)
d. Share NASA video about a robotic hand http://www.nasa.gov/mov/329198main_Robotic_Arm.mov
e. Review the vocabulary words used today: robot, machine, future, and replace.

SESSION THREE

Elaborate:

a. Show some images of end effectors.
b. Distribute Styrofoam cups, masking tape, and twine. Have students use these materials to build an end effector. (Application: Hands on)
c. Have groups share their end effectors. (Integrating Process: Speaking, Listening)
d. Explain the term “recycle.” Have students point out examples of materials at home that are recycled. (Integrating Process: Speaking, Listening)
e. Explain homework for one week: Have students use their sketch from Session 1 to build their robot using various recyclable materials found at home. Explain that recycling...
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materials (using materials over again) helps save the Earth’s limited resources. Have students give examples of the materials that they recycle at home. (Preparation: Linking to background)
f. Tell students to bring their robot to Session Four and give the date.
g. Review the vocabulary word used today: recycle.

SESSION FOUR
Elaborate
e. Share out robot designs and tasks the robot will be able to do.
f. In groups of five, have students put their robots in order from shortest to tallest. Model how to measure a robot and fill in the How Tall is Your Robot? graphing worksheet. (Scaffolding: Modeling)
g. Then have students measure their group’s robots using a ruler and color in their measurement data on the How Tall is Your Robot? graphing sheet.
h. Leave the robots (in the groups) in order from shortest to tallest and have students do a museum walk around the room to see each group’s robots.
i. Come together as a group and discuss the robot size data and robot features and jobs. (Assessment: Group, Written)

Evaluate:
a. After seeing each other’s robots and hearing about them, students will write a robot story. Share the requirements on the Writing About Robots worksheet:
   • How this robot will be used in the future.
   • What kinds of recycled materials were used to make the robot.
   • Why using recycled materials is a good thing. (Assessment: Individual, Written)
b. Share the Scoring Rubric for Robot Story.

Assessment

Math: How Tall is Your Robot? graphing sheet can be graded for accuracy. Of the 5 robots measured and graphed, 4 should be correctly measured and graphed.

Language: Give a vocabulary quiz over the terms: robot, replace, future, machine, and recycling. Mastery will be considered 80% or higher.

Writing: The story about the robot’s use and how it was constructed can be graded with the 6 Traits Writing Rubric in the areas of Content and Ideas. A score of 4 or higher will be considered mastery.

Geography and Economics: Students should identify the recycled materials used to make the robot and why recycling is a good practice in their stories. Use the Scoring Rubric for Robot Story to evaluate the social studies. Students should score 7 points or higher to be considered mastery.

Engineering: Collect sketches from Session 1 and evaluate students as to how they followed their design in the finished product. Students should be rated as Satisfactory (many of the elements shown in the sketch were found in the robot) or Unsatisfactory (sketch was not used). Students can also gain a Satisfactory if they comment that when they tried to build the sketched design, it did not work, so they had to modify their plans to make the robot workable.

Extensions

Discuss that if robots become commonplace in businesses, what will happen to the humans who worked there.

Share the Newspaper Article about Wearable Robotic Arm.

Sources

Websites are given above.