

NOTE: THIS UNIT WAS COMPLETED IN A DIFFERENT FORMAT, BUT IT IS A GREAT PROJECT IDEA!

Author: Pete Martin

THE BACKWARD DESIGN PROCESS

Unit of Planned Instruction: High School Students teaching Elementary Students about Robot.

Grade Level (s): 4 to 5	Projected Length of Time: 15 – 20 Days

I. Identify Desired Results

What overarching (big picture) understandings are desired? These can be stated as “essential” questions that need to be answered for the unit.

Knowledge/Skill/Process

1. What is the difference between a robot and an automated machine?
2. What are the names given to parts of a robot?
3. How are robots powered?
4. How are robots used?
5. What is the safety issues involving robots?
6. What impact will robotic technology have on the cultural values of the world?

What will students understand as a result of this unit? These should be related to the six facets of understanding: explanation, interpretation, application, perspective, empathize, and self-knowledge.

Students will understand

1. will be able to explain the practical uses of robots.
2. will be able to interpret possible careers in robotics.
3. will be able to apply the safety guidelines of robots.
4. develop a perspective of the use of robots.
5. will empathize with the cultural issues of robots in work place.
6. timeline showing the history of the robot.

Identify the Pennsylvania Academic Standards addressed in this unit.

Standard Statement	Standard Number	Statement Letter
Technological Devices	3.7.4	A
Technology	3.6.4	C
Science, Technology and Human Endeavors	3.8.4	A, B, C
Numbers, Number Systems and Number Relationships	2.1.5	C
Measurement and Estimation	2.3.5	A, B, C, E
Mathematical Problem Solving and Communication	2.5.5	B, C, F
Learning to Read Independently	1.1.5	A
Reading Critically in All Content Areas	1.2.5	A, B
Quality of Writing	1.5.5	B, E
Speaking and Listening	1.6.5	A,C,D,E,F
Research	1.8.5	A, B, C

Identify the Standards for Technological Literacy Content Standards identified in this unit.

Standard Statement	Standard Number	Benchmark Level
The cultural, social, economic, and political effects of technology. – Good and bad effects.	4	3-5
The role of society in the development and use of technology. – Changing needs and wants.	6	3-5
Assess the impact of products and systems. – Examine trade-offs.	13	3-5

How does this unit contribute to the students' overall program of planned instruction?

<p>What course does this unit fit into and how?</p> <ul style="list-style-type: none"> • Introduction to Robots • The students develop an overview of how and why robots are used in today's industry.
<p>How does this contribute to a K-12 approach To Technology Education?</p> <ul style="list-style-type: none"> • It will develop an interest in one aspect of technology education – robotics.

II. Determine Acceptable Evidence

What evidence will show that students understand how and why robots are used in industry?
(See what students understand as a result of this unit)

Performance Tasks, Projects

- Be introduced to robotics by the high school students presenting a Robot Fair demonstrating the practical uses of robots.
- Identify the parts of a robot by sketching and labeling.
- Complete a safety performance test along with robot terminology.
- Create a set of easy to understand instruction to assemble a robotic arm
- Develop a robotic arm using styrofoam, syringes, and plastic tubing.
- Demonstrate the operation of their robotic arm during a presentation attended by their families.
- Research and construct a timeline showing the history of robots.

Quizzes, Tests, Academic Prompts

- Complete a quiz on the parts of a robot.
- Evaluate robotic arm.
-

Other Evidence

(e.g. observations, work samples dialogues)

- Observations
- Completion of robotic arm.

Student Self-Assessment

Self Assess by:

- Self assess their work habits while building the robot arm.
- Self assess the function of the robotic arm.
- Self assess the interaction with the high school students.

III. Planning Learning Experiences and Instruction

Given the targeted understandings, other unit goals, and the assessment evidence identified, what knowledge and skill are needed?

<i>Students will need to know...</i>	<i>Students will need to be able to...</i>
<ul style="list-style-type: none"> • drawing skills • oral Presentation Skills • math skills • reading skills 	<ul style="list-style-type: none"> • cut and draw. • interact with high school students • correctly measure parts to assemble robot • follow directions to assemble robot arm..

What teaching and learning experiences will equip students to demonstrate the targeted understandings? Think of this as the unit outline.

<ol style="list-style-type: none"> 1. High school students will introduce the students to robots through a Robot Fair. 2. Introduce the parts of a robot. 3. Introduce how robots are powered. 4. Explain the difference between a robot and an automated machine. 5. Introduce and apply safety rules involved in robotics. 6. Explain the good and bad aspects of robotics in industry. 7. Work with a high school student to build a robotic arm. 8. Develop an oral presentation on the robotic arm for families. 9. Develop a timeline on the history of robots.
--

Rubric#1

ROBOT CONSTRUCTION

Name: _____ Date: _____

	Possible Points	Points Awarded
All Styrofoam parts cut-out correctly	10	
All wooden parts cut-out correctly	10	
Base assembled according to plans	15	
Shoulder assembled according to plans	15	
Arm assembled according to plans	15	
Gripper assembled according to plans	15	
Do all axes move freely and independently?	15	
Are syringes filled with liquid	5	
Total Possible Points	100	

Grade according to the following scale:

100-81 = excellent

80-61 = very good

60- 41 = good

40- 21 = satisfactory

20-0 = poor

Rubric #2

Robot Programming

Name: _____ Date: _____

	Possible Points	Points Awarded
Robot programming written in sequential order.	10	
Does flowchart follow a sequents of events pertaining to your robot program.	20	
Does your robot operate according to your written Program	20	
Total Possible Points	50 x 2	
Grade according to the following scale: 100-81 = excellent 80-61 = very good 60- 41 = good 40- 21 = satisfactory 20-0 = poor		

Rubric #3

Oral Presentation

Name: _____ Date: _____

	Possible Points	Points Awarded
Demonstrate operation of their robot arm	20	
Presentation was well planned and coherent.	20	
Presenter stated the importance of each axes working Independently.	20	
Communication aides were clear and useful.	20	
How well did they respond to questions.	20	
Total Possible Points	100	

Grade according to the following scale:
100-81 = excellent
80-61 = very good
60- 41 = good
40- 21 = satisfactory
20-0 = poor