Lesson Title	Sabotage Challenge
Length of Lesson	6 Days
Created By	Dustin Spayde
Subject	Robotics
Grade Level	11-12
State Standards	
DOK Level	DOK 4
DOK Application	Design, Create, Apply Concepts, Analyze, Critique, Connect
National Standards	9-12: A(Inquiry), E (technology)
Graduate Research Element	Developing Automated Systems, Programming

Student Learning Goal:

National Science Education Standards of Content 9-12
A (Inquiry): Identify questions and concepts that guide scientific investigations.
E (Science and Technology): Abilities of technological design: propose designs and choose between possible solutions, implement a proposed solution, evaluate the solution and its consequences, communicate the problem, process, and solution; Understanding about science and technology

Materials Needed (supplies, hand-outs, resources): A Lego Mindstoms NXT kit per 5 students, Access to computers (one for each group) with USB ports and the RobotC software (or other compatible language) installed on each, black tape.

Lesson Performance Task/Assessment:
Students will be broken up into small teams (groups of 4 for my class). Each team will be given a kit and told to build a robot that can complete the challenge. Teams must make and use functions in their programs. Teams must present a design review to the class before competition. Teams must also evaluate their team members.

Grading was based on 5 items:
Robot design (group grade/individual participation grade)
Design review presentation
Individual grade (evaluations)
Qualifying for competition
Challenge grade (group completion grade)

Lesson Relevance to Performance Task and Students:
An automated vehicle such as this could easy be found in many factories and ports around the world. Developing its navigation system is an applicable task for a many engineering fields. Designing, programming, and troubleshooting a robot design where

each team member is responsible for one aspect of a project, is a very realistic scenario for actual engineering work.

Anticipatory Set/Capture Interest:
Making a it a competition always captures the interest in my class

Guided Practice:
Day One: Detail rules

Independent Practice:
Day 1: Students must first build a robot

Day 2,4-5: Students must program their functions and work together to complete the overall challenge.

Day 3: Design Review Presentations

Day 6: Competition

Remediation and/or Enrichment:
Remediation: individual IEP; partner help throughout lesson; shorten parts of assignment; focus upon smaller elements of the process

Enrichment/Extension:
Allow faculty and other guest to be part of the design review process

Check(s) for Understanding:

Day One: Do all groups have the basics of their robot design worked out?
Day Two: Have all students begun tested their programs? How can you improve your robot's performance? Is your robot/program over complicated?
Day Three: All groups should have the completed the challenge using only their functions?

Closure:

Ask which design is the best and why?

Possible Alternate Subject Integrations:

*Math – can manipulate mathematical expressions to isolate needed variables

*Programming – Basic logic and algorithm models

Teacher Notes: below is a picture of the course I designed for this lesson. It requires the robot 2 differently designed robots (Robot A & Robot B). Robot A is holding a frame of a box on top of it at a set height with nothing else above the level the box is resting on. Robot A's task is to deliver the box from square A to the End w/o stepping on an X. Robot B's task is to have arm/hook device and use it to steal the box. B may start at either B square. B does not have to deliver the box, but must devise a way to locate Robot A.

A			X	B
X	X		X	
			X	
	X			
			X	
	X			
			X	X
	X			
	X		X	
B				End