

## INSPIRE GK12 Lesson Plan



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

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**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