Gr. 8 - Understanding Structures & Mechanisms

Systems in Action

Hovercraft

Specific Expectations:

1.2 Assess the impact on individuals, society, and the environment of alternative ways of meeting needs that are currently met by existing systems, taking different points of view into consideration.

2.1 Follow established safety procedures for working with apparatus, tools, materials, and electrical systems.

2.4 Use technological problem-solving skills to investigate a system that performs a function or meets a need.

2.5 Investigate the information provided to consumers/clients to ensure that a system functions safely and effectively.

3.3 Identify the various processes and components of a system.

3.7 Explain way in which mechanical systems produce heat, and describe ways to make these systems more efficient.

3.9 Identify social factors that influence the evolution of a system.

Big Idea (for lesson):

Students explore a ways to overcome friction and fluid drag by looking at, designing, and building hovercrafts.

Accommodations:

- ☒ Increase time
- ☒ Visual Aids
- ☒ Manipulatives
- ☒ Chunking
- ☒ Step-by-Step
- ☐ Scaffolding
- ☒ Copy of Notes
- ☒ Student Grouping

Differentiated Instruction:

- ☒ Content: Use demo to show the content as you offer verbal descriptions.
- ☒ Process: Have students work in pairs and support each other if physical impediments exist.
- ☒ Product: Students may submit their final product in pairs, and communicate their findings either verbally, visually, or through written means.
- ☐ Other: _____

Bloom's Taxonomy:

- ☒ Knowledge
- ☒ Comprehension
- ☒ Application
- ☒ Analysis

Multiple Intelligence:

- ☒ Verbal/Linguistic
- ☒ Logical/Mathematical
- ☒ Visual/Spatial
- ☒ Bodily/Kinesthetic

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☒ Synthesis	☒ Naturalist
☒ Evaluation	☐ Musical/Rhythmic
	☒ Interpersonal
	☒ Intrapersonal

Delivering The Lesson:

Portion & Timing	Grouping:			Introduction:	Materials
Minds On: 5 mins	W ☒	S ☐	I ☐	Teacher asks class some introductory questions: -How can two surfaces have no friction between them? (*Answer: if they aren't touching.*) -Can you think of a some mechanism that eliminates friction during its motion by creating space between itself and other surfaces? (*Answer: Hovercrafts!*) Show the LEGO hovercraft, and demonstrate its abilities on different surfaces.	-Demo: LEGO Technic – Hovercraft (42002)
Action: 30 mins	W ☒	S ☒	I ☒	Have students build their own hovercraft according to the instructions on the handout. Compare performances of hovercrafts and consider the differences in design: How did more or less holes affect the hovercraft's performance? Teacher can circulate and ask questions of the different groups: -What are the advantages of multiple holes? (*Answer: Air escapes more quickly, so hovercraft is lifted higher and glides better.*) -What are the advantages of only one hole? (*Answer: Air escapes more slowly, so the balloon supply lasts longer.*)	-Hovercraft – Handout -Balloons, sticky tack, CDs, snappy cap, tape, toothpick.
Consolidate: 5 mins	W ☒	S ☒	I ☐	Teacher prompts some open discussion with the following questions: -Are any ways they could have improved their design? (*How about a way to keep air flowing because the balloon runs out quickly?*) -What changes could be made for a	Hoverspeed-Hovercraft-Arriving-in-Calais.mp4

				hovercraft to carry heavy cargo? -Teacher can show the class a video of the Hovercraft ferries that crossed the English Channel until 2000. -For homework, ask students to brainstorm and create a blueprint of a new hovercraft design that can lift heavy loads.	
Extension! Several Days/1 Period	W ☒	S ☐	I ☐	Building Project: Work as a class to make your own, RIDEABLE hovercraft! The following websites outline the procedure very easily. 1. http://www.sciencebuddies.org/science-fair-projects/project_ideas/Aero_p036.shtml#summary 2. http://spaceflight.nasa.gov/brainbite/rocketscience/hovercraft/ 3. Important Hovercraft Safety Guidelines are at the bottom of the following website http://www.sciencebuddies.org/science-fair-projects/project_ideas/Aero_p036.shtml#procedure	-Requires adult supervision always. -Safety goggles -Power Tools -For materials list, refer to websites. -Refer to "Important Hovercraft Safety Guidelines".
				Research Project: -Who was Christopher Cockerell? -How did he make his first model of a hovercraft? -How have the uses of hovercrafts changed over the years?	