



Teacher Name(s):	Lynn Petkewich
School and District:	Lynn Classical High School / Lynn Public Schools
Course:	Pre-Engineering Drawing

Abstract: In 200 words or less, please provide a summary of the goal for the lesson extension and its relationship between industry and academic topic.

Engineering/Technology Link:

- How did you *introduce* engineering/ technology concepts or the company/industry focus in your course? Check the appropriate box(es) or choose Other.
 - Defined terms (science, engineering, technology)
 - Described the engineering design process
 - Engineering design challenge related to industry
 - Overview of the company
 - Challenge based on 'industry specific' area of focus (manufacturing process, quality control, measurement, development, teamwork etc.)
 - Other: _____

Level of Inquiry: Which of the following best describes the level of inquiry (adapted from Bell 2005) you used for this lesson/unit? Check the appropriate level.

- Structured inquiry:* Instructor provides question and procedure. Students determine the results based on given procedures.
- Guided inquiry:* Instructor provides question. Students design procedure and determine the results.
- Open inquiry:* Students investigate their own research question. Students design procedures and implement the procedure on their own.

Amp It Up! Engineering/Technology and Industry Lesson Extension

Student Assessment:

Students thought the project was fun.

Delivery Assessment:

The creativity of the students was amazing.

Additional resources and assessments: Attachments should include handouts, readings (with references), lab write-ups, rubrics, exams/quizzes, and/or other similar materials.

Description:

This project in the Pre-Engineering & Drawing course relates to the GE Aviation industry in that the software the students use to draw their prototype and the process the students follow, are similar to the CAD software and the design process used at GE Aviation [Design, Manufacture, Assembly/Test, Flight Service Center, Program Management, Customer Support].

As with GE, engineering design involves practical problem solving, research, development, and invention/innovation. It requires designing, drawing, building, testing and redesigning. Students should demonstrate the ability to use the engineering design process to solve a problem or meet a challenge. Students are made aware that it is okay to fail in their design, in that, that's what the Engineering Design Process is about- they will learn from their mistakes, document, improve, test, redesign.

Learning Objective:

Student use the 8 Steps of Engineering Design Process to solve the problem [Float My Boat]:

1. Identify the Need or Problem
2. Research the Need or Problem
3. Develop Possible Solution(s)
4. Select the Best Possible Solution(s)
5. Construct a Prototype
6. Test and Evaluate the Solution(s)
7. Communicate the Solution(s)
8. Redesign

Essential Vocabulary:

Engineering Design Process, Prototype, Evaluate, Redesign

Materials Needed: Scissors, Tape, Stapler, Ruler, Paper, Straws, Drawing

Learning Experience(s):

- Your results should include amount of time, if at all, your boat floated (right side up) and how much weight it could hold and float (suggestions for objects for the boat weight are paper clips, erasers, coins, candy).
- Students will use a sink filled with water to test their designs.
- Possible solution will be presented. Prototype will be created, tested, evaluated and redesigned if necessary, according to the 8 Steps of Engineering Design Process.

Assessment:

- Students will create a prototype, test and report results. (Boat)
- Students will use MS Word to list and explain [2-3 sentences per step] the 8 steps of the engineering design process used to implement the prototype.
- Students will use TurboCAD software to design the prototype with measurements, geometric shapes, line widths, line formatting and color, and text labeling.

Building A Structure: Float My Boat

CRITERIA	Effective Team Member	Self-directed	Attains Goals	Student Grade
Remarkable 4	Always Contributes as productive and cooperative member in the design, documenting and implementation of the prototype to enhance the goal outcome.	Always The boat prototype provides clear evidence of troubleshooting, testing, and refinements based on data or scientific principles.	Always The TurboCAD drawing is neat with clear measurements and labeling of all components.	
Acceptable 3	Frequently Contributes as semi-productive and cooperative member in the design, documenting and implementation of the prototype to enhance the goal outcome.	Frequently The boat prototype provides clear evidence of troubleshooting, testing and refinements.	Frequently The TurboCAD drawing is neat with clear measurements and labeling of most components.	
Making Progress 2	Inconsistently Contributes toward the goal outcome of designing, documenting and implementation of the prototype.	Inconsistently The boat prototype provides some evidence of troubleshooting, testing and refinements.	Inconsistently The TurboCAD drawing provides clear measurements and labeling of most components.	
Starting Out 1	Rarely Contributes toward goal accomplishment of designing, documenting and implementation of the prototype.	Rarely The boat prototype provides little evidence of troubleshooting, testing or refinement.	Rarely The TurboCAD drawing does not show measurements clearly or is otherwise inadequately labeled.	

**Student's
Reflective
Assessment**

Teacher Assessment